

SOME EFFECTS OF FIRE SUPPRESSION AND PRESCRIBED BURNING ON BIRDS AND SMALL MAMMALS IN SAGEBRUSH

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Introduction

Ecosystems in northwestern Wyoming have remained relatively unperturbed by fire for the last 70-80 years. Recently a fire management plan was implemented in the Teton wilderness allowing natural fires to burn, and similar plans are being developed for other wilderness areas in Wyoming and central Idaho. Large portions of these areas consist of sagebrush (Artemisia tridentata) communities where natural fires frequently occur.

Prescribed burning in sagebrush is also an expanding program in this region. Burning is often used to reduce sagebrush densities, increase forage production for livestock and improve certain wildlife habitat. Plans to use prescribed fire to simulate the ecological effects of a natural fire regime in Jackson Hole are also being developed. These plans are based on the contention that fires are necessary to maintain diversity within many ecosystems of the Jackson Hole region, and the exclusion of fire has resulted in increased areas occupied by sagebrush communities.

Studies of the effects of fire in sagebrush on consumers, including both invertebrates and vertebrates, are virtually non-existent. Even for some of the more conspicuous groups like birds, the best available information on response to shrub habitat alteration comes from studies on the effects of herbicides.

This study was designed to explore the response of bird and small mammal density and diversity to fire. Field operations were based from the JHBRs at Moran, Wyoming.

Results

Bird and small mammal communities were studied in a fire suppressed sagebrush ecosystem and on two sagebrush prescribed burns, one spring burn and one fall burn. Breeding bird density and diversity were positively correlated with increasing vegetation cover and diversity, and were directly related to the destruction of suitable nesting habitat. Non-breeding birds were inversely related to increasing vegetation structure due to more favorable hunting and foraging conditions following the removal of sagebrush and litter by the fire.

Total bird density was reduced following both burns and returned to preburn levels three years after spring burning and two years following fall burning. Total bird species diversity was significantly higher ($P < .05$) during the first postburn year on both burns, and returned to control values after two years. Seasonal changes in total diversity on both burns were due to non-breeding bird species richness.

The contribution of non-breeding birds to the total avifauna based on occurrence and abundance was highest in the early post-fire stages and decreased with time. Bird communities on the burns were less similar (based on occurrence and abundance) to avifaunas on the unburned control and became more similar with time.

This study indicates that changes in bird density and diversity following prescribed burning of sagebrush are short-lived, suggesting that the bird community in a fire suppressed mountain big sagebrush ecosystem is highly resilient to fire perturbation.

Small mammal species composition, total density and biomass changed little in the unburned sagebrush while individual species capture rates varied considerably. Stomach contents analysis indicated that the small mammal community is generalized (diversified) in its food habits although individual species are somewhat specialized.

Following spring burning the number of small mammal species, total density and biomass were slightly lower than control levels, and returned to unburned levels after three years. Small mammals shifted their food habits slightly in response to an increased availability of food types on the burn.

Species richness was greatly reduced on the fall burn in the first post-burn year. Species with specific niche requirements were unable to sustain populations on the fall burn. Two years after burning, four species were captured, although only two (Peromyscus maniculatus and Spermophilus armatus) were caught in live traps. Total small mammal density increased dramatically in the first postburn year and decreased during the second year but was still significantly higher ($P \leq .10$) than the unburned density. These large increases were due to increased numbers of transient individuals from the surrounding habitat. Food use patterns on the fall burn were similar to those on the spring burn where small mammals utilized their preferred food types in relation to its abundance or availability. These results support the contention that total small mammal numbers are not depleted by fire, but that there is a change in species composition.

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