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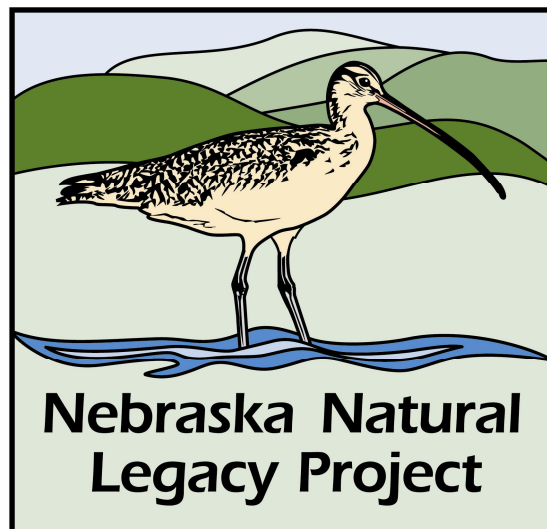


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Plains Harvest Mouse
(*Reithrodontomys montanus griseus*)

A Species Conservation Assessment
for
The Nebraska Natural Legacy Project



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The mission of the Nebraska Natural Legacy Project is to implement a blueprint for conserving Nebraska's flora, fauna and natural habitats through the proactive, voluntary conservation actions of partners, communities and individuals.

Purpose

The primary goal in development of at-risk species conservation assessments is to compile biological and ecological information that may assist conservation practitioners in making decisions regarding species of interest. The Nebraska Natural Legacy Project recognizes the plains harvest mouse (*Reithrodontomys montanus griseus*) as a Tier I at-risk species of high conservation need. Some general management recommendations are made here regarding the plains harvest mouse; however, conservation practitioners will need to use professional judgment to make specific management decisions based on objectives, location, and a multitude of variables. This resource was designed to share available knowledge of the plains harvest mouse that will aid in the decision-making process or in identifying research needs to benefit the species. Species conservation assessments should be re-evaluated as new pertinent scientific information becomes available. The Nebraska Natural Legacy Project focuses efforts in the state's Biologically Unique Landscapes (BULs), but it is recommended that whenever possible, practitioners make considerations for a species throughout its range in order to increase the outcome of successful conservation efforts.

<u>Common Name</u>	Plains Harvest Mouse	<u>Scientific Name</u>	<i>Reithrodontomys montanus griseus</i>	
<u>Order</u>	Rodentia	<u>Family</u>	Cricetidae	
<u>G-Rank</u>	G5TNR	<u>S-Rank</u>	S1	<u>Goal</u> 7 <u>Distribution</u> Limited
<u>Criteria for selection as Tier I</u>	Critically imperiled; possibly declining			
<u>Trends since 2005 in NE</u>	Unknown			
<u>Range in NE</u>	Eastern portion of state			
<u>Habitat</u>	Tallgrass prairie - heavily grazed, open prairies, salt marshes			
<u>Threats</u>	Loss of tallgrass prairie habitat; lack of heavy grazing; management issues			
	Climate Change Vulnerability Index: Not Vulnerable; increase likely			
<u>Research/Inventory</u>	Conduct surveys to assess distribution and abundance (particularly in saline wetlands); determine specific habitat requirements			
<u>Landscapes</u>	Elkhorn Confluence, Sandstone Prairies, Southeast Prairies, Saline Wetlands, Willow Creek Prairies			

Status

According to the last review in 1996, the plains harvest mouse has a state Heritage status rank of S1, U.S. national status of N5 and global conservation rank of G5TNR (NatureServe 2009). *R. m. griseus* is limited regionally, and it is estimated that less than 200 individuals are present in the state of Nebraska (Schneider et al. 2011). The Nebraska Natural Legacy Science Team set a goal of maintaining at least seven populations in the state (Schneider et al. 2011). Lifespan of a plains harvest mouse is likely little more than a year (Timm et al. 2012); individuals have been recaptured up to 14 months after initial capture (Waggoner 1975, Wilkins 1986).

Principal Threats

Loss of quality grasslands, encroachment of trees and dense vegetation, and prairie conversion to agriculture threaten plains harvest mouse habitat. In Nebraska, approximately 98% of the state's historic prairies have already been lost (Sampson and Knopf 1994). Harvest mice avoid dense forests and dense upland vegetation (Jones et al. 1983, Seabloom and Shaffer 2005).

Dispersal, and in due course, genetic exchange between individuals can be highly limited during and after construction of roads, particularly highways that serve as major barriers to movement of small mammals (Oxley et al. 1974, Wilkins 1982, Garland and Bradley 1984).

Species Description

The plains harvest mouse is small, brownish with a dark mid-dorsal stripe and buffy patch behind the ear (Seabloom and Shaffer 2005). Pelage of belly and hind feet is whitish or yellowish-gray (Wilkins 1986, Seabloom and Shaffer 2005). Sparsely-haired tail is shorter than the length of the head and body and has a very thin blackish stripe on the dorsal side (Wilkins 1986). In Nebraska, *R. montanus* has a hind foot of 14-16 mm; whereas, the western harvest mouse (*R. megalotis*) generally has a hind foot length of about 18 mm (K. Geluso, unpubl. data). Males and females look alike, but females may have slightly larger anatomical measurements than males (Smith 1964, Wilkins 1986). Plains harvest mouse length ranges from 94-138 mm and weight 5-14 g (Wilkins 1986, Seabloom and Shaffer 2005, K. Geluso, unpubl. data).

Habitat and Range of Species

In Nebraska, the plains harvest mouse inhabits open prairie, often heavily grazed; fence lines (Seabloom and Shaffer 2005); and salt marshes (Wilkins 1986, Schneider et al. 2011). The mouse seems to prefer vegetation from approximately 2.5-25 cm tall, less than 40% bare ground, and loamy sand soil (Wilkins 1986). But, occurrences of the species in the state are from the Tallgrass Prairie Ecoregion (Schneider et al. 2011).

Dispersal, Home Range, and Population Density

Brown (1946) found density of the plains harvest mouse to reach 6.8 individuals per hectare. Two to four nests are typically constructed near the edge of an individual mouse's range (Kaye 1961). Movements occur mostly at night, but mice may travel relatively short distances from one nest to another during the day as well; these movements tend to span

outward in an arc no more than 180 degrees (Kaye 1961). The plains harvest mouse avoids some areas in relative close proximity to nests; therefore, area requirements and range size calculations become complex (Kaye 1961). Estimates of home range are 0.04-0.84 ha, with individuals moving up to 185 m over 5 months (Wilkins 1986).

Diet

The plains harvest mouse feeds on invertebrates and plants at night (Wilkins 1986, NatureServe 2009). Grasshoppers make up a significant portion of the diet (Brown 1946, Wilkins 1986), as well as seeds (Timm et al. 2012). Documented plants consumed include seeds and/or parts from Indian grass (*Sorghastrum nutans*), buffalo grass (*Bouteloua dactyloides*), switchgrass (*Panicum virgatum*), ironweed (*Veronia* sp.), snow on the mountain (*Euphorbia marginata*), and Maximilian sunflower (*Helianthus maximiliani*) (Brown 1946, Wilkins 1986). Food may be cached underground to survive harsh winters (Timm et al. 2012).

Reproduction

“Globular” nests 10-11 cm by 6-7 cm (wintering nests are somewhat larger; Kaye 1961) are constructed of grasses on or within a few centimeters of the ground (Brown 1946, Smith 1964, Davis 1974, Wilkins 1986). The plains harvest mouse may also nest under logs or pieces of lumber (Smith 1964) or inside selected objects (Wilkins 1986). Females are polyestrous and breed during warmer months, March – July, in Nebraska (Jones 1964, Wilkins 1986). Gestation is approximately 21-22 days (Wilkins 1986, NatureServe 2009, Timm et al. 2012). Litter size ranges from 1-9, with 3-4 typical (Wilkins 1986, Timm 2012). Newborn pups are blind and lack hair (Wilkins 1986). They wean at 2 weeks of age and reach adult size at 5 weeks (LeRaas 1938, Wilkins 1986). The plains harvest mouse sexually matures around 2 months of age (LeRaas 1938, Davis 1974, Wilkins 1986).

Research and Conservation Strategies

A multitude of factors should be considered before implementing any conservation actions for species. Within the guidelines of state and federal law, the Nebraska Natural Legacy Project recommends: 1) consider, but do not limit options to, scenarios that benefit both the species of interest and property owners, 2) consider species dispersal and landscape context, 3) plan for multiple years, and 4) do no harm.

In Nebraska, prospects for plains harvest mouse conservation exist in at least five Biologically Unique Landscapes: Elkhorn Confluence, Sandstone Prairies, Southeast Prairies, Saline Wetlands, and Willow Creek Prairies. These landscapes offer the best opportunities for conservation of the species within Nebraska based on current knowledge. One may want to consider the following information (summarized in Table 2) when planning conservation efforts for plains harvest mouse:

- 1) Trapping and/or tagging can be used for plains harvest mouse surveys. Sherman live traps are one means of catching small mammals. Traps are typically set early evening and checked early the next morning. Species, mass, sex, reproductive status, and any other pertinent information can be recorded when individuals are captured, as well as trap station location. Individuals should be released as soon as

data are collected and if so desired, mice are marked via various expert-approved methods for small mammals (Clark et al. 2005). Mice have been tagged with gold-198 and tracked with a Geiger counter to monitor movements (Kaye 1961).

- 2) Minimizing loss of arid and xeric upland grasslands can benefit plains harvest mouse and, clearly, is a priority for conservation of a suite of species. When opportunities present themselves for habitat restoration, further strides in halting population declines and even possibly increasing numbers can be achieved. In southeastern Kansas, small mammals have exhibited a positive response to conversion of tall fescue pastures to tallgrass prairie (Rucker 2001); an experimental design, likely involving grazing, could inform whether or not a similar management strategy could work in Nebraska. A well-planned grazing and prescribed fire schedule may benefit small mammals (Higgins and Kruse 1989, Schneider et al. 2011). See “Native Grassland Management Guidelines for Nebraska’s Wildlife Management Areas” for more specific strategies (Steinauer et al. 2011).
- 3) Because habitat degradation can have negative impacts on small mammals, Clark and others investigated low-level nitrogen-amendment (16.4 kg N/ha/y), as well as fencing, in improving quality of vegetative cover to effectively reduce predation (2005). Their results did not demonstrate a significant advantage to *R. montanus* on nitrogen-amended plots, but the authors discuss the possibility that the mouse could exhibit greater survival and densities on fenced plots with no nitrogen amendment. At this time, there is not convincing evidence to recommend nitrogen-amendment or fencing specifically for plains harvest mouse in Nebraska.
- 4) Small mammal habitat can become fragmented by roads and other barriers to species dispersal. Introductions and re-introductions of *R. m. griseus* into appropriate grassland habitats may be one way to increase their populations and reduce likelihood of loss of genetic diversity.
- 5) Continued grazing in upland pastures in eastern Nebraska, especially on those that consist of sandy soils should benefit the species and limit the abundance of the larger western harvest mouse.
- 6) Numerous USDA-NRCS Farm Bill Programs may be used strategically for the benefit of plains harvest mouse, including:

CRP – CP 2 (Native Grasses), 4D (Permanent Wildlife Habitat), 9 (Shallow Water Areas for Wildlife), 10 (Existing Grasses and Legumes), 21 (Filter Strips-grass), 23 (Wetland Restoration-floodplain), 23A (Wetland Restoration- non-floodplain), 25 (Rare and Declining Habitat), 29 (Wildlife Habitat Buffer), 33 (Upland Bird Habitat Buffer), 38 (State Acres for Wildlife Enhancement), 42 (Pollinator Habitat);

EQIP- 528 – Prescribed Grazing, 314 – Brush Management, 390 – Riparian Herbaceous Cover, 644 – Wetland Wildlife Habitat Management, 645 – Upland Wildlife Habitat Management, 657 – Wetland Restoration, 659 – Wetland Enhancement;

WRP - Wetlands Reserve Program;
WHIP – Wildlife Habitat Incentive Program;
GRP – Grassland Reserve Program;
FRLPP – Farm and Ranch Lands Protection Program;
and WILD Nebraska

Availability of programs may vary annually.

Information Gaps

The distribution and abundance of the plains harvest mouse in Nebraska, particularly in the saline wetlands, could be better understood through surveys. It would be helpful to determine any specific habitat characteristics required by *R. m. griseus*. Its population trend in Nebraska is unknown.

Considerations for Additional Species

At-risk species that share habitat with the plains harvest mouse should be considered in management plans for the mouse. On-the-ground conservation for the plains harvest mouse may affect or be influenced by at-risk species that can be found in the same Biologically Unique Landscapes as the rodent. Table 1 lists a sample of at-risk species you may want to consider while planning for plains harvest mouse habitat on the landscape. This list will not apply to all plains harvest mouse sites of occupancy nor is the list all-inclusive.

TABLE 1. Tier 1 at-risk species identified in the Nebraska Natural Legacy Project that inhabit biologically unique landscapes with the plains harvest mouse (Schneider et al. 2011) may necessitate consideration in habitat management plans.

Animals

Plains Pocket Mouse (*Prognathus flavescens perniger*)
Greater Prairie-Chicken (*Tympanuchus cupido*)
Loggerhead Shrike (*Lanius ludovicianus*)
Blanding's Turtle (*Emydoidea blandingii*)
Massasauga (*Sistrurus catenatus*)
Buchholz Black Dash (*Euphyes conspicua buchholzi*)
Iowa Skipper (*Atrytone arogos iowa*)
Ottoe Skipper (*Hesperia ottoe*)
Regal Fritillary (*Speyeria idalia*)
Married Underwing (*Catocala nuptialis*)
Whitney Underwing (*Catocala whitneyi*)
Salt Creek Tiger Beetle (*Cicindela nevadica lincolniana*)

Plants

Missouri Sedge (*Carex missouriensis*)
Saltwort (*Salicornia rubra*)
Western Prairie Fringed Orchid (*Platanthera praeclara*)

TABLE 2. Summary of suggested management for the plains harvest mouse in Nebraska. The following should be interpreted as general guidelines based on the best available knowledge at the time of this publication. See Research and Conservation section of this document for more detail and Reference section for sources of additional information.

FOCUS	STRATEGIES	MITIGATION and CONSIDERATIONS
Inventory of distribution, abundance, and preferred habitats in Nebraska	Use approved methods for trapping and tagging individuals. Consult literature and species experts for safe capture and handling protocols. Characterize vegetation.	Evaluate the role of Nebraska’s saline wetlands as habitat for plains harvest mouse
Prescribed Fire	Consult local experts and see Steinauer et al. 2011 for strategic grassland management recommendations	Fire can improve small mammal habitat but they are often sensitive to timing
Grazing	Consult local experts and see Steinauer et al. 2011 for strategic grassland management recommendations	Plains harvest mouse responds positively to relatively heavy grazing
Limit woody encroachment in native grasslands	Use various methods (e.g., mechanical, fire) to remove eastern redcedar and other woody species	Evidence suggests the species prefers low-stature grassland vegetation from 2.5-25 cm tall and less than 40% bare ground
Minimize loss of, maintain, and/or restore grassland acres	CRP enrollment; convert fescue to diverse prairie; environmental education that fosters appreciation and conservation of grasslands	Plains harvest mouse is not known to widely disperse, so focus work in areas where the species already occurs
Introductions and re-introductions into suitable grassland habitat	Consider sites once populated by <i>R. m. griseus</i> or novel sites with suitable habitat features	The release and translocation of genetically diverse individuals can strengthen the population

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