Research Project: Sheep Grazing-Rangeland Ecology Relationship

Location: **Dubois, Idaho**

Title: Effects of Grazing after Fire in Sagebrush Steppe Communities

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Interpretive Summary: Federal land management agencies have instituted mandatory rest from grazing after fire on rangelands that they manage. No research has been conducted to determine whether this rest is beneficial to the plant community. Our study determined the change in numbers of key plant species (threetip sagebrush, tapertip hawksbeard, arrow leaf balsamroot, antelope bitterbrush, and downy brome) caused by differences in the length of the rest from grazing after a wildfire that burned at the USDA-ARS U.S. Sheep Experiment Station near Dubois, ID. A preliminary analysis of the data reveals that tapertip hawksbeard, an important range species, was larger in the fall and non-grazed paddocks, bitterbrush, another important range species was reduced in fall grazed paddocks, and threetip sagebrush and downy brome densities were not altered in the grazing treatments. The results of this study will have implication for management of rangeland after fire in the sagebrush steppe.

Technical Abstract: The ecological implications of livestock grazing after fire on rangelands are not well known. Few studies have addressed the influence of post-fire grazing in sagebrush steppe communities, yet federal land management agencies place mandatory rest from grazing after fire. This study examines the ecological impacts of seasonal grazing 1, 2, and 3 years after fire on: a) sagebrush recruitment, b) abundance of downy brome and other noxious rangeland weeds, and c) persistence of native forbs and grasses. Research was conducted from 2001 to 2004 in southeastern Idaho in cooperation with the USDA-ARS U.S. Sheep Experiment Station near Dubois, ID. The research site was burned by a wildfire in July 2000. Six grazing treatments were applied with 4 replications per treatment resulting in 24 paddocks (about 2.7 ha/each). Sheep grazed for 5 to 8 days at a stocking rate sufficient to remove 40 % of available biomass. We examined density of threetip sagebrush (Artemisia tripartitia), tapertip hawksbeard (Crepis acuminata), antelope bitter brush (Purshia tridentata), and downy brome (Bromus tectorum) and measured canopy cover of all herbaceous plants throughout each paddock. Preliminary analysis of density measurements revealed a trend for increased tapertip hawksbeard density in control and fall grazed paddocks versus spring grazed paddocks ($p < 0.10$). A reduction in density of bitterbrush is evident in fall grazed

paddocks versus spring grazed paddocks (p = 0.05). No differences in density of threetip sagebrush or downy brome were observed among treatments. Results from measurement of cover and implications for management will also be discussed.

Biodiversity rebounds after wildfire - Up From the Ashes

During the summer of 2000, a wildfire blazed through 500 hectares of grazingland at the Agricultural Research Service's U.S. Sheep Experiment Station (USSES) near Dubois, Idaho. That fire has sparked new research on the effects that grazing animals have on rangeland biodiversity and its recovery after wildfires.

Currently, there is much debate among scientists and others about how grazing affects diversity of plant species growing in grazed areas. Some say grazing is harmful; others claim it neither helps nor hurts; and still others insist it can be beneficial if managed correctly. But little data has actually been collected until now.

"When the 2000 wildfire burned through the station, it destroyed half of a long-term study," says Gregory Lewis, USSES' research leader. For more than 50 years, USSES scientists had been analyzing the effects of grazing at different times of year and the effects these grazing periods had on the plant community.

During the long-term study, some pastures were grazed only in the spring, others only in the fall. The control pastures weren't grazed at all, and after 50 years, they had been taken over by a heavy canopy of sagebrush. The fall-grazed pastures had less sagebrush and more perennial forbs, while the spring-grazed pastures had less forb cover and increased grass and sagebrush.

Forbs are broadleaf plants that don't have woody stems and include perennial plants such as arrowleaf balsamroot and tapertip hawksbeard.

Rangeland scientist Steven Seefeldt says that when the 2000 fire roared through, the ungrazed pastures fared the worst. According to Seefeldt, "There wasn't a green thing left. The fire took it all to the ground."

The spring-grazed plots fared a little better--between 3 and 5 percent of the area was not burned. By far, the fall-grazed pastures fared best, with between 15 and 20 percent of the area remaining unburned.

Species: Variety vs. Abundance

Since the fire, Seefeldt and USSES technician Scott McCoy have been recording the types of vegetation that are growing back in the different pastures.

"The number of species each pasture supports now is virtually identical," says Seefeldt. The formerly fall-grazed and ungrazed pastures currently support 70 species each, and the formerly spring-grazed pastures support 69.

The differences become noticeable when the relative abundance of each of the species the pastures support is taken into consideration. Seefeldt and McCoy say that more of the spring-grazed land is now taken up by invasive and annual species.

This research will add important information to the debate about the consequences of grazing--and its timing--on biodiversity.

To Graze or Not To Graze ...

In a related study, Seefeldt is looking at the effect sheep have on rangeland when they're allowed to graze relatively soon after a wildfire.

Seefeldt explains that in the past decade, hundreds of thousands of hectares of rangeland in the western United States have burned in wildfires. To allow these areas time to recover, land managers usually prohibit livestock from grazing on them for 2 to 3 years. Unfortunately, in many cases, the land is taken over by exotic invasive weeds before livestock are reintroduced. The invasive weeds can crowd out native vegetation, change fire frequency, decrease palatable forage for native animals, and increase soil erosion.

The research currently available regarding when to begin grazing again on burned areas does not take into account growth and development of invasive weeds and their effects on native plants. To address this lack of data, Seefeldt has teamed with Karen Launchbaugh, a professor of rangeland ecology at the University of Idaho.

Woolly Weed Whackers

Sheep are efficient foragers and, unlike cattle, can thrive on a fair number of invasive weeds, such as leafy spurge and spotted knapweed. After the fire of 2000, Seefeldt says the experiment station had a great opportunity to determine which plants would take root most quickly after a fire and to find out how grazing animals such as sheep would affect the rangeland's recovery.

He hypothesized that if sheep were allowed to graze relatively soon after a fire, a higher percentage of invasive plants would be eaten, giving native vegetation the time it needed to reestablish itself.

If Seefeldt's hypothesis turns out to be correct, sheep producers could benefit just as much as native plant species. They could offer their animals' services as rangeland rehabilitators after a fire.

The idea of using sheep as biological control agents for weeds has precedent. In Canada, some producers are paid as much as $5 per sheep per month to have their animals graze on lands that are part of reforestation projects. Both the producers and the land managers benefit in this situation. The sheep get paid to eat, and the land managers spend much less money than they would have on herbicides or mowing. Also, sheep can be herded to where they're needed most--unlike insect biocontrol agents. When the season's over, their wool, meat, and lanolin can be sold for profit.