

RECORDS OF THE NORTHERN GRASSHOPPER MOUSE  
(*ONYCHOMYS LEUCOGASTER*) IN WESTERN IOWA

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ABSTRACT.—In Iowa, the northern grasshopper mouse (*Onychomys leucogaster*) previously was known only from the northwestern part of the state. Herein, we report records of *O. leucogaster* from the 1970s and 1980s that extend its distribution into west-central and southwestern Iowa. These records may represent dispersal movements into these parts of Iowa by southward movements from populations in northwestern Iowa or they may represent eastward movements of individuals from Nebraska prior to channelization of the Missouri River.

*Key words:* *Onychomys leucogaster*, northern grasshopper mouse, distribution, records, Iowa, Missouri River.

The northern grasshopper mouse (*Onychomys leucogaster*) occurs across western and central North America, including parts of Canada, the United States, and Mexico (Hall 1981). In the United States, *O. leucogaster* reaches its easternmost limits in Minnesota, Iowa, Nebraska, Kansas, Oklahoma, and Texas (Hall 1981, Benedict et al. 2000). Throughout its range, it inhabits partially disturbed to undisturbed areas of shrubsteppe, desert scrublands, and various types of grasslands (Jones 1964, Choate and Terry 1974, McCarty 1978, Mulligan et al. 2005).

Distribution of the northern grasshopper mouse has remained relatively static across most of its range during the last half century (Hall and Kelson 1959, Hall 1981, Reid 2006). However, in Nebraska, its distribution has expanded eastward, with records beyond the easternmost limits reported by Jones (1964). Genoways and Choate (1970) reported records in Cass County, and Benedict et al. (2000) described 11 additional records in Richardson, Cass, and Otoe counties in extreme eastern and southeastern Nebraska. In adjacent Iowa, *O. leucogaster* only has been captured in grassy habitats from Dickinson, Lyon, Plymouth, Sioux, and Kossuth counties in northwestern Iowa (Bowles 1975).

Herein, we report 2 records of *O. leucogaster* from the 1970s and 1980s from west-central and southwestern Iowa (Fig. 1). To learn more about habitats and other details at sites of capture, we contacted the original collector

and preparator for the specimen from Mills County, and we tracked down field notes and an unpublished report for the specimen from Pottawattamie County. Voucher specimens originally were deposited in the natural history collection at the University of Nebraska at Omaha; but presently, both specimens are housed in collections at the Division of Zoology, University of Nebraska State Museum (UNSM), University of Nebraska at Lincoln.

Record from Mills County

On 29 October 1978, a male *O. leucogaster* (UNSM 19015) was captured “7 miles S of Malvern on county road L66 in Mills County,” about 80 m north of Fremont County. This locality is 15 km east of the floodplain of the Missouri River and 1.2 km west of the West Nishnabotna River. The individual was captured in a roadside ditch dominated by brome (*Bromus*) and surrounded by agricultural fields of corn or soybeans. The area of the capture site was flat, but with rolling hills 0.8 km to the west. Other species of small mammals captured in Sherman live traps in the immediate area included northern short-tailed shrew (*Blarina brevicauda*), house mouse (*Mus musculus*), prairie vole (*Microtus ochrogaster*), and southern bog lemming (*Synaptomys cooperi*).

Record from Pottawattamie County

On 4 June 1989, a male *O. leucogaster* (UNSM 29172) was captured at DeSoto

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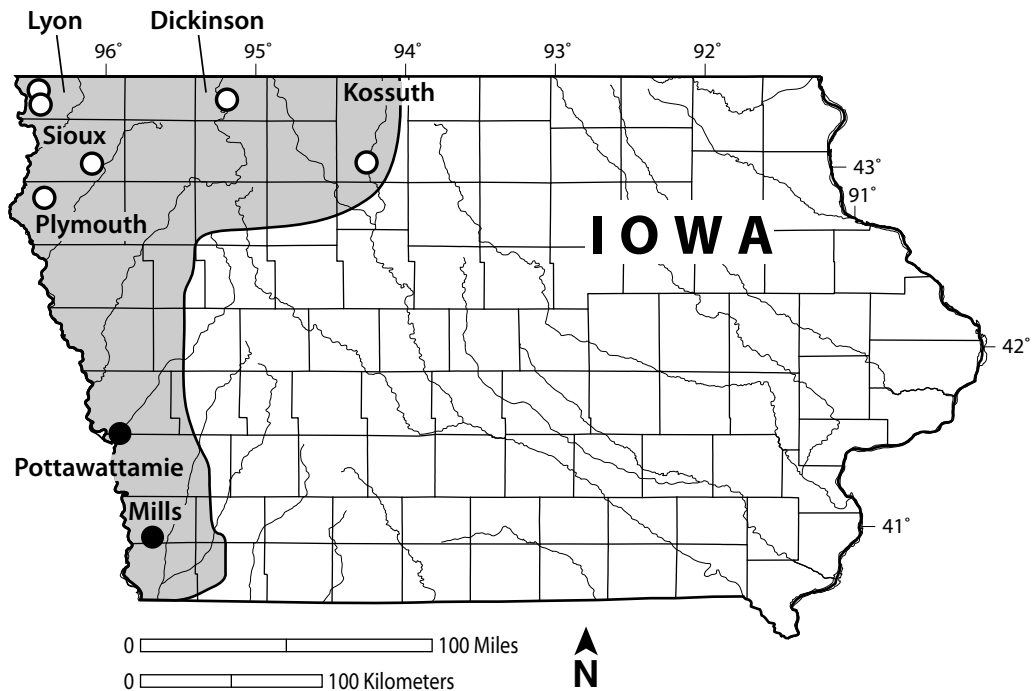


Fig. 1. Distribution of the northern grasshopper mouse (*Onychomys leucogaster*) in Iowa. Open circles represent previously published records (Bowles 1975), and closed circles represent newer records from 1978 and 1989 presented in this study. The shaded region represents the currently known distribution of *O. leucogaster* in Iowa.

National Wildlife Refuge in Pottawattamie County. This wildlife refuge is located in the floodplain of the Missouri River, about 8 km west of Missouri Valley, Iowa. This individual was captured in a grassland dominated by brome that had not been burned for at least 10 years prior to the date of capture. Grasses ranged from 0.3 to 0.6 m in height. The capture site was dry and contained areas of open sand. Other species captured in Sherman live traps in nonnative grasslands at the refuge included *M. ochrogaster* and the western harvest mouse (*Reithrodontomys megalotis*).

#### Conclusions

Our records of *O. leucogaster* from west-central and southwestern Iowa are east of recent records from eastern Nebraska (Benedict et al. 2000) and south of former records from Iowa (Bowles 1975). Explanations for our new records in western Iowa are unknown, but we propose 2 possible scenarios: records represent an eastward expansion from Nebraska prior to the channelization of the Missouri

River, or records represent a southward expansion from northwestern Iowa.

Northern grasshopper mice in western Iowa may have originated from populations in eastern Nebraska prior to the channelization of the Missouri River—that is, before construction of Gavins Point Dam in the late 1960s near Yankton, South Dakota. Jones (1964) suggested that the Missouri River and its riparian forests acted as a barrier to dispersal of *O. leucogaster* eastward at the latitude of Nebraska. He also noted that this barrier was breached to the north in South Dakota, where *O. leucogaster* occurs on the eastern side of the Missouri River. Prior to the river's channelization, movements of river channels may have permitted northern grasshopper mice to disperse across the floodplain of the Missouri River. Historically, rivers without large-scale alterations to hydrology, such as dams, likely enabled small terrestrial vertebrates to occasionally disperse across channels during periods of low flow or when channels were completely dry. During periods of high flow, the lateral movements of channels in floodplains may also permit movement across

the river. Channels change position mainly as blocked flows reroute to paths of least resistance. During flood pulses, this rerouting can move waterways to the opposite sides of land masses in floodplains. As river channels change, these areas of land along with their sessile (or nearly sessile organisms) remain in one spot. During such events, organisms could be said to "move across" the river, but the river actually moves around them, yielding individuals on the opposite side of the river.

A second hypothesis for how individuals reached west-central and southwestern Iowa is by southward movement from populations of *O. leucogaster* in northwestern Iowa. This movement would actually be an extension of the suspected original southeastward movement of *O. leucogaster* from southeastern South Dakota into northwestern Iowa (Bowles 1975). We find such a scenario more likely than *O. leucogaster* originating in Nebraska, especially if individuals reached the Missouri River in eastern Nebraska after its channelization. For example, Benedict et al. (2000) postulated that because of widespread trapping in the region by prior mammalogists, recent distributional records in eastern parts of Nebraska were likely the result of a recent expansion in distribution rather than undetected populations (see Jones 1964).

Explanations for possible southward movements in Iowa associate these movements with habitats created by large-scale changes in land use in the region. Benedict et al. (2000) suggested that dispersal of *O. leucogaster* into eastern Nebraska was associated with clearing of forests, increased use of land for agriculture, and establishment of roadside ditches. Similar large-scale changes in habitat also apply to western Iowa. Several studies note that roadside ditches and upland grain fields are habitats commonly used by northern grasshopper mice in the Great Plains (Jones 1964, Choate and Terry 1974, Bowles 1975). Such habitats provide an abundant supply of food, materials for constructing dens, and areas of bare ground for dust-bathing (Choate and Terry 1974, Benedict et al. 2000). These stocky-bodied mice appear to inhabit areas void of dense vegetation for easier travel and areas having greater densities of prey (Stapp 1997). Bowles (1975) noted that the first few individuals captured in Iowa were from a short-grass pasture and grassy areas by roadways.

To our knowledge, no published record of *O. leucogaster* is known east of our localities in

west-central and southwestern Iowa. We suspect that further trapping in western, central, and southwestern Iowa will show a more widespread distribution of *O. leucogaster*.

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