Loss of Critical Browse Communities on the Charles Sheldon National Wildlife Refuge

Charlie D. Clements and James A. Young
USDA-ARS 920 Valley Road Reno, NV 89512

Introduction

The loss of critical browse communities is a significant factor in the decline of mule deer (*Odocoileus hemionus*) herds throughout the western United States. Mule deer are currently the only declining big game species in North America. Mule deer are browsers and therefore benefit when browse species such as antelope bitterbrush (*Purshia tridentata*), big sagebrush (*Artemisia tridentata*), mountain mahogany (*Cercocarpus ledifolius*), and other woody species are productive components of their range **(Figure 1)**. All of these critical browse species have limited, or no sprouting following burning in wildfires. In the more xeric environments, the invasive annual cheatgrass (*Bromus tectorum*) has invaded millions of acres of rangelands. Cheatgrass provides a fine textured, early maturing fuel that increases the chance, rate and spread of wildfire. The invasion of cheatgrass has significantly reduced the fire frequency from an estimated 80-110 years down to 5-10 years in many habitats **(Figure 2)**. In the more mesic environments, the reduction or change in grazing management has resulted in the increase of perennial grasses and the build up of fuels. On the Charles Sheldon National Wildlife Refuge, livestock were removed in 1991. The removal of the livestock resulted in an increase in density and cover of perennial grasses that provided the continuity of fuels that allowed the fire to burn from shrub to shrub and build into a firestorm **(Figure 3)**. The result was the conversion of productive browse communities into perennial grass dominated landscapes. Perhaps this is how the landscape appeared prior to European contact.

Figure 1. Mule deer herds are very dependent on productive browse species such as antelope bitterbrush and big sagebrush.

Figure 2. Wildfires annually burn thousands of acres of critical browse communities.

Badger Mountain Case Study

The Badger Mountain unit of the Refuge experienced wildfires in 1994, 1997, and 2000. The 1994 wildfire burned excellent stands of antelope bitterbrush, big sagebrush, and mountain mahogany. In 1996 the recruitment of antelope bitterbrush throughout the burned habitat was very promising, but the 1997 wildfire not only burned thousands of acres of critical habitat adjacent to the 1994 burn, but also much of the previously burned habitat that was in the process of restoring itself. The 2000 wildfire burned thousands of acres of critical browse communities adjacent to the 2 previous wildfires leaving a large continuum of habitat void of any productive woody browse species. With each wildfire more and more habitat that provided a seed source for the recruitment browse species was burned. Before the 1994 wildfire the density of shrubs was over 6,000 per acre **(Figure 4)**, now more than 10 years later the shrub density is just under 1,200 **(Figure 3)**. The fear is that a wildfire will reoccur before the shrub density can even reach 50% of pre-burn densities due to the significant fuel loads provided by these dense perennial grass stands. The loss of mountain mahogany is most disturbing as there is almost complete absence of any recruitment.

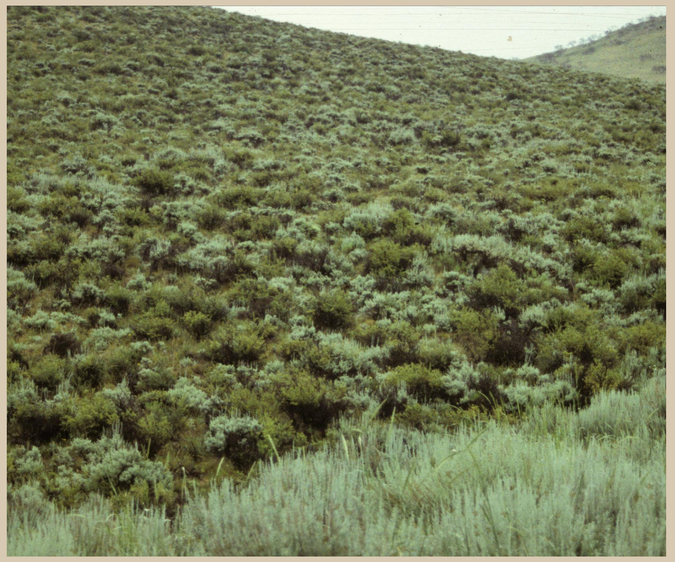

Figure 4. A very productive antelope bitterbrush and big sagebrush community on Badger Mountain prior to being burned in a wildfire.

Conclusions

The Badger Mountain unit of the Refuge illustrates one example of the loss of critical browse communities that often go unnoticed. One of the reasons for this has to do with the simple fact that the removal of livestock has imbedded in the minds of resource managers that the removal of livestock resulted in "*Rangeland Health*", what is apparent is the loss of very healthy browse communities. The loss of these browse communities leave an empty plate scenario for wintering mule deer herds and other wildlife species **(Figure 5)**. This is not to say that these critical browse communities are lost forever, but most authorities agree that for most big sagebrush communities the dominance of shrubs increases with domestic livestock grazing and conversely tends to decrease with prolonged protection from such grazing, but shrubs never completely disappear from the community. Mule deer are not the only species of concern, sage grouse (*Centrocercus urophasianus*) and pigmy rabbits (*Brachylagus idahoensis*) are just a couple of examples of other wildlife species that depend on these shrublands. Antelope bitterbrush recruitment is closely related to the caching activities of granivorous rodents, therefore given a seed source these rodents play an active role in the distribution and caching of antelope bitterbrush seed. Sagebrush on the other hand does not have an active wind or granivore seed dispersal system, and it does not build persistent seedbanks, so the recruitment of sagebrush back into these large burned landscapes is a very slow process. Mountain mahogany has an excellent wind dispersal system and may very well be harvested and dispersed by granivorous rodents, but the recruitment of mountain mahogany is absent not only in burned habitats of the Badger Mountain unit but many other burned sites in the Intermountain West. Resource managers must be aware of the slow rate of return of these critical browse species following wildfire. The interactions among grazing management, perennial grasses, critical browse species, and the interval between wildfires is a complex issue that resource managers and researchers must address if the decline in mule deer is to be reversed.

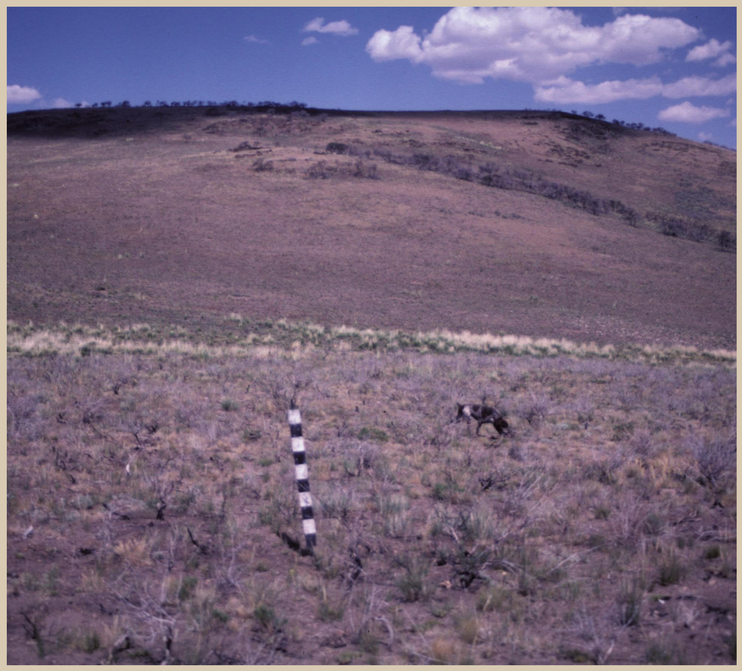

Figure 3. Formerly, a very productive and critical antelope bitterbrush, big sagebrush, and mountain mahogany habitat burned and converted to perennial grass dominance.

Figure 5. The loss of critical browse communities can have significant impacts on wildlife, especially during winter months.

Suggested Reading

Clements, C. D. and J. A. Young. 1997. A Viewpoint: Mule Deer Habitat and Rangeland Health. J. Range Manage. 50:129-138

Wright, H. A. 1980. The role and use of fire in the semi-desert grassland type. **In:** Gen. Tech. Rpt. 85. USDA, Forest Service, Ogden, UT

Young, J. A. and R. A. Evans. 1989. Dispersal and germination of big sagebrush (*Artemisia tridentata*) seeds. Weed Science 37:319-325.