Pygmy Rabbit

Brachylagus idahoensis

REGULATORY STATUS

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

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS3 (Bb), Tier II
WYNDD: G4, S2
Wyoming Contribution: MEDIUM
IUCN: Least Concern

STATUS AND RANK COMMENTS

Pygmy Rabbit (*Brachylagus idahoensis*) was petitioned for listing as an Endangered or Threatened species under the Federal Endangered Species Act in 2003. In 2010, listing was denied when the United States Fish and Wildlife Service deemed the species was not in danger of extinction or extirpation in all or a significant portion of its range [1]. However, the Distinct Population Segment (DPS) of Pygmy Rabbit in Washington's Columbia Basin is listed as a Federal Endangered Species [2].

NATURAL HISTORY

Taxonomy:

Although previously placed in the genus *Sylvilagus*, Pygmy Rabbit is now in the monotypic genus *Brachylagus* due to pronounced morphological and ecological differences [3]. No subspecies have been designated; however, Pygmy Rabbits in the Columbia Basin are considered a DPS due to genetic, geographic, and ecological differences [2].

Description:

Pygmy Rabbit is identifiable in the field but is often confused with cottontail rabbits (*Sylvilagus* spp.). Pygmy Rabbit is the smallest rabbit in North America [3, 4]. Females tend to be larger than males. Pelage is similar across sexes and age classes and is buff gray to silver gray and can be tipped with brown. Abdomen is typically pale buff colored and legs and nape are rufous brown [3, 4]. Pygmy Rabbit has notably short, round ears, the interior of which are thickly furred and tan or gray. The tail is short, inconspicuous, and buff to tan on the underside [3-5]. Unlike Pygmy Rabbit, sympatric cottontail species have longer ears that are sparsely furred and pink on the interior and a clearly visible tail that is white on the underside.

Distribution & Range:

Pygmy Rabbit occurs in the Great Basin and parts of adjacent intermountain areas in the western United States [3-5]. The disjunct Columbia Basin population in Washington was believed

extirpated from the wild in 2004, but reintroduction efforts are ongoing [2]. Wyoming represents the eastern-most extent of the range of Pygmy Rabbit, and the species is patchily distributed throughout the southwest portion of the state. Confirmed and suspected breeding has been document in 7 of Wyoming's 28 latitude/longitude degree blocks [6]. Pygmy Rabbit recently has been confirmed in one area in northwest Colorado [7].

Habitat:
Pygmy Rabbit is a sagebrush obligate that occurs in areas with tall, dense sagebrush and deep soils capable of supporting burrows [3-5]. Pygmy Rabbit typically is found in Big Sagebrush (*Artemisia tridentata*) with a high density of shrub cover, but will use landscapes containing multiple small patches of tall, dense sagebrush in a matrix of shorter shrubs [8]. Sagebrush provides both food and cover to Pygmy Rabbit. Unlike most North American rabbits, Pygmy Rabbit is semi-fossorial and relies on burrows for year-round cover. Burrow entrances typically are located at the base of sagebrush shrubs. Separate single–entrance natal burrows are used for reproduction [9].

Phenology:
Pygmy Rabbit typically breeds from late winter through early summer. Females produce up to 3 litters each year and kits are typically born from April thru July [3-5]. Natal dispersal typically occurs at 6–12 weeks of age [10], and juveniles do not breed their first summer [3]. Pygmy Rabbit is active year-round and does not migrate; however, home ranges can be smaller in winter [11].

Diet:
Sagebrush comprises up to 99% of Pygmy Rabbit diet in winter and over 50% in summer [3, 4]. The species also eats a variety of grasses and forbs in summer.

CONSERVATION CONCERNS

Abundance:
Continental: WIDESPREAD BUT PATCHY
Wyoming: UNCOMMON
Pygmy Rabbit is patchily distributed, and abundance can vary with the size and quality of habitat patches [4]. Pygmy Rabbit can be locally abundant in parts of southwestern Wyoming [12, 13] but likely decreases in abundance near the periphery of the its range in southcentral Wyoming [12]. Despite several studies estimating occupancy of Pygmy Rabbit in parts of Wyoming [12, 14, 15], robust estimates of abundance are not available for the state.

Population Trends:
Historic: MODERATE DECLINE
Recent: UNKNOWN
Historic population declines likely resulted from loss, fragmentation, and degradation of sagebrush habitat [4]. Assessing trends is difficult because Pygmy Rabbit populations may shift across the landscape over time [16], and techniques for monitoring populations are still being developed [17, 18]. Trends in Pygmy Rabbit occupancy have been studied in only one area in Wyoming and suggest that occupancy has been slowly increasing from 2011–2014 in the study area; however, the rate of increase in occupancy appears to be decreasing [15]. Recent declines have been documented in Washington [2] and Oregon [19, 20], and anecdotal evidence suggests declines in populations elsewhere in the species' range [4].

Intrinsic Vulnerability:

HIGH VULNERABILITY
Pygmy Rabbit has high intrinsic vulnerability in Wyoming because of the species' narrow habitat requirements and limited reproductive and movement abilities. Pygmy Rabbit is restricted to areas with tall, dense sagebrush and deep soils. The species also has low fecundity relative to other rabbit species. Individuals do not breed until their second year and typically have 1–3 litters per year (avg. 6 kits/litter) [4]. Although Pygmy Rabbit can disperse up to 12 km, average natal dispersal is just 1–3 km [10]. The species may be reluctant to cross open spaces, which could potentially limit recolonization of isolated populations [4, 5, 14].

Extrinsic Stressors:
MODERATELY STRESSED
Pygmy Rabbit annual survival rates vary considerably with site, year, sex, age, etc., but generally are low (0.3–45%), with predation typically the main source of mortality [21-23]. Loss and fragmentation of sagebrush habitat due to fire, invasive plant species (e.g., Cheatgrass (*Bromus tectorum*)), and anthropogenic modification/conversion practices also threaten Pygmy Rabbit [4]. In Wyoming, use of remaining sagebrush patches by Pygmy Rabbit was inhibited following prescribed burns [14], and probability of occupancy was lower in survey grid cells containing either disturbed habitat or predators [12]. In Utah, the proportion of active burrows and relative abundance of Pygmy Rabbit was reduced near habitat edges [24]. Pygmy Rabbit also tended to avoid entering areas treated by crushing sagebrush (i.e., aerator treatment) [25]. These results suggest that fragmentation, manipulation, and loss of sagebrush habitat in Wyoming could negatively impact this species. Fragmentation and loss of sagebrush habitat due to energy development currently is occurring throughout the species' range in Wyoming. Furthermore, exposure of Pygmy Rabbit to energy development in Wyoming is predicted to increase 105% by 2030 based on models of current species distribution [26] and projected energy development [27]. Pygmy Rabbit also may be negatively impacted by climate change because sagebrush is predicted to decline with increasing temperature in some climate change models [28].

KEY ACTIVITIES IN WYOMING

Graduate students at the University of Wyoming have recently investigated Pygmy Rabbit in Wyoming. Research in 2004 and 2005 examined the distribution of Pygmy Rabbit in the state and extended the species' known range north of Jeffrey City and east to Rawlins [29]. A genetic study found that Pygmy Rabbit in Wyoming appears to be relatively well-connected through gene flow, maintaining moderate levels of genetic diversity [14]. However, this same study found that Pygmy Rabbit tended not to use burned areas even where remaining patches of sagebrush were of sufficient size to support the species [14, 30]. Current ongoing research has found that 48% of the predicted distribution of Pygmy Rabbit in Wyoming falls in core areas identified and managed for Greater Sage-Grouse (*Centrocercus urophasianus*) conservation [31, 32]. A recent study by the Wyoming Game and Fish Department found that occupancy of Pygmy Rabbit within its predicted distribution in Wyoming was 48% based on a survey of 50 grid cells randomly selected from within the species' distribution [12]. This study also reported that occupancy was lower on grid cells containing predators and habitat disturbance [12]. Ongoing monitoring of Pygmy Rabbit occupancy in Sublette County has occurred since 2010 [15]. Occupancy is lower in the Pinedale Anticline oil and gas exploration and development area than a nearby reference area; however, occupancy has been slowly increasing in both areas since 2011 [15]. A recent study tested the accuracy of 2 predictive distribution models for Pygmy Rabbit in Wyoming and found that although both models performed moderately well in undeveloped

areas, the ability of both models to predict habitat for Pygmy Rabbit declined sharply with increasing road density associated with oil and gas development [33].

ECOLOGICAL INFORMATION NEEDS

The current distribution of Pygmy Rabbit in Wyoming is still unclear, and eastern and northern range limits of the species need further investigation [29]. Abundance estimates for Pygmy Rabbit in Wyoming are lacking and population trend data are restricted to one study in Sublette County. Currently, very little data exist to evaluate effects of different types of habitat alteration on Pygmy Rabbit survival, movement, and recruitment.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Nichole L. Bjornlie. Current management priorities for Pygmy Rabbit include continuing and expanding occupancy surveys in order to monitor population trends throughout the range of the species in Wyoming. Because sagebrush habitat in Wyoming is far vaster than the distribution of Pygmy Rabbit in the state, incorporating habitat metrics into survey efforts will help elucidate variables that may be important to presence and distribution. Finally, survey efforts will continue to evaluate the impacts of energy development and habitat alteration, all of which will be used to develop management and conservation recommendations.

CONTRIBUTORS

Wendy A. Estes-Zumpf, WYNDD
Nichole L. Bjornlie, WGFD
Kaylan A. Hubbard, WYNDD

REFERENCES

[1] United States Fish and Wildlife Service. (2010) Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Pygmy Rabbit as Endangered or Threatened, *Federal Register 75*, 60516-60561.

[2] United States Fish and Wildlife Service. (2003) Endangered and Threatened Wildlife and Plants; Final Rule to List the Columbia Basin Distinct Population Segment of the Pygmy Rabbit (*Brachylagus idahoensis*) as Endangered, *Federal Register 68*, 10388-10409.

[3] Green, J. S., and Flinders, J. T. (1980) *Brachylagus idahoensis*, *Mammalian Species 125*, 1-4.

[4] Keinath, D. A., and McGee, M. (2004) Species assessment for Pygmy Rabbit (*Brachylagus idahoensis*) in Wyoming, p 84, Wyoming Natural Diversity Database and USDI Bureau of Land Management, University of Wyoming, Laramie, WY.

[5] Wyoming Game and Fish Department. (2010) State Wildlife Action Plan, p 512.

[6] Orabona, A., Rudd, C., Grenier, M., Walker, Z., Patla, S., and Oakleaf, B. (2012) Atlas of birds, mammals, amphibians, and reptiles in Wyoming, p 232, Wyoming Game and Fish Department Nongame Program, Lander, WY.

[7] Estes-Zumpf, W. A., Zumpf, S. E., Rachlow, J. L., Adams, J. R., and Waits, L. P. (2014) Genetic Evidence Confirms the Presence of Pygmy Rabbits in Colorado, *Journal of Fish and Wildlife Management 5*, 118-123.

[8] Ulmschneider, H. (2008) Surveying for Pygmy Rabbits (*Brachylagus idahoensis*), p 57, Interagency Pygmy Rabbit Working Group, Boise, Idaho.

[9] Rachlow, J. L., Sanchez, D. M., and Estes-Zumpf, W. A. (2005) Natal burrows and nests of free-ranging Pygmy Rabbits (*Brachylagus idahoensis*), *Western North American Naturalist 65*, 136-139.

[10] Estes-Zumpf, W. A., and Rachlow, J. L. (2009) Natal dispersal by Pygmy Rabbits (*Brachylagus idahoensis*), *Journal of Mammalogy 90*, 363-372.

[11] Sanchez, D. M., and Rachlow, J. L. (2008) Spatio-temporal factors shaping diurnal space use by Pygmy Rabbits, *Journal of Wildlife Management 72*, 1304-1310.
[12] Cudworth, N., Karsch, M., and Grenier, M. (2014) Pygmy Rabbit (*Brachylagus idahoensis*) distribution and occupancy in Wyoming, In *Threatened, Endangered, and Nongame Bird and Mammal Investigations: Annual Completion Report* (Orabona, A. C., and Cudworth, N., Eds.), pp 295-306, Wyoming Game and Fish Department.
[13] Estes-Zumpf, W., Griscom, H., and Keinath, D. (2009) Pygmy Rabbit monitoring in the Pinedale Anticline Project Area, Sublette County, Wyoming., Wyoming Natural Diversity Database.
[14] Thimmayya, A. C. (2010) Habitat ecology and genetic connectivity of the Pygmy Rabbit (*Brachylagus idahoensis*) across southern Wyoming, p 110, University of Wyoming, Laramie, WY.
[15] Hayden-Wing Associates. (2014) Pygmy Rabbit monitoring in the Pinedale Anticline Project Area, Sublette County, Wyoming, p 16, Prepared for Wyoming Game and Fish Department, Pinedale Anticline Project Office, and Bureau of Land Management by Hayden-Wing Associates, LLC, Laramie, Wyoming.
[16] Rachlow, J. L. (2012) Personal communication.
[17] Price, A. J., and Rachlow, J. L. (2011) Development of an index of abundance for Pygmy Rabbit populations, *Journal of Wildlife Management 75*, 929-937.
[18] Wilson, T. L., Odei, J. B., Hooten, M. B., and Edwards, T. C., Jr. (2010) Hierarchical spatial models for predicting Pygmy Rabbit distribution and relative abundance, *Journal of Applied Ecology 47*, 401-409.
[19] Weiss, N. T., and Verts, B. J. (1984) Habitat and distribution of Pygmy Rabbits (*Sylvilagus idahoensis*) in Oregon, *Great Basin Naturalist 44*, 563-571.
[20] Beauvais, G. P., Sequin, E., Rachlow, J., Dixon, R., Bosworth, B., Kozlowski, A., Carey, C., Bartels, P., Obradovitch, M., Forbes, T., and Hays, D. (2008) *Brachylagus idahoensis*, In *The IUCN Red List of Threatened Species. Version 2015.3*, http://www.iucnredlist.org.
[21] Sanchez, D. M. (2008) Pieces of the Pygmy Rabbit puzzle: space use, survival, and survey indicators, p 162, University of Idaho, Moscow, ID.
[22] Crawford, J. A., Anthony, R. G., Forbes, J. T., and Lorton, G. A. (2010) Survival and causes of mortality for Pygmy Rabbits (*Brachylagus idahoensis*) in Oregon and Nevada, *Journal of Mammalogy 91*, 838-847.
[23] Price, A. J., Estes-Zumpf, W., and Rachlow, J. (2010) Survival of juvenile Pygmy Rabbits, *Journal of Wildlife Management 74*, 43-47.
[24] Pierce, J. E., Larsen, R. T., Flinders, J. T., and Whiting, J. C. (2011) Fragmentation of sagebrush communities: does an increase in habitat edge impact Pygmy Rabbits?, *Animal Conservation 14*, 314-321.
[25] Wilson, T. L., Howe, F. P., and Edwards, T. C., Jr. (2011) Effects of sagebrush treatments on multi-scale resource selection by Pygmy Rabbits, *Journal of Wildlife Management 75*, 393-398.
[26] Camp, M. J., Rachlow, J. L., Shipley, L. A., Johnson, T. R., and Bockting, K. D. (2014) Grazing in sagebrush rangelands in western North America: implications for habitat quality for a sagebrush specialist, the pygmy rabbit, *Rangeland Journal 36*, 151-159.
[27] Keinath, D. (2015) Evaluating the vulnerability of Wyoming's wildlife to habitat disturbance, p 176, University of Wyoming, Laramie, WY.
[28] NatureServe. (2015) Climate change impacts on world's smallest rabbit, http://www.natureserve.org/.
[29] Purcell, M. J. (2006) Pygmy Rabbit (*Brachylagus idahoensis*) distribution and habitat selection in Wyoming, p 175, University of Wyoming, Laramie, WY.
[30] Thimmayya, A. C., and Buskirk, S. W. (2012) Genetic connectivity and diversity of Pygmy Rabbits (*Brachylagus idahoensis*) in southern Wyoming, *Journal of Mammalogy 93*, 29-37.
[31] Carlisle, J., and Chalfoun, A. D. (2012) The Effectiveness of Sage-Grouse Core Areas as an Umbrella for Nongame Species of Greatest Conservation Need, In *Threatened, Endangered, and Nongame Bird and Mammal Investigations: Annual Completion Report* (Grenier, M. B., Abel, B., and Cudworth, N., Eds.), p 208, Wyoming Game and Fish Department.
[32] Gamo, S., Carlisle, J. D., Beck, J. L., Bernard, J. A. C., and Herget, M. E. (2013) Greater Sage-Grouse in Wyoming: an umbrella species for sagebrush-dependent wildlife, *The Wildlife Professional 7*, 56-59.
[33] Germaine, S., Ignizio, D., Keinath, D., and Copeland, H. (2014) Predicting Occupancy for Pygmy Rabbits in Wyoming: An Independent Evaluation of Two Species Distribution Models, *Journal of Fish and Wildlife Management 5*, 298-314.

Figure 1: Adult Pygmy Rabbit. (Photo courtesy of J. Witham)


Figure 2: North American range of *Brachylagus idahoensis* in blue. (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 habitat used by the Pygmy Rabbit in Custer County, Idaho. (Photo courtesy of Wendy A. Estes-Zumpf)

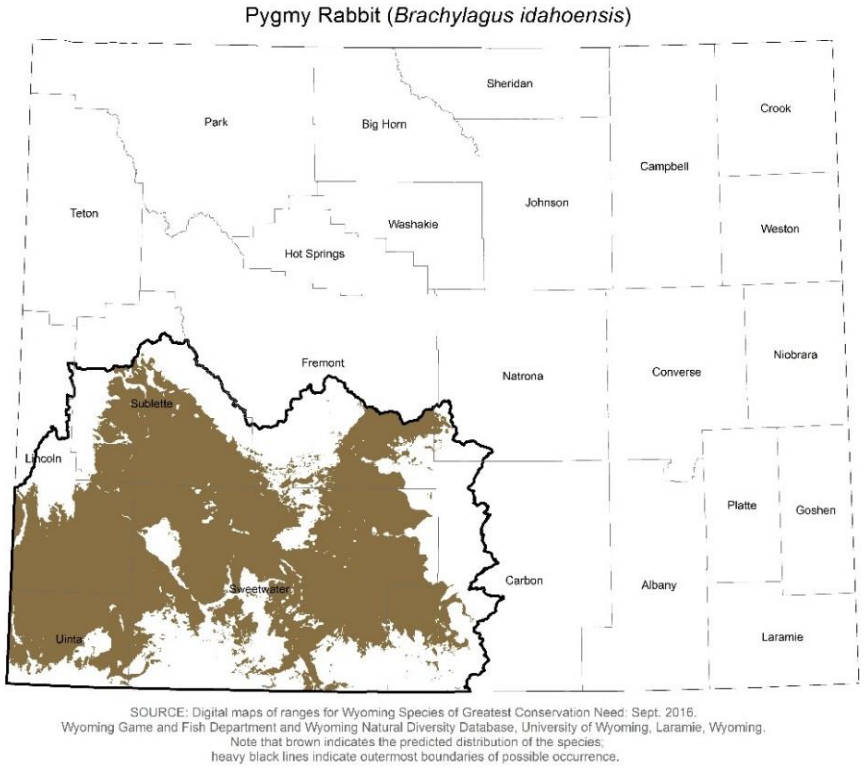

Figure 4: Range and predicted distribution of *Brachylagus idahoensis* in Wyoming.