Are Mice Eating Up All the Pine Seeds?

Rafal Zwolak, Kerry Foresman, and Elizabeth Crone, Division of Biological Sciences, University of Montana, Missoula, MT; Dean Pearson and Yvette Ortega, Wildlife Biologists, Wildlife and Terrestrial Habitats Science Program, RMRS, Missoula, MT

Wildlife, even miniscule mice, can play an important role in forest regeneration and composition by consuming seeds, seedlings, and saplings. Mice can, through sheer numbers, consume a tremendous number of seeds. We wanted to learn if deer mice could affect how ponderosa pine forests regenerate after fire.

(above) Rafal Zwolak recording data on seedling establishment in a pair of experimental cages. In 2007, seedlings emerged only in those cages that excluded mice. The experiment will be continued in 2008. (Photo by Leigh Ann Reynolds) (left) Don't be misled by their small stature! Abundant and voracious, deer mice are capable of exerting strong ecological influences. (Photo by Rafal Zwolak)

In the late 1800s, ponderosa pines commonly formed open, park-like forests at lower elevations in the West. Today, these forests are often overrun with shade-tolerant Douglas-fir trees that suppress the pines and increase the risk for stand-replacing fires. Historically, frequent, low-intensity fires were thought to maintain the dominance of ponderosa pines by periodically killing Douglas-firs. Although efforts are underway to return fire to the landscape to restore ponderosa pine forests and reduce the risk of stand-replacing fires, widespread house building around forests limits the use of fire and therefore limits the modern role of fire in these systems. This exclusion of fire requires that we understand how other forces may influence the composition of trees and rate of succession.

In the West, small mammals like deer mice are voracious seed predators that could greatly influence tree regeneration and forest composition. Deer mice numbers increase following disturbance and deer mice tend to select larger seeds over smaller ones. Therefore, they could affect both the rate of tree regeneration following disturbance and the relative abundance of Douglas-fir versus ponderosa pines by targeting the larger ponderosa pine seeds. To better understand the role of these mice in affecting tree regeneration and tree species composition following disturbance, we monitored deer mouse populations

(continued on page 12)

Meet BEMRP's Executive Committee

BEMRP is a multi-disciplinary partnership that brings together scientists from the U.S. Forest Service Rocky Mountain Research Station and the University of Montana, together with managers from the Bitterroot National Forest and Northern Region.

Greg Jones—RMRS Human Dimensions Science Program
Krista Gebert—RMRS Human Dimensions Science Program
Mick Harrington—RMRS Fire, Fuels, and Smoke Science Program
Ward McCaughey—RMRS Forest and Woodland Ecosystems Science Program
Alan Watson—Aldo Leopold Wilderness Research Institute
Dean Pearson—RMRS Wildlife and Terrestrial Habitats Science Program
Jim Burchfield—The University of Montana College of Forestry and Conservation
Sue Heald—Bitterroot National Forest
Chuck Oliver—Bitterroot National Forest
Dan Ritter—Bitterroot National Forest
Kerry McMenus—Northern Region Office

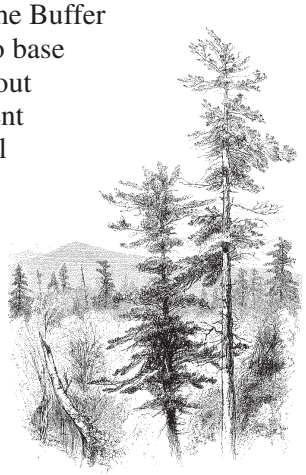
Mapping Cultural Values . . . (from page 4)

On the Reservation, we found that the primary meanings Tribal members associate with the Buffer Zone are wilderness protection, wildlife and water quality, access and functional attachments (such as a source of medicinal plants), recreation and scenic values, and personal and cultural meanings symbolic of long-term associations with nature in the Northern Rockies. We used a computer-based mapping exercise to develop 154 community resident maps of important places in the Buffer Zone across these five types of meanings. The map on the bottom of page 4 represents an overall average of those maps.

We also asked study subjects to identify major threats they perceive to these meanings. Initial analysis reveals that residents perceived four primary categories of threats to the meanings they attached to the Buffer Zone: wildfire, intense logging, roads and development, and off-highway vehicle use. The threat of wildfire was broadly recognized by many subjects and blamed on years of fire restriction, resulting in the feeling that now uncontrolled fires would be disastrous due to over-stocked or dense vegetation.

Logging also was commonly listed among threats, giving rise to the dilemma that Tribal resource managers face. Specifically, people expressed fears about intense logging, extreme logging, commercial logging, and large scale logging, suggesting that people are more threatened by the scale and intensity it might entail than the logging itself.

Residents are also concerned about other threats to the Buffer Zone such as perceived increases in road access, subdivision of property, and ATV and motorcycle use on and off roads. Some miscellaneous threats attached to specific areas in the Buffer Zone were cattle grazing, recreation over use, horses, litter, weeds, impacts to water quality, and insect outbreaks. While many of these threats exist at a large scale, many were attached to specific places in the Buffer Zone, providing opportunity to base discussions with the public about priorities for future management actions. BEMRP scientists will continue to facilitate interaction between forest managers and the public as proposals are developed in 2008 to reduce fire hazard, increase forest health, and restore the natural role of fire on Tribal lands.



Mice . . . (from page 8)

following natural wildfire, evaluated deer mouse seed predation on Douglas-fir and ponderosa pine seeds, and determined whether seed predation affected tree regeneration.

At two different sets of study sites on the Lolo National Forest, we confirmed that deer mouse populations increase dramatically in the first years after forest fires. At one set of study sites, we put out ponderosa pine and Douglas-fir seeds in trays to evaluate deer mouse seed selection. We also placed seeds on the ground in cages that either allowed or precluded mouse access to evaluate the effect of seed predation on seedling recruitment. Our preliminary data indicate that 1) mice did not exhibit size-dependent seed selection, i.e., mice consumed Douglas-fir seeds as readily as ponderosa pine seeds, 2) mice consumed large numbers of both seed species, and 3) seed predation by mice greatly reduced recruitment of seedlings for both species. Thus, mice may influence the *rate* of post-fire regeneration, but not the *trajectory*, meaning the direction the system is going such as toward a forest dominated by one tree species over another. When finished, our study will improve our understanding of animal-plant interactions in western forest succession and determine whether deer mice warrant special management in regenerating forests.

What Kind of Cutting . . . (from page 7)

possible to improbable. The crowning index (wind speed at which fire will spread in the tree crowns) almost tripled in the OT plots from 12 to 34 mph with thinning but changed minimally (17 to 19 mph) in the UC treatment. This contrast reflects the large and small canopy fuels changes for the OT and UC plots, respectively.

Therefore, models show that surface wind speeds increase as a result of thinning, which in turn leads to an increase in surface fire intensity. However, this expected fire intensity increase should not result in increased crown fire potential. Instead, reductions in canopy fuel quantities and increases in canopy base heights in the OT treatment results in a low probability of crown fire spreading or even initiating. Increases in canopy base heights with removal of ladder fuels in the UC treatment greatly reduce the chance of crown fire initiation. But with the overstory fuels virtually unaltered, the likelihood of crown fire spread remains unchanged. So, the trade-off for increased fire intensity is a substantial decrease in crown fire potential.