Sagebrush Vole

Lemmiscus curtatus

REGULATORY STATUS

USFWS: No special status
USFS R2: No special status
USFS R4: No special status
Wyoming BLM: No special status
State of Wyoming: Nongame Wildlife

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS4 (Cb), Tier II
WYNDD: G5, S4
Wyoming Contribution: LOW
IUCN: Least Concern

STATUS AND RANK COMMENTS

Sagebrush Vole (*Lemmiscus curtatus*) has no additional regulatory status or conservation rank considerations beyond those listed above.

NATURAL HISTORY

Taxonomy:

Formerly within the genus *Arvicola* and then *Lagurus* [1], the species is now placed in the monotypic genus *Lemmiscus*. The two previous genera are now reserved exclusively for Eurasian taxa [2, 3]. *Lemmiscus* is assumed to be closely related to the primary genus of North American voles, *Microtus*, but the precise relationship is not well-understood [2, 4]. Six subspecies of *L. curtatus* have been recognized in the past [1]. There is no modern genetic description of these subspecies, nor is there any obvious geographic separation between them. Of the nominal subspecies, only *L. c. levidensis* occupies Wyoming [5].

Description:

Sagebrush Vole is a small, light colored vole with a noticeably short tail (13–20 mm). The relatively long, soft, and dense pelage is pale gray to ashy gray dorsally, transitioning to silver or white on the venter; the tail is only indistinctly bicolored. There is no appearance of a dorsal stripe. Total length is 101–113 mm; hind foot is 12–17 mm; and weight is 17–38 g [1, 5]. Adults can be distinguished from *Microtus* by the short tail, which is only about as long as the hind foot in *Lemmiscus* [5]. Detailed dental characters can identify skulls to species [1].

Distribution & Range:

The range of Sagebrush Vole closely tracks that of Big Sagebrush (*Artemesia tridentata*), extending from southern Alberta and Saskatchewan south through Montana and Wyoming to northwestern Colorado, then west to southern Nevada, eastern Oregon, and eastern Washington. Documented occurrences of Sagebrush Vole in Wyoming are somewhat scattered across the state, with most concentrated in the basins of southern Wyoming. A 2015 field effort captured

Sagebrush Vole in all major basins of the state except the Bighorn Basin [6]. Sagebrush Vole is largely restricted to environments below lower timberline, although population segments can extend into patches of montane sagebrush with shrubland connections to basin environments [1, 5, 7]. Early suggestions that Sagebrush Vole was a colonial species have been refuted by more recent studies indicating a non-colonial spacing [8].

Habitat:
Sagebrush Vole almost always occupies areas with significant coverage of Big Sagebrush. Occupation of sites without sagebrush (e.g., arid grasslands, rabbitbrush, greasewood) is known but considered atypical [1, 5, 7]. One study in the Upper Green River Basin found Sagebrush Vole density decreased with increasing height and density of sagebrush, but more precise habitat preferences are largely unknown [9]. Sagebrush Vole is often captured during small mammal studies in appropriate habitat, but usually at such low rates that researchers find it hard to analyze detailed habitat responses [9-13]. The species constructs and uses underground burrows and nests. Burrows can be extensive enough to describe as tunnel systems and sometimes incorporate tunnels of pocket gophers (*Thomomys* spp). Surface runways are also used and maintained, similar to those of *Microtus* voles [1].

Phenology:
Sagebrush Vole is active and breeds year-round. Reproduction may peak in spring and fall, possibly to match periods of rapid vegetation growth while avoiding summer droughts and winter freezes. Gestation is 25 days; litters range from 1–13 young, with an average of about 5 young. Young are altricial at birth, fully-furred at about 7 days, and weaned and independent at about 20 days. Multiple litters per year are likely. Individuals are active at any time of day, with some indication of a crepuscular pattern [1, 8].

Diet:
Diet is composed almost entirely of plant material. Sagebrush Vole eats a broad variety of vegetation, including seeds, leaves, stems, fruits, and culms of a wide range of grasses and forbs. Bark and leaves of shrubs are known to be eaten as well, and even conifer seeds have been found in the mouths of captured Sagebrush Voles. Sagebrush bark may be more important as a nest building material than as food. Sagebrush Vole is not known to store food. [1, 5, 8].

CONSERVATION CONCERNS

Abundance:
Continental: WIDESPREAD
Wyoming: COMMON
Sagebrush Vole is generally captured at low rates in most small mammal inventories in appropriate habitat. However, it was the fourth most frequently captured species (out of 20 total) in a small mammal inventory covering all basin environments in Wyoming in 2015. The same study documented Sagebrush Vole at 23 of 47 total trapping sites across the state [6]. That fraction (49%) is lower than the 60% occupancy figure presented for Sagebrush Vole in the Great Basin and Interior Columbia Basin, which was derived via structured literature review [12]. There is a general recognition that Sagebrush Vole increases in abundance following mild winters, above normal summer precipitation, and early autumn precipitation [1].

Population Trends:
Historic: UNKNOWN
Recent: UNKNOWN
Historic and recent population trends of Sagebrush Vole in Wyoming and adjacent states are unknown. Some researchers suggest that long-term declines in sagebrush have probably caused similar declines in Sagebrush Vole [11, 12].

Intrinsic Vulnerability:
LOW VULNERABILITY
Sagebrush Vole is moderately specialized to shrublands dominated by Big Sagebrush, but appears to occur widely within that overall habitat type. The species is generally considered one of the rarer small mammals in the state, but recent studies challenge that notion [6, 9]. Populations fluctuate on par with other species of rodent in similar habitat, and reproductive output is not especially low nor high relative to what is predicted by body size.

Extrinsic Stressors:
MODERATELY STRESSED
The association between Sagebrush Vole and sagebrush suggests that processes that degrade and replace sagebrush (e.g., weed invasion, infrastructure placement, road building) could also reduce habitat quality and numbers of Sagebrush Vole. A literature review focusing on the Great Basin indicated consistently lower densities of Sagebrush Vole where sagebrush had been altered by chemical or mechanical treatments, extensive weed invasion, or heavy livestock grazing [11, 12]. Dispersed infrastructure placement, such as that found in natural gas extraction fields, does not appear to affect density of Sagebrush Vole [9].

KEY ACTIVITIES IN WYOMING
Recent research projects in Wyoming have clarified several aspects of the ecology of Sagebrush Vole [6, 9]. In particular, the 2015–2016 field effort directed by the Wyoming Game and Fish Department and the Wyoming Natural Diversity Database has greatly expanded our knowledge of the distribution and abundance of Sagebrush Vole statewide. Data from this project's 2016 field season is not yet available, but is expected to add important new information in this context.

ECOLOGICAL INFORMATION NEEDS
More detailed information on the preferences of Sagebrush Vole for particular characteristics of sagebrush shrublands would assist wildlife and range managers in predicting the effects of intentional and unintentional vegetation changes occurring in the basins of Wyoming.

MANAGEMENT IN WYOMING
This section authored solely by WGFD; Nichole L. Bjornlie. Recent management activities have focused on funding research projects to improve trapping techniques and understanding of distribution, occupancy, and habitat of Sagebrush Vole and other small mammal species associated with arid shrublands throughout the state. However, additional information that would assist with the development of management recommendations is lacking. Consequently, priorities in Wyoming in the short-term will focus on addressing these data deficiencies. Of particular importance are data on habitat requirements, population trends, and limiting factors, including impacts of sagebrush treatment projects and other anthropogenic development and

habitat manipulations, which will ultimately be used to develop management and conservation recommendations.

CONTRIBUTORS

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Figure 1: Adult Sagebrush Vole photographed in Carbon County, Wyoming. (Photo courtesy of Kristina M. Harkins)

Figure 2: North American range of *Lemmiscus curtatus*. (Map from: Patterson, B. D., et al. (2007) Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0, NatureServe, Arlington, Virginia.)

Figure 3: Sagebrush Vole habitat in Sweetwater County, Wyoming. (Photo courtesy of Kristina M. Harkins)

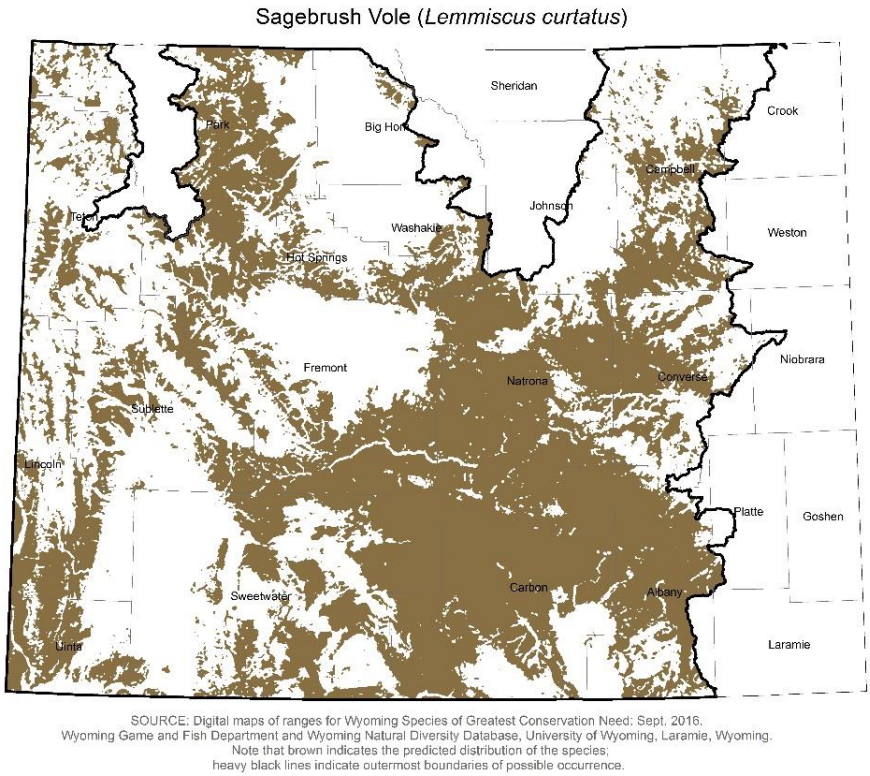

Figure 4: Range and predicted distribution of *Lemmiscus curtatus* in Wyoming.