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WILDLIFE DIVERSITY IN SAGEBRUSH HABITATS

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Introduction

The sagebrush-dominated area of the West covers approximately 155.5 million acres (Paige and Ritter 1999). Although sagebrush communities have undergone much change in modern history, the boundaries of sagebrush distribution have remained fairly constant. Vale (1974) examined 29 historic journals and diaries from the early 19th century and concluded that shrubs visually dominated presettlement vegetation in much of the Intermountain West, with much of the area covered by thick brush stands. However, according to Miller and Eddleman (2001), fire influences caused plant composition to vary from dominant stands of sagebrush to grasslands. The authors went on to say that much of the sagebrush steppe ecosystem during pre-settlement times was probably composed of open shrub stands with a substantial component of perennial grasses and forbs (wildflowers). Extreme weather conditions and insect outbreaks also affected the historic patterns of vegetation composition in sagebrush habitats.

Sagebrush-grass communities vary greatly in composition and structure (Tisdale and Hironaka 1981, Miller and Eddleman 2001), but to one degree or another provide food, cover, escape routes, rearing sites, etc. for a variety of wildlife species (McAdoo and Klebenow 1979). Some of these species inhabit sagebrush habitats year-round, while others use them only seasonally or occasionally. Species that require sagebrush for some part of their life cycle are "sagebrush obligates." According to Paige and Ritter (1999), at least 8 vertebrate species are considered sagebrush obligates: the sage grouse, Brewer's sparrow, sage sparrow, sage thrasher, pygmy rabbit, sagebrush vole, pronghorn antelope, and sagebrush lizard. In parts of their range, gray flycatchers and least chipmunks may also be considered sagebrush obligates.

A number of other vertebrate species have a wider range of habitat adaptation, occurring not only in sagebrush but in other vegetation types as well. Sagebrush communities provide habitat for approximately 100 bird species and 70 mammal species (Braun and others 1976). Several species of lizards and snakes also inhabit sagebrush areas (Fautin 1946). Grazers, browsers, and seedeaters foraging in sagebrush-grass communities use the grasses, forbs, sagebrush, and/or other shrub species found there. In turn, many of these species, including hoofed mammals, rodents, hares and rabbits, small birds, reptiles, and insects are important prey for predatory species living in or near sagebrush-grass communities.

This fact sheet is one of two on wildlife in sagebrush habitats. The other focuses on managing sagebrush habitats for a variety of wildlife species (McAdoo and others 2003), and both are based primarily on a paper by McAdoo and others (in press).

Sagebrush Obligates

The West-wide decline in sage grouse populations and habitat has resulted in the sage grouse being petitioned for listing as threatened or endangered. Much political attention has therefore been focused on this species. These birds require sagebrush for food and/or cover during each stage of their life cycle (Connelly and others 2000; Klebenow 2001). Although sage grouse depend on sagebrush for survival, they thrive in landscapes with a mixture of sagebrush habitat types, varying in age and cover classes. Best habitat includes a mosaic combination of diverse sagebrush community structure, i.e., sagebrush stands with varying shrub heights and canopy cover and a diverse understory of perennial grasses and forbs. The proportion of sagebrush, perennial grasses, and forbs in an area varies with the species or subspecies of sagebrush, the ecological potential of the site, and condition of the habitat (Klebenow 2001). During the course of a year, sagebrush is quantitatively the most important component in the diet of sage grouse, comprising 60 to 80% of all food consumed. However, during spring and summer these birds (especially the juveniles) shift from a sagebrush-dominated diet to one of forbs and insects (Klebenow and Gray 1968).

Figure 1. Pronghorns are 1 of 8 wildlife species known as "sagebrush obligates," that is, they specifically require sagebrush during some part of their life cycle. [JKM photo]

Habitat requirements vary among the other sagebrush obligates. Sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located in the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Page and Ritter 1999). Pygmy rabbits live in areas with clumps of tall sagebrush in loose soils, whereas pronghorn antelope (Figure 1) prefer short growing sagebrush, presumably because their keen eyesight is adapted for detecting danger at long distances. Like sage grouse, both pygmy rabbits and pronghorns typically eat sagebrush almost exclusively during winter (Page and Ritter 1999). However, pronghorns depend primarily on forbs during much of the year.

Sagebrush voles (native mice related to lemmings), feed on green herbaceous plants in summer. They use the shredded bark of sagebrush to line their burrows and eat the bark and twigs of sagebrush during winter. Sagebrush lizards prey on insects found in sagebrush habitat, often climbing the shrubs in search of their prey.

Other Sagebrush-Associated Species

Habitat requirements differ widely among other bird species associated with sagebrush-grass communities. Some species, such as loggerhead shrikes, nest primarily in the canopy of sagebrush and other shrubs. Others nest primarily on open ground or in grass, requiring varying amounts of herbaceous cover. Such species include horned larks, vesper sparrows, and western meadowlarks. Other species, like lark sparrows, are typically most abundant in areas with a diverse mixture of sagebrush and bunchgrass (McAdoo and Klebenow 1989). Horned larks and burrowing owls are adapted to more open areas, and both species often increase after wildfire or other disturbances reduce dense sagebrush canopies. Birds of prey such as prairie falcons, kestrels, golden eagles, ferruginous hawks, Swainson's hawks, and red-tailed hawks hunt for prey in a wide array of sagebrush and other relatively open habitats.

In addition to pronghorn antelope, other big game species depend on sagebrush-grass communities to some extent. Mule deer are closely associated with sagebrush-grass communities in much of their range. Being primarily shrub-eaters (browers), vegetation changes favoring shrubs often benefit mule deer populations. Many forbs and shrubs associated with sagebrush communities are

important in mule deer diets, with grasses used primarily in spring**.** Forb use is highest in summer, and on many mule deer ranges, big sagebrush is the staple component in winter and early spring (Kufeld and others 1973), with the "Wyoming" subspecies being preferred. Elk generally depend upon grasses for forage throughout much of their range, but they also eat shrubs, including big sagebrush, especially during fall and winter (Kufeld 1973). In parts of the Great Basin, elk use sagebrush-dominated habitats in other seasons as well. Bighorn sheep also use sagebrush-grass communities in some areas, especially as winter range. Although grasses are typically the major component in the bighorn sheep diet, shrubs are important, and big sagebrush is a preferred shrub (McQuivey 1978).

In addition to the sagebrush obligate pygmy rabbit, four other species of hares and rabbits may occur in sagebrush-grass communities. The most common species is the black-tailed jackrabbit (Figure 2), an opportunistic feeder that selects for succulent vegetation. Black-tailed jackrabbits eat primarily grasses and forbs until winter, when they feed on shrubs, including the leaves and bark of big sagebrush. During high populations, this species can cause considerable damage to rangeland vegetation and cultivated crops (McAdoo and others 1987). Within sagebrush-grass habitats, black-tailed jackrabbits are typically associated with increasing shrub cover, whereas white-tailed jackrabbits are associated with increasing grass cover (Verts and Carraway 1998). Two other rabbit species, desert cottontails and mountain cottontails, are also found in some sagebrush-grass habitats.

Figure 2. Black-tailed jackrabbits are one of many wildlife species that occur in sagebrush as well as other habitats. [JKM photo]

Many rodent species (at least 28) inhabit sagebrush-grass communities, with the deer mouse typically being most common. Unlike the sagebrush vole that was mentioned above as a sagebrush obligate, deer mice occur in a wide variety of vegetation types. Great Basin pocket mice are restricted primarily to sagebrush habitats (McAdoo and Klebenow 1979). Most rodent species eat herbaceous vegetation or seeds, but differ in specific habitat preferences. Rodents in general have a reputation for negative impacts on rangelands, but some species, such as kangaroo rats, can be quite beneficial in terms of seed dispersal and germination (McAdoo and others 1983).

At least nine bat species may be found within sagebrush habitats, but are more closely associated with caves, rock crevices, and water sources. The Merriam's shrew, an insect-eater, is sometimes a relatively common small mammal species in sagebrush basins (Ports and McAdoo 1986). Western rattlesnakes, gopher snakes, leopard lizards, horned lizards, and other reptiles also make their homes in sagebrush habitat, but amphibians are found only near water sources that may be surrounded by sagebrush or other upland habitat.

Although several mammalian predators use sagebrush habitats in search of prey, none are exclusively linked to sagebrush. The most common predator species using sagebrush habitats include coyotes, badgers, long-tailed and short-tailed weasels, bobcats, and mountain lions.

Conclusions

It is obvious that the diverse array of wildlife species using sagebrush habitats have a similarly wide range of habitat requirements. Vegetation management for biological diversity ("biodiversity") on a landscape scale should take these diverse habitat requirements into consideration. Management for any one species may or may not provide the habitat requirements for other species. Creating a mosaic of habitats with multiple-aged stands of sagebrush and varying degrees of herbaceous and shrub cover would provide the diverse vertical and horizontal vegetation composition and structure required by diverse wildlife species. More information on managing sagebrush habitats for a variety of wildlife species is presented in a follow-up fact sheet (McAdoo and others 2003).

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