

2004

# LEAST SHREW (*CRYPTOTIS PARVA*) IN EXTREME WEST-CENTRAL NEBRASKA

Keith Geluso  
*United States Geological Survey*

Jeremy A. White  
*University of Nebraska at Omaha*

Michael A. Bogan  
*United States Geological Survey*

Follow this and additional works at: <http://digitalcommons.unl.edu/tnas>



Part of the [Life Sciences Commons](#)

---

Geluso, Keith; White, Jeremy A.; and Bogan, Michael A., "LEAST SHREW (*CRYPTOTIS PARVA*) IN EXTREME WEST-CENTRAL NEBRASKA" (2004). *Transactions of the Nebraska Academy of Sciences and Affiliated Societies*. 11.  
<http://digitalcommons.unl.edu/tnas/11>

This Article is brought to you for free and open access by the Nebraska Academy of Sciences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Transactions of the Nebraska Academy of Sciences and Affiliated Societies by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

## LEAST SHREW (*CRYPTOTIS PARVA*) IN EXTREME WEST-CENTRAL NEBRASKA

Keith Geluso<sup>1</sup>, Jeremy A. White<sup>2</sup>, and Michael A. Bogan<sup>1</sup>

<sup>1</sup>United States Geological Survey  
Arid Lands Field Station  
Museum of Southwestern Biology  
Albuquerque, New Mexico 87131

<sup>2</sup>Department of Biology  
University of Nebraska at Omaha  
Omaha, Nebraska 68182

### ABSTRACT

During the past 35 years, the least shrew (*Cryptotis parva*) has expanded its distribution along riverine and other mesic corridors in western parts of its distribution, although some recently discovered populations in the West might represent relicts of a previous Pleistocene distribution. In Nebraska, the least shrew originally was known only from eastern and central parts of the state, but recent records are now available from extreme west-central Nebraska and the northwestern corner of the state. Our record from west-central Nebraska probably represents recent westward expansion of *C. parva* along the North Platte River. This capture in Scotts Bluff Co., Nebraska was only 225 m from the Wyoming state line. Selective trapping along the North Platte River and its tributaries in eastern Wyoming likely will result in discovery of least shrews in that state.

† † †

The least shrew (*Cryptotis parva*) occurs throughout much of the eastern United States and ranges southward through Mexico into Panama (Hall 1981). In the United States, westernmost limits of its distribution are based on records from South Dakota, Nebraska, Colorado, and New Mexico (Backlund 2002, Benedict et al. 2000, Hafner and Shuster 1996, Hall 1981). In Nebraska, *C. parva* originally was known only from eastern, north-central, and south-central parts of the state (Jones 1964), but recent studies show this soricid to be more widespread. Specimens are now available from the northwestern corner in Dawes and Sheridan counties (Benedict et al. 2000) and from localities in the Sandhill Region (Cherry Co., Bogan and Ramotnik 1995; Thomas Co., Manning and Geluso 1989).

Benedict et al. (2000) postulated that newly discovered specimens of *C. parva* from Dawes and Sheridan counties may represent individuals from a previously

undetected relict population or may represent a recent westward expansion of the species into northwestern Nebraska. Although preliminary comparisons of cranial features between northwestern and eastern populations from Nebraska suggest the possibility of a relict population (Benedict et al. 2000), further investigations are needed to confirm or refute this hypothesis (see Hafner and Shuster 1996). In the present study, we report a new record of *C. parva* from extreme west-central Nebraska and discuss whether it represents a recent immigrant to the region or a descendant of a relict population.

### METHODS

In 2001 and 2002, we conducted surveys of mammals at the North Platte National Wildlife Refuge, Scotts Bluff Co. in western Nebraska. In 2001, surveys were conducted in July, and in 2002, surveys were conducted from May to July. We censused small mammals using Sherman live traps, and on occasion, museum specials and pitfall traps. Traps were set in all major habitats in the refuge. Individuals kept as voucher specimens were deposited in the U.S. Geological Survey Biological Survey Collection at the Museum of Southwestern Biology (MSB), University of New Mexico, Albuquerque.

### RESULTS AND DISCUSSION

On 22 May 2002, we captured an adult *C. parva* in a Sherman live trap on the bank of a narrow perennial stream that borders the southern edge of Stateline Island in North Platte National Wildlife Refuge. The coordinates of the capture site are 41°59.348'N, 104°02.980'W. The stream flows through a riparian forest dominated by cottonwoods (*Populus deltoides*) in

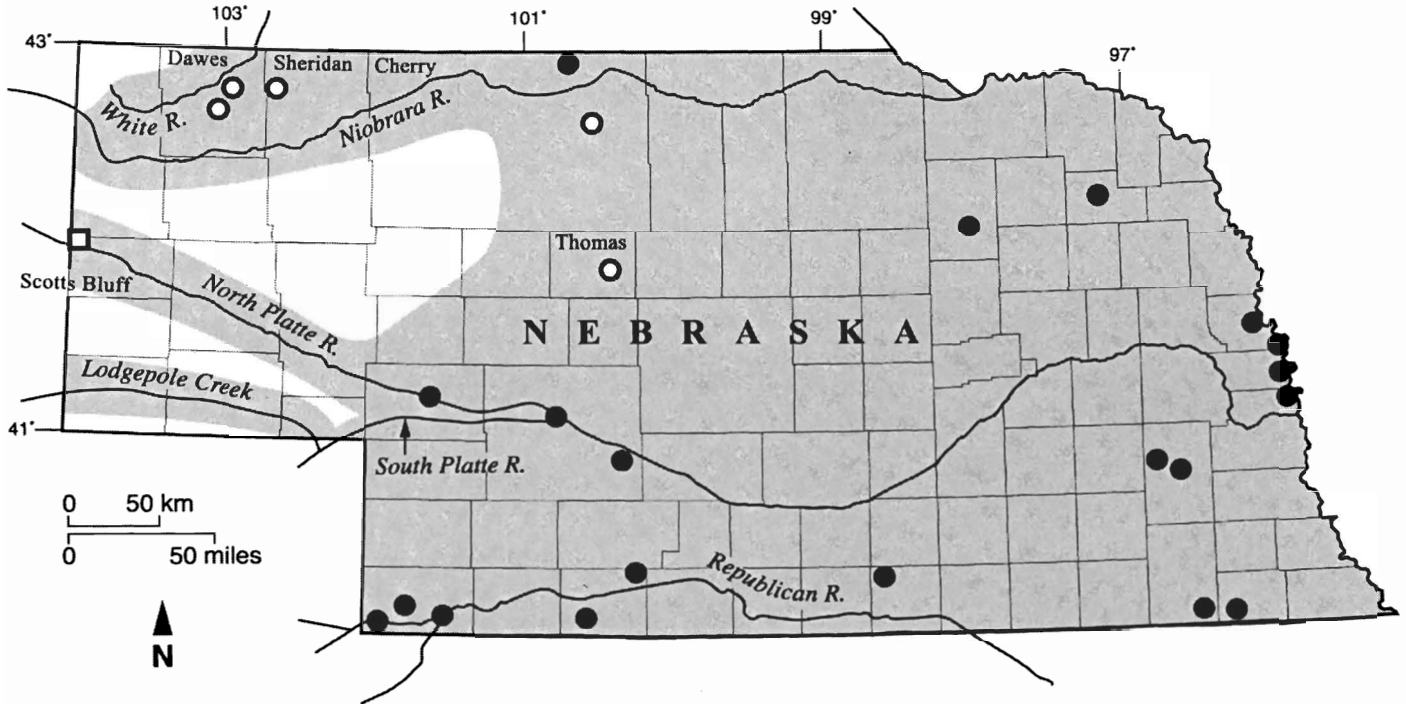


Figure 1. Distribution of the least shrew (*Cryptotis parva*) in Nebraska. Shading represents the proposed distribution in the state. Closed circles represent records published in Jones (1964). Open circles represent published records since Jones (see Benedict et al. 2000). The square represents our record of *C. parva* in extreme west-central Nebraska.

the floodplain of the North Platte River. The shrew (MSB 124187) was a female containing five fetuses; the largest one measured 7 mm in crown-to-rump length. This individual represents the westernmost record for *C. parva* in Nebraska, and it was captured only 225 m from the Wyoming border (Fig. 1). The nearest published record of a least shrew is 120 km to the northeast (Benedict et al. 2000); however, the nearest published record from the floodplain of the North Platte River is 210 km to the southeast (Fig. 1; Jones 1964). Although *C. parva* generally inhabits more upland habitats than the masked shrew (*Sorex cinereus*) in Nebraska (Jones 1964), our *C. parva* was captured within 30 m of a *S. cinereus*, and both species were captured in the same habitat.

In the past 35 years, the distribution of *C. parva* has expanded because many new records have been discovered beyond the westernmost limits reported by Hall and Kelson (1959) and Jones (1964). Records of *C. parva* discovered after 1964 now exist in all states in western parts of its range, including South Dakota (Backlund 1995, Backlund 2002), Nebraska (Benedict et al. 2000, this study), Kansas (Bee et al. 1981, Choate and Reed 1988), Colorado (Armstrong 1972, Choate and Reed 1988), Texas (L. Choate 1997, Jones et al. 1993, Owen and Hamilton 1986), and New Mexico (Hoditschek et al. 1985, Owen and Hamilton 1986).

Thus far, two scenarios have been proposed for origins of these peripheral populations. First, populations may be spreading because of recent expansion of favorable mesic habitats due to extensive irrigation, roadside ditches, stock ponds, or cooler and wetter climates (Armstrong 1972, Backlund 2002, Choate and Reed 1988, Frey 1992, Owen and Hamilton 1986). Or second, peripheral populations might represent surviving relicts of a previous Pleistocene distribution (Benedict et al. 2000, Hafner 1993, Hoditschek et al. 1985).

Recently, Hafner and Shuster (1996) compared allozymic patterns of three extant peripheral populations of least shrews in New Mexico to populations farther east in Texas. They concluded that two of the populations probably resulted from recent dispersal from the east, while the other probably represents a relict population from a more mesic period during the Wisconsinian. Populations resulting from westward expansion are connected to eastern populations by east-flowing drainages, while the population suspected of being a relict is isolated from eastern populations by an elevated, arid plateau.

We believe our record of *C. parva* from the floodplain of the North Platte River is another example of least shrews moving west along a riverine corridor.

Our conclusion is similar to suspected westward movement of *C. parva* in nearby northeastern Colorado (Armstrong 1972) and southwestern South Dakota (Backlund 2002). In addition, we suspect specimens from Dawes and Sheridan counties in northwestern Nebraska are probably another example of recent westward movements rather than descendants of a relict population. This prediction is based on the fact that drainages and other suitable habitats in northwestern Nebraska are connected to those in southwestern South Dakota. Although western populations might have gone undetected because of lack of past surveys, documentation of westward movement of *C. parva* along most parts of its western distribution suggests this sorcid has been expanding throughout the plains in recent years (see Armstrong 1972, Backlund 2002, Choate and Reed 1988, Owen and Hamilton 1986). Clearly, additional investigations of genetic patterns of *C. parva* along the western edge of its range would help determine origins of peripheral populations; however, if eastern populations are expanding, reconnecting, and interbreeding with relict populations, origins might be difficult to ascertain via genetic studies (Hafner and Shuster 1996).

Least shrews are not the only species of mammal moving westward along riverine corridors in the Great Plains. A number of woodland mammals also have expanded into central regions of the United States (Benedict et al. 2000, Choate and Krause 1974, Choate and Reed 1986, Geluso 2004, Sparks and Choate 1995, Sparks and Choate 2000, Wilson and Choate 1996). Changes in land use (e.g., suppression of prairie fires, elimination of native grazers, planting of native and exotic trees, and alteration of flow regimes in rivers) have increased forests and woodlands, especially along waterways in the Great Plains (Johnson 1994). These wooded corridors have been suggested as the cause for westward movements of woodland species, and changes in land use probably are related to westward movements of *C. parva* in Nebraska.

To our knowledge, no published record of *C. parva* is known from Wyoming, except for fossil records from the late Pleistocene (Harris 1985). Because of the proximity of our record to the Wyoming border and because of recent westward expansions of *C. parva* along east-flowing drainages, we suspect, as others do (Backlund 2002), that *C. parva* occurs in eastern portions of Wyoming and should be looked for along the North Platte River and its tributaries.

#### ACKNOWLEDGMENTS

We thank B. McKinney and S. Knode of the North Platte National Wildlife Refuge for their logistical assistance during our project and for allowing us to con-

duct surveys of mammals on refuge property. We also thank R. Benedict and an anonymous reviewer for helpful comments on an earlier version of the manuscript, C. Ramotnik (U.S. Geological Survey, Biological Survey Collection, Museum of Southwestern Biology, University of New Mexico, Albuquerque) for assistance in museum matters associated with this research, and A. Fox (University of Nebraska State Museum) for preparing Fig. 1.

#### LITERATURE CITED

- Armstrong, D. M. 1972. Distribution of mammals in Colorado. *Monograph of the Museum of Natural History, The University of Kansas* 3: x + 1–415.
- Backlund, D. C. 1995. New records for the dwarf shrew, pygmy shrew, and least shrew in South Dakota. *Prairie Naturalist* 27: 63–64.
- . 2002. The expanding distribution of the least shrew, *Cryptotis parva*, in South Dakota. *Proceedings of the South Dakota Academy of Science* 81: 153–159.
- Bee, J. W., G. E. Glass, R. S. Hoffmann, and R. R. Patterson. 1981. Mammals in Kansas. *Public Education Series of the Museum of Natural History, University of Kansas* 7: ix + 1–300.
- 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.
- Bogan, M. A., and C. A. Ramotnik. 1995. The mammals. In: M. A. Bogan (ed.), *A Biological Survey of the Fort Niobrara and Valentine National Wildlife Refuges*. Fort Collins, CO: Midcontinent Ecological Science Center, National Biological Service, U. S. Department of the Interior: 140–186.
- Choate, J. R., and J. E. Krause. 1974. Historical biogeography of the gray fox (*Urocyon cinereoargenteus*) in Kansas. *Transactions of the Kansas Academy of Science* 77: 231–235.
- , and K. M. Reed. 1986. Historical biogeography of the woodchuck in Kansas. *Prairie Naturalist* 18: 37–42.
- , and M. P. Reed. 1988. Least shrew, *Cryptotis parva*, in southwestern Kansas and southeastern Colorado. *Southwestern Naturalist* 33: 361–362.
- Choate, L. L. 1997. The mammals of the Llano Estacado. *Special Publications of the Museum, Texas Tech University* 40: 1–239.
- Frey, J. K. 1992. Response of a mammalian faunal element to climatic change. *Journal of Mammalogy* 73: 43–50.
- Geluso, K. 2004. Westward expansion of the eastern fox squirrel (*Sciurus niger*) in northeastern New Mexico and southeastern Colorado. *Southwestern Naturalist* 49: 111–116.

- Hafner, D. J. 1993. Reinterpretation of the Wisconsin mammalian fauna and paleoenvironment of the Edwards Plateau, Texas. *Journal of Mammalogy* 74: 162–167.
- , and C. J. Shuster. 1996. Historical biogeography of western peripheral isolates of the least shrew, *Cryptotis parva*. *Journal of Mammalogy* 77: 536–545.
- Hall, E. R. 1981. *The Mammals of North America, Second ed.* New York, John Wiley and Sons: 1: 1–600 + 90 pp.
- , and K. R. Kelson. 1959. *The Mammals of North America*. New York, Ronald Press Company: 1: 1–546 + 79 pp.
- Harris, A. H. 1985. *Late Pleistocene Vertebrate Paleocology of the West*. Austin, University of Texas Press: 293 pp.
- Hoditschek, B., J. F. Cully, Jr., T. L. Best, and C. Painter. 1985. Least shrew (*Cryptotis parva*) in New Mexico. *Southwestern Naturalist* 30: 600–601.
- Johnson, W. C. 1994. Woodland expansion in the Platte River, Nebraska: Patterns and causes. *Ecological Monographs* 64: 45–84.
- Jones, J. K., Jr. 1964. Distribution and taxonomy of mammals of Nebraska. *Publications of the Museum of Natural History, University of Kansas* 16: 1–356.
- , R. W. Manning, F. D. Yancey, and C. Jones. 1993. Records of five species of small mammal from western Texas. *Texas Journal of Science* 45: 104–105.
- Manning, R. W., and K. N. Geluso. 1989. Habitat utilization in a man-made forest in the Sandhill region of Nebraska. *Occasional Papers of the Museum, Texas Tech University* 131: 1–34.
- Owen, R. D., and M. J. Hamilton. 1986. Second record of *Cryptotis parva* (Soricidae: Insectivora) in New Mexico, with review of its status on the Llano Estacado. *Southwestern Naturalist* 31: 403–405.
- Sparks, D. W., and J. R. Choate. 1995. New distributional records for mammals in Kansas. *Prairie Naturalist* 27: 185–192.
- , and J. R. Choate. 2000. Distribution, natural history, conservation status, and biogeography of bats in Kansas. In: Choate, J. R. (ed.), *Reflections of a Naturalist: Papers Honoring Professor Eugene D. Fleharty*. Fort Hays Studies, Special Issue 1: 173–228.
- Wilson, G. M., and J. R. Choate. 1996. Continued westward dispersal of the woodchuck in Kansas. *Prairie Naturalist* 28: 21–22.