

Pacific Southwest Research Station

Sierra Nevada Research Center

Small mammal and truffle response to burning in mixed-conifer forest

The Research:

There is little information to the effects of fuel reduction treatments on wildlife and their food webs. In previous research we found the abundance and diversity of truffles, a key food source in forest food webs, decreased as the intensity of fuel treatment increased. This short-term (≤ 2 years) response, however, may change as truffles, small mammal populations, and forest habitat rebound from prescribed fire and thinning treatments. Using a field experiment with fuel treatments completed in 2001, we are examining whether the intensity of fuel reduction influences this food web by measuring small mammal and truffle abundance, truffle consumption, and habitat variables in replicate plots 5-7 years following burning and thinning treatments. We are comparing the response of the northern flying squirrel (*Glaucomys sabrinus*; a truffle specialist) and the lodgepole chipmunk (*Neotamias speciosus*; a dietary generalist) to assess how these ecologically distinct species respond to six different levels of fuel treatment. Changes in the abundances of these two species may significantly influence predators that rely on them, such as the California spotted owl, northern goshawk, and Pacific fisher. Forest managers working with the Teakettle Experiment have urged this study of forest food webs to understand the potential impact of fuel reduction treatments on sensitive species in California's Sierra Nevada.

Objectives:

Our research objective is to test whether the effect of fuel treatments on forest food webs is dependent on treatment intensity, such that high-intensity treatments (overstory thin, combined thin and burn) generally have a negative impact and low-intensity treatments (burn only, understory thin only) have a positive or neutral effect.



Photo: Bill Laudenslayer



Our Mission:

Sierra Nevada Ecosystems are complex and our knowledge of them is incomplete. As a result, the long term outcome of any given land and resource management strategy is uncertain. We will provide assistance to land managers and policy makers by addressing this management dilemma through targeted research, emphasizing an integrated, ecoregional approach to examine particular physical, ecological, and socio-economic issues, across a range of appropriate spatial and temporal scales specific to each issue.

This unit will represent the collective research expertise and interests of scientists located in Fresno, Davis and Albany as well as other scientists within the Pacific Southwest Research Station. With a full spectrum of research, from long term, fundamental research to short-term, tactical applications, this Center is intended to support conservation, restoration, and sustainable utilization of the lands within the Sierra Nevada ecoregion.



USDA Forest Service
Pacific Southwest Research Station
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Objectives:

Specifically, we predict the following mid-term responses:

- 1) truffle abundance and northern flying squirrel capture rates, habitat use, and truffle consumption decline with increasing disturbance intensity;
- 2) capture rates of lodgepole chipmunks, availability of non-truffle foods (e.g., seeds, fruits), and consumption of non-truffle foods by chipmunks increase with disturbance intensity;
- 3) the burn-only treatment has a negative short-term but no lasting impact on all food web variables;
- 4) thin-only treatments will have a lasting negative impact on all food web variables, primarily due to slower recovery of flying squirrel and truffle-related stand variables.

Application of Research Results:

Managing fuels treatments is an immediate focus of many forestry practices, but the public is often very concerned about potential impacts on wildlife habitat and forest health. Very little information is available about how different fuel treatment prescriptions affect forest food webs and how these changes impact wildlife abundance and habitat use. Much of the controversy over fuels treatments has focused on the perceived negative effects of fire and thinning disturbances on wildlife, despite the fact that these forests had a historic disturbance regime of frequent, low-intensity fire. Immediate effects of fuel treatments are likely to reduce wildlife abundance as animals adjust to new forest conditions. This immediate response may reinforce perceptions that fuel treatments are disruptive of a delicate balance supporting wildlife and their habitat. A longer, intermediate-term response, however, may provide important information regarding the resiliency of forest food webs to different treatments that approximate or depart from historic disturbances to which wildlife are adapted.

Science and management information from this project has and will continue to be presented to the general public, and education and management organizations. This research will benefit USDA Forest Service fire and land management personnel through presentations and reports as well as researchers at the Pacific Southwest Research Station, University of California Davis, and other academic and research institutions.

Location:

Our primary study is located at the Teakettle Experimental Forest in the southern Sierra Nevada (Sierra National Forest; 1800-2400 m elev., 36°58' N latitude and 119°2' W longitude). Other research (e.g., fire effects on truffle biodiversity) is located various areas of Yosemite National Park.



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