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Distributional expansion of the Hispid Cotton Rat (*Sigmodon hispidus*) into Dawson County, Nebraska

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Abstract

In the last century, the Hispid Cotton Rat (*Sigmodon hispidus*) has moved northward in central parts of the United States, reaching Nebraska in the late 1950s. Recent surveys demonstrate Hispid Cotton Rats inhabit counties across southern parts of Nebraska south of the Platte River. Herein, we report on captures of *S. hispidus* from a new county (Dawson County), its seasonal occurrence at our study site, and the first known record of the Hispid Cotton Rat north of channels of the Platte River. Our captures represent one of the northern-most records in Nebraska.

Keywords: common reed, Hispid Cotton Rat, *Phragmites australis*, Nebraska, Platte River, *Sigmodon hispidus*

The Hispid Cotton Rat (*Sigmodon hispidus*) is wide-ranging across North America from California to Virginia, and from southern Nebraska to northern parts of Mexico (Bradley et al. 2008). In the United States, distribution of the Hispid Cotton Rat has expanded northward in the Great Plains during the last century (Cockrum 1948), with the first documented specimens from Nebraska in Richardson County (Jones 1960). By 1965, the species expanded farther northward to Adams County (Genoways and Schlitter 1967), and by 1975, the Hispid Cotton Rat had expanded to six counties in Nebraska with its northern-most location from Kearney County (Farney 1975).

From 1948 to 1965, *S. hispidus* was estimated to move at 8.9 km per year in southern Nebraska (Genoways and Schlitter 1967), but Benedict et al. (2000) did not report a change in distribution for *S. hispidus* since the 1970s in the state. More recent surveys in southern Nebraska, however, demonstrate westward movements rather than continued northward movements in the state, as Hispid Cotton Rats now are known from Chase, Gosper, Hayes, Phelps, and Red Willow counties (Wright et al. 2010, Wills et al. 2011). One hypothesis for the lack of further northward movements is that the Platte River formed a barrier to northward dispersal (Thompson and Finck 2013). Herein, we report on an additional northward movement of *S. hispidus* in south-central Nebraska. We document the species from a new county in the state, report on seasonal occurrence at our trapping site, and document the first individuals north of a Platte River channel.

During a study to examine use of invasive common reed (*Phragmites australis*) by small mammals in south-central Nebraska, we set Sherman live traps (7.6 by 8.9 by 22.9 cm, H.B. Sherman Traps, Tallahassee, Florida) at four sites along the Platte River. We set traps in

Dawson, Buffalo, and Hall counties on one property (Jeffery Island site) managed by both the Central Nebraska Public Power and Irrigation District (CNPPID) and the Platte River Recovery Implementation Program (PR-RIP; 40.681894°N, 99.560466°W), one property managed by the Nebraska Public Power and Irrigation District (40.688930°N, 99.357632°W), and two properties managed solely by the Platte River Recovery Implementation Program (40.685041°N, 99.331926°W and 40.748933°N, 98.588615°W); coordinates represent the center of each study area. At each study site, we set traps in two habitats, with one habitat that consisted of common reed stands and the other consisted of a mixture of native and exotic plants. Plants in areas not dominated by common reed were comprised of plains cottonwood (*Populus deltoides*), eastern redcedar (*Juniperus virginiana*), smooth brome (*Bromus inermis*), and a variety of forbs (e.g., annual ragweed *Ambrosia artemisiifolia* and *Polygonum spp.*). At each site, we set 96 Sherman live traps divided equally between the two habitats. Due to the relatively small, disjunct patches of common reed at sites, we further divided each of the four sites into three subplots with common reed and three subplots without common reed. Each subplot of common reed was matched with an equal-sized patch dominated by the mixture of native and exotic vegetation.

We set traps weekly, rotating between locations every week from late April to late August 2014, with one additional trapping session in late September into early October. We baited traps with mixture of bird seed and set traps in late afternoon and checked them shortly after sunrise. Notes were recorded on species, sex, mass, reproductive status (scrotal, pregnant, or lactating), and age (adult and juvenile) for each individual captured

in traps. Each individual was marked with a uniquely numbered 1 cm etched ear tag (Kent Scientific Corporation, Torrington, Connecticut). Most individuals were released shortly after processing, but a few individuals were kept as voucher specimens and deposited in the Vertebrate Museum at the University of Nebraska at Kearney (VMUNK). Trapping, handling, and euthanasia procedures were approved by the Institutional Animal Care and Use Committee at UNK (protocol #042011 to J.T. Springer).

From April to October 2014, we accrued 5,906 trap nights and captured eight species of small mammals. From most to least common, we captured the White-footed Deermouse (*Peromyscus leucopus*), North American Deermouse (*P. maniculatus*), Western Harvest Mouse (*Reithrodontomys megalotis*), Meadow Vole (*Microtus pennsylvanicus*), Northern Short-tailed Shrew (*Blarina brevicauda*), Cinereus Shrew (*Sorex cinereus*), the Hispid Cotton Rat, and Meadow Jumping Mouse (*Zapus hudsonius*).

On 30 September 2014, we captured our first Hispid Cotton Rat during our study on the eastern portion of Jeffery Island (40.682027°N, 99.566324°W, WGS 84) within a patch of common reed that measured 0.16 ha. The individual was an adult male that weighed 75.1 g (VMUNK 4498). Eight additional cotton rats (3 male, 4 female, 1 unknown sex) were captured and released during the same trapping session from 30 September to 3 October at the same site from the same subplot as well as another common reed subplot located about 164 m to the east. Average mass was 89.5 g (48.2–152.3 g), thus representing subadults and adults based on ages presented in Wright et al. (2010). We did not observe any reproductively active females based on visual observations. Our captures represent the first records of Hispid Cotton Rat in Dawson County and first record north of a Platte River channel in Nebraska. The closest published record to our site is located in Phelps County at the High State Wildlife Management Area 14.3 km to the southeast of our trapping site (Wills et al. 2011).

A number of hypotheses have been proposed as factors previously restricting the continued northward movements of *S. hispidus* in Nebraska, including climatic limitations, predator interactions, and physical barriers (Benedict et al. 2000, Farney 1975, Thompson and Finck 2013). The Platte River has been proposed as a potential limiting physical barrier in the northward expansion in Nebraska (Thompson and Finck 2013). Our study suggests the Platte River is not a barrier, similar to the Missouri River not being a barrier for this species (Thompson and Finck 2013). In 2014, the Platte River had increased flows from late May through early July that likely prevented individuals from crossing the river during this period. During late July and August, however, portions of the river were shallow



Hispid Cotton Rat (*Sigmodon hispidus*)
Photo: CDC/James Gathany, 2005

or dry, likely enabling the Hispid Cotton Rat to cross such a barrier and establish a population at our Jeffery Island study site. We did not detect its presence until late September despite an extensive trapping effort, which suggests that the Hispid Cotton Rat had not yet reached and crossed the river channel from more southerly areas. Our study suggested that during times of limited or no flows, the Platte River was not a barrier for Hispid Cotton Rats. Now that a population has been established north of a channel of the Platte River, we predict populations might continue to increase and expand north of the Platte River in Nebraska if other conditions, such as climate, are appropriate. A combination of warmer climatic conditions in recent years allowing populations to persist nearby as well as a period of limited flows at the study site likely enabled this barrier to be crossed. Other vertebrate species in the region also have been documented responding to unusually warm climatic conditions in recent years along the Platte River (Geluso et al. 2014, Wright et al. 2014).

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