

NOTES ON THE DISTRIBUTION OF EASTERN WOODRATS AND HISPID COTTON RATS IN SOUTH-CENTRAL NEBRASKA

The eastern woodrat (*Neotoma floridana*) and hispid cotton rat (*Sigmodon hispidus*) reach distributional limits in southern Nebraska (Jones 1964, Farney 1975). In the last half century, both species have expanded their distributional ranges in the region (Kugler and Geluso 2009, Wright et al. 2010). Herein, we report new localities of occurrence for both species that extend known distributional boundaries in south-central Nebraska beyond those reported by Kugler and Geluso (2009) and Wright et al. (2010).

Associated with other studies, we captured small mammals in Sherman live-traps in south-central Nebraska. Voucher specimens were deposited in collections at the University of Nebraska at Kearney (UNK; formally referred to as Vertebrate Museum of Kearney State College—VMKSC) and University of Nebraska State Museum (UNSM) in the Division of Zoology. Our trapping and handling procedures for small mammals followed guidelines of the American Society of Mammalogists (Gannon et al. 2007, Sikes et al. 2011) and were approved by the Animal Care and Use Committees at the U.S. Geological Survey's Northern Prairie Wildlife Research Center (Study Plan 8330-0M0P3) and University of Nebraska at Kearney (#060408). We followed Genoways et al. (2008) for common and scientific names of mammals and Kaul et al. (2006) for common and scientific names of plants reported herein.

Records of Eastern Woodrats.—The eastern woodrat occurs throughout parts of the eastern and central United States, with three subspecies inhabiting Nebraska (Jones 1964, Clausen 1999). Of these subspecies, *N. f. campestris* is known from 10 counties in southern Nebraska (Jones 1964, Kugler and Geluso 2009). Along the Platte River, the easternmost distribution of *N. f. campestris* is located in Dawson County (11 km west of Lexington, near Darr Road and the Platte River, 40°46.667'N, 99°52.026'W; Kugler and Geluso 2009). Here we report on records of *N. f. campestris* obtained farther east in Dawson County and comment on a possible barrier that has prevented its expansion eastward.

On 26, 28, and 29 July and 17–19 August 2010, we captured woodrats on the westernmost part of Jeffrey Island, which lies east of Lexington, Dawson County, Nebraska, USA. At least five individuals were captured in 1,216 trap nights consisting of adult males and females (UNSM ZM-30027 and UNSM ZM-30028); the exact number of individuals is not known because not all individuals were marked with ear tags. On 13 October 2010, we returned to capture sites to examine placement and construction materials of woodrat houses. We observed three houses in <5 min at the first site (40°42.214'N, 99°41.069'W) and one house in <2 min at the second site (40°42.410'N, 99°41.268'W). We observed houses at the base of plains cottonwoods (*Populus deltoides*) and eastern red-cedars

(*Juniperus virginiana*), on fallen logs, and in a hollow cavity of a live, standing cottonwood. Houses ranged in size from 0.5 to 0.75 m in height and from 1.0 to 1.5 m in width, suggesting they were not of recent construction. Houses were comprised of sticks and bark mainly from cottonwoods, and we observed fresh clippings of red-cedars on all of them. Houses were situated in woodlands consisting mainly of cottonwoods and red-cedars interspersed with grasses. Also, rough-leaf dogwood (*Cornus drummondii*) was present in the area. Red-cedars and cottonwoods were mature, but deep furrows in the bark of small-diameter cottonwoods suggested limited growth, caused by a water diversion upstream that had likely lowered the water table. Other species of mammals captured in the immediate area included the masked shrew (*Sorex cinereus*), prairie vole (*Microtus ochrogaster*), meadow vole (*M. pennsylvanicus*), meadow jumping mouse (*Zapus hudsonius*), white-footed deer mouse (*Peromyscus leucopus*), North American deer mouse (*P. maniculatus*), and western harvest mouse (*Reithrodontomys megalotis*).

Our records represent a 17.5-km extension in distribution for eastern woodrats east of previous localities reported by Kugler and Geluso (2009). Also, we searched for woodrat houses without success at two sites about 7 km east of the above localities on Jeffrey Island on 9 December 2010. The first site (40°41.402'N, 99°34.975'W) contained a woodland of mature cottonwoods and few scattered red-cedars interspersed with various grasses and forbs. The second site (40°41.704'N, 99°36.621'W) was a forested area that contained more cottonwoods and red-cedars. Interspersed between trees were many thickets of shrubs comprised of mainly rough-leaf dogwoods. Although cottonwoods were mature, red-cedars were relatively small with diameter breast heights <14 cm. We searched each site for 1 hr without observing a woodrat house.

Lack of a continuous wooded corridor along the Platte River in the region likely has provided an eastern barrier to woodrat dispersal along the river. Much of Jeffrey Island has lacked wooded habitats since at least 1938, based on an aerial photograph taken that year. The main section of the island was grazed continually for decades and continues to lack trees (M. Peyton, Central Nebraska Public Power and Irrigation District, personal communication). Currently, the northern part of the island and lands adjacent to the north contain mainly scattered trees, with some central areas containing moderately dense trees, such as observed in the Dogwood State Wildlife Management Area. Additionally, lands beyond river channels generally consist of agricultural fields that are inhospitable to woodrats. In the Great Plains, recent afforestation of corridors along prairie rivers had enabled mammalian species to traverse into formerly uninhabitable areas (Benedict et al. 2000). Along the Republican and Niobrara rivers in Nebraska, recent documented shifts in the distribution of eastern woodrats has occurred in wooded corridors along waterways (Kugler and Geluso 2009; Geluso unpublished data). We predict

that woodrats will expand eastward along the Platte River if they eventually cross open areas or those with scattered trees, which is increasingly possible in the future as areas with trees become increasingly denser.

Records of Hispid Cotton Rats.—Hispid cotton rats occur from parts of northern South America to the southern half of the United States, with the northernmost records occurring in southern Nebraska (Hall 1981, Cameron 1999, Wright et al. 2010). In Nebraska, the hispid cotton rat currently is known from 13 counties, with many county records reported during the last decade (Wright et al. 2010). In south-central Nebraska, trapping efforts during recent decades in Kearney, Adams, and Phelps counties resulted in a lack of captures for cotton rats (see Wright et al. 2010). Here we report on captures for the hispid cotton rat in Phelps and Gosper counties, which represent the first records for these two counties and extend its distribution northward in the region.

On 25 September and 1–4 October 2009, we captured nine adult hispid cotton rats in 540 total trap nights at a site in Phelps County (one male, UNSM ZM-30029) and two sites in Gosper County (six females and two males; a single female was kept as a voucher —UNK #4489). In areas with hispid cotton rats, we also captured the masked shrew, northern short-tailed shrew (*Blarina brevicauda*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), hispid pocket mouse (*Chaetodipus hispidus*), prairie vole, white-footed deer mouse, North American deer mouse, and western harvest mouse. In Phelps County (High State Wildlife Management Area, 40°33.879'N, 99°38.375'W), we captured cotton rats in a grassland that consisted of smooth brome (*Bromus inermis*), big bluestem (*Andropogon gerardii*), and sunflower (*Helianthus* spp.). This grassland was bordered by a wetland with smartweed (*Polygonum* spp.), barnyard grass (*Echinochloa* spp.), sedges (*Carex* spp.), and rushes (*Juncus* spp.) on one side and corn fields on other sides. At one site in Gosper County (Elley Federal Waterfowl Production Area, 40°28.980'N, 99°40.497'W), we captured individuals in areas containing smooth brome, switchgrass (*Panicum virgatum*), sunflower, milkweed (*Asclepias* spp.), white sage (*Artemisia ludoviciana*), and thistle; the pasture was surrounded by corn and soybean fields. We captured cotton rats at the other site in Gosper County (Peterson Federal Waterfowl Production Area, 40°28.878'N, 99°38.906'W) in a prairie that consisted of mainly smooth brome with scattered forbs including milkweed, dogbane (*Apocynum cannabinum*), and common ragweed (*Ambrosia artemisiifolia*).

Our northern-most record in Phelps County (40°33.879'N, 99°38.375'W) was about 54 km northwest of the closest locality of occurrence in Harlan County (40°06.880'N, 99°25.439'W; Wright and Geluso 2010) and about 47 km west of a former locality of occurrence in Kearney County (Farney 1975). Our records help to understand the distribution of the hispid cotton rat in south-central Nebraska. Further trapping is warranted west and

north of these sites to determine the possible extent of the range in Frontier and Dawson counties, where we suspect the species occurs.

Our research was conducted in part by the Central Platte River Priority Ecosystem Study, U.S. Geological Survey, and supported by Northern Prairie Wildlife Research Center, U.S. Geological Survey. The Undergraduate Research Council at the University of Nebraska at Kearney also provided funding in part for this research. We thank W. Trumbull, C. Castleberry, and C. Helms for assistance in trapping woodrats; M. Peyton (Central Nebraska Public Power and Irrigation District) for granting access to trap for small mammals on Jeffrey Island; J. Drahota (Rainwater Basin Wetland Management District, U.S. Fish and Wildlife Service) for access to trap for small mammals on Federal Waterfowl Production Areas; The Platte River Whooping Crane Critical Habitat Maintenance Trust for lodging; and M. Sovada, B. Anderson, and two anonymous reviewers for comments on earlier versions of the manuscript.—*Heather D. Wills, Keith Geluso¹, Eric J. Smits, Joseph T. Springer, and Wesley E. Newton. Department of Biology, University of Nebraska at Kearney, Kearney, NE 68849, USA (HDW, KG, EJS, JTS). U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown ND 58401, USA (WEN).* ¹Corresponding author e-mail address: gelusok1@unk.edu.

LITERATURE CITED

- Benedict, R. A., H. H. Genoways, and P. W. Freeman. 2000. Shifting distributional patterns of mammals in Nebraska. *Transactions of the Nebraska Academy of Sciences* 26:55–84.
- Cameron, G. N. 1999. Hispid cotton rat / *Sigmodon hispidus*. Pages 593–595 in D. E. Wilson and S. Ruff, editors. *The Smithsonian book of North American mammals*. Smithsonian Institution Press, Washington, D.C., USA.
- Clausen, M. K. 1999. New records of the eastern woodrat from southeastern Nebraska. *The Prairie Naturalist* 30:187–188.
- Farney, J. P. 1975. Natural history and northward dispersal of the hispid cotton rat in Nebraska. *Platte Valley Review* 3:11–16.
- Gannon, W. L., R. S. Sikes, and the Animal Care and Use Committee of the American Society of Mammalogists. 2007. Guidelines of the American Society of Mammalogists for the use of wildlife animals in research. *Journal of Mammalogy* 88:809–823.
- Genoways, H. H., J. D. Hoffman, P. W. Freeman, K. Geluso, R. A. Benedict, and J. J. Huebschman. 2008. Mammals of Nebraska: checklist, key, and bibliography. *Bulletin of the University of Nebraska State Museum, Lincoln* 23:1–92.

- Hall, E. R. 1981. The mammals of North America. Second edition. Volume 2. John Wiley and Sons, New York, New York, USA.
- Jones, J. K., Jr. 1964. Distribution and taxonomy of mammals of Nebraska. University of Kansas Publications, Museum of Natural History 16:1–356.
- Kaul, R. B., D. Sutherland, and S. Rolfsmeier. 2006. The flora of Nebraska. Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Lincoln, USA.
- Kugler, K. A., and K. Geluso. 2009. Distribution of the eastern woodrat (*Neotoma floridana campestris*) in southern Nebraska. Western North American Naturalist 69:175–179.
- Sikes, R. S., W. L. Gannon, and the Animal Care and Use Committee of the American Society of Mammalogists. 2011. Guidelines of the American Society of Mammalogists for the use of wild mammals in research. Journal of Mammalogy 92:235–253.
- Wright, G. D., K. Geluso, and R. A. Benedict. 2010. Hispid cotton rat (*Sigmodon hispidus*) in Nebraska: distribution, reproduction, and seasonal activity. Western North American Naturalist 70:400–406.
- Submitted 29 July 2011. Accepted 6 Dec 2011. Associate Editor was Christopher S. DePerno.