

Records of the Red-bellied Snake (*Storeria occipitomaculata*) in central and northeastern Nebraska

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Abstract

Red-bellied Snakes (*Storeria occipitomaculata*) are a distinctive, small species that live in moist woodlands throughout much of eastern North America. In the Great Plains, isolated populations exist in South Dakota, Wyoming, and Nebraska. In Nebraska, the only known extant population occurs in wooded riparian habitats along the Big Bend Reach of the Platte River in south-central parts of the state. Herein, we report on new county records of Red-bellied Snakes in Nebraska, with two observations from Merrick County along the Platte River adjacent to known populations and two observations of a new population in the extreme northeastern part of the state in Dixon County. The Dixon County population likely is contiguous with populations from southeastern South Dakota and northwestern Iowa. It is unknown whether populations in Nebraska are connected currently. Our county records provide notable data on the distribution and habitat of the Red-bellied Snake in the state and suggest we likely do not understand the full extent of the distribution for this secretive species in Nebraska.

Keywords: county records, distribution, Dixon County, Merrick County, Nebraska, Red-bellied Snake, *Storeria occipitomaculata*

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The Red-bellied Snake (*Storeria occipitomaculata*) is a small species with varying shades of brown and gray on the dorsum with characteristic red or orangish ventral scales (Ernst and Ernst 2003). This fossorial species consumes predominantly slugs, but also earthworms, beetle larvae, and snails, and occurs in moist woodlands with rocks or logs across as well as grasslands bordering woodlands (Ernst and Ernst 2003, LeClere 2013, Tye et al. 2017). Red-bellied Snakes occur from Nova Scotia to Saskatchewan southward to Florida and eastern Texas (Ernst and Ernst 2003).

In the Great Plains, isolated populations of Red-bellied Snakes occur along the Platte River in Nebraska and in the Black Hills of South Dakota/Wyoming (Ernst and Ernst 2003, Ballinger et al. 2010, Fogell 2010, Tye et al. 2017, Kiesow and Davis 2020). In Nebraska, recent observations in the last few decades are known from five counties (Buffalo, Dawson, Hall,

Kearney, and Phelps) along the Big Bend Reach of the Platte River in south-central parts of state (Fogell 2010, Geluso 2012, Tye et al. 2017, Schaaf and Caven 2023). The first report of this species in this region was from the 1960s (Lynch 1985) whereas the second record from the area was from 1989 (Peyton 1989), demonstrating that Red-bellied Snakes have been rather inconspicuous in Nebraska for decades. In the state, this secretive species has two peaks of activity (i.e., at least when we commonly observe them), one in April/May and the other in September (Tye et al. 2017) that is likely associated with movements to and from hibernacula (Ernst and Ernst 2003, Fogell 2010). Herein, we report on several observations of Red-bellied Snakes in Nebraska that represent new records from Merrick and Dixon counties. Moreover, the observations from Dixon County represent a new region of occurrence and habitat for this species in the state.

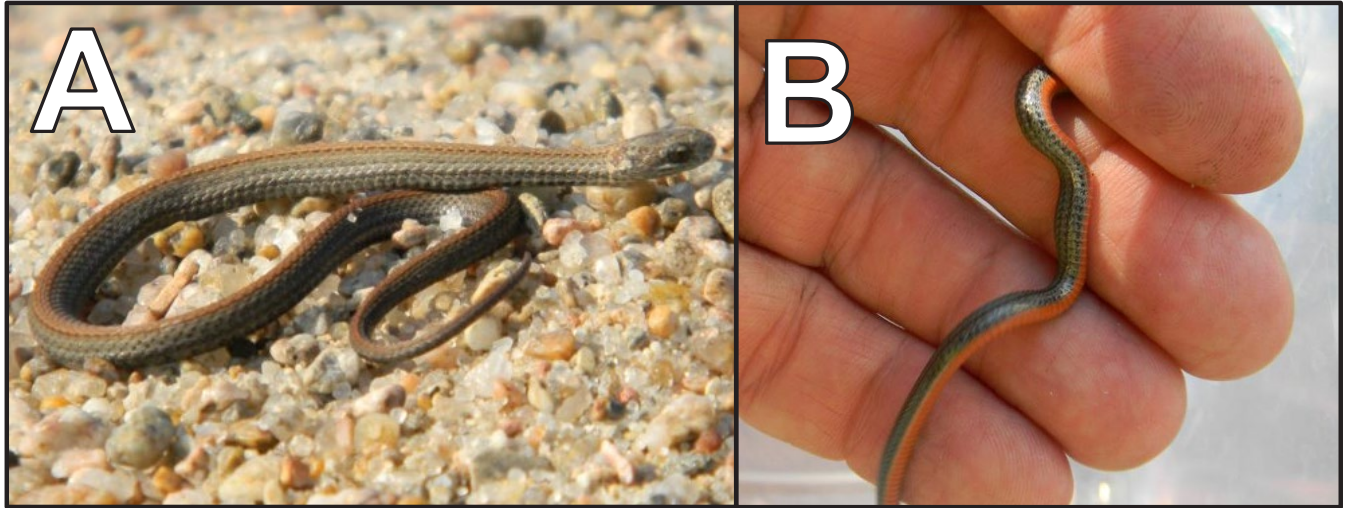


Figure 1. Photograph of A) dorsal view and B) side view of a Red-bellied Snake (*Storeria occipitomaculata*) from under a bridge on Nebraska Highway 92 that spans the Platte River, south and east of Clarks, Merrick County, Nebraska, from 5 September 2012. Photographs taken by James Duffy.

In Merrick County, we report on two observations of Red-bellied Snakes. One observation was on 5 September 2012 from under a bridge on Nebraska Highway 92 that spans the Platte River (3.5 km S, 1.1 km E Clarks; 41.185301°N, 97.824360°W, WGS 84; Fort Hays Sternberg Museum of Natural History [FHSM], Photographic Voucher #16498; **Figure 1**). The habitat surrounding the area consisted of dense and open wooded areas along with grazed pastures in the flood plain of the river. Several borrow pits were also in the area. The high temperature on this day was 30.0°C with a low of 15.0°C, and the individual was a young-of-the-year based on its size.

The second observation from Merrick County was at Bader Memorial Park on 21 April 2022 (2.4 km S, 0.5 km E Chapman Post Office; 40.988555°N, 98.148994°W, WGS 84). The individual was observed in a small patch of mowed grassland about 25 m from riparian woodlands that bordered an active channel of the Platte River (**Figure 2**). Riparian woodlands also occurred about 65 m to the east and northeast of the observation site, across a paved roadway. To the southwest of the small, mowed grassland was another grassland that has been burned occasionally but not grazed by livestock for the last 15 years. To the northwest was a grazed grassland along Wood River, a small creek about 425 m away that meanders through the property. Wood River flows into the Platte just to the northeast of the observation site. Thus, the entire area was within the flood plain of the Platte River

and represented by lowland woodlands and grasslands. On the day of observation for this Red-bellied Snake, the high temperature was 23.3°C with a low of 2.8°C (Chapman, Nebraska; data from Wunderground.com).

All previously published recent records of Red-bellied Snakes have been from counties to the west of Merrick County along the Platte River. Thus, these new observations extend the distribution of this species 62.5 km to the east from the closest previously published record, about 3.8 km north of Doniphan in Hall County (40.8082°N, 98.3803°W; Tye et al. 2017). With our new observations, we would expect this species to likely occur farther east along the Platte River. We certainly expect the species to occur in both Hamilton and Polk counties, as those counties are just to the south of sites reported herein on the opposite side of the Platte River.

In Dixon County, we report on two observations of Red-bellied Snakes from near Martinsburg, Nebraska. Both observations were documented at a single homestead 2.8 km W Martinsburg (42.510°N, 96.866°W; WGS 84) during a 7-year period. The first specimen was found killed by a domestic cat (*Felis catus*) on 21 September 2016 (**Figure 3**; FHSM #18140), whereas the second individual was captured alive and released on 25 September 2023 (**Figure 4**). The habitat surrounding the homestead consisted of agricultural fields, some grassland pastures, and a small creek (i.e., Daily Branch) with patches of woodlands. The Missouri River is about 17 km to the



Figure 2. Photograph of A) dorsal view and B) ventral view of a Red-bellied Snake (*Storeria occipitomaculata*) near Chapman, Merrick County, Nebraska from 21 April 2023. Photographs taken by Sarah M. Bailey.

northeast, so these individuals were not directly associated with the Missouri River floodplain or riparian woodlands of the Missouri River. On days of observations, the high and low temperatures were 25.6°C and 14.4°C on 21 September 2016 and 22.8°C and 10.6°C on 25 September 2023 (Allen, Nebraska; data from Wunderground.com).

Due to their small size, these snakes have many potential predators. Known predators include bass, snakes, domestic chickens, other birds, and ground squirrels (Ernst and Ernst 2003). Our report of a predation event on this species by a domestic cat is not surprising, as cats are voracious predators on many small animals, including reptiles (Loss et al. 2013). As human populations continue to grow in Nebraska, especially along wooded waterways such as the Platte River, domestic and feral cats could be a threat to local populations of this uncommonly seen species.

These observations from Dixon County represent a new region of the state for the occurrence of this species, as all records in recent decades were from south-central Nebraska (Tye et al. 2017, Schaaf and Caven 2023). For our Dixon County records, the closest record in Nebraska is from 167 km to the southwest near Clarks, noted above in Merrick County, along the Platte River. However, the closest previously published record is outside of Nebraska only 56.0 km to the northeast in Union

County, South Dakota (River Rd, ~0.8 rd km N jct 307th St, 42.94456°N, 96.52338°W; Biodiversity Collections, The University of Texas at Austin [TNHC], #106069; Kiesow and Davis 2020). We suspect that the population in Dixon County likely is contiguous with those known populations in southeastern South Dakota and northwestern Iowa (LeClere 2013, Kiesow and Davis 2020). It is unclear whether the population in south-central Nebraska is contiguous with those newly discovered in northeastern Nebraska.

These four new observations of the Red-bellied Snake suggest the distribution of this secretive species still might be incomplete in Nebraska. A historic record (1850s) either from along the Missouri River in Washington County or from eastern reaches of the Platte River just west of Omaha in Douglas County (Lynch 1985, Somma 2022) suggests that populations might occur along the entire Missouri River in eastern Nebraska and along the Platte River from central Nebraska east to the Missouri River. Red-bellied Snakes are known from the entire eastern border of Kansas and South Dakota (Ernst and Ernst 2003, Collins et al. 2010, Kiesow and Davis 2020), so it is unclear why the species is not known from all of eastern Nebraska and western Iowa.

The recorded habitat for this species in Nebraska is lowland river floodplains with wooded habitats (Tye et al. 2017). However, a recent paper documented this

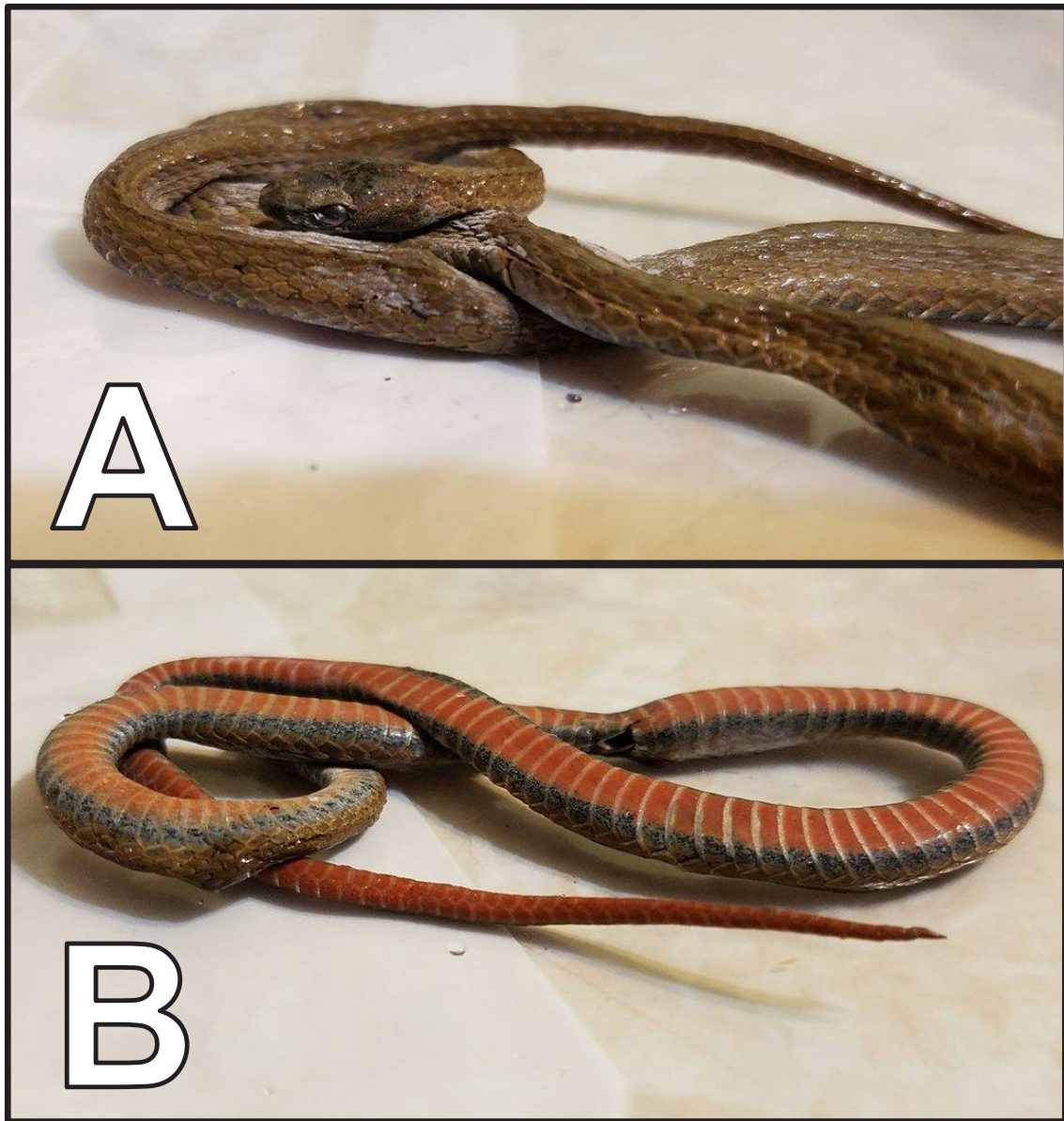


Figure 3. Photograph of A) dorsal view and B) ventral view of a Red-bellied Snake (*Storeria occipitomaculata*) from Dixon County from 21 September 2016 that was killed by a domestic cat (*Felis catus*). Photographs taken by Kenna Anderson.

species in grassland habitats distant from wooded areas along the Platte River (Schaaf and Caven 2023). Our new observations from Dixon County also suggest this species might not be confined to lowland riverine wooded habitats but also occurs in more upland wooded habitats away from large rivers.

Much information remains unknown for this secretive species in the state, in part, due to the relatively few observations of the species throughout the years. All four observations reported herein occurred during the

two known peaks of activity/observation from the state (Tye et al. 2017), as one of our observations was from April and the other three observations were from September. This species is most diurnal during these activity peaks, being commonly observed in the late morning and afternoon (Ernst and Ernst 2003). During warmer summer weather, the species becomes more nocturnal and crepuscular (Ernst and Ernst 2003, LeClere 2013). Based on our observations and the little that is known about Red-bellied Snake activity, we suggest conducting



Figure 4. Photograph of a Red-bellied Snake (*Storeria occipitomaculata*) from Dixon County from 25 September 2023. Photograph taken by Angie Ketelsen.

future surveys during April and September on warm days to increase the chances of observations. Any additional observations of this species should be shared with biologists in the state and confirmed with photographs of the snake's head and underside. To further our understanding of Red-bellied Snake ecology and distribution, all small snakes documented along the Platte and Missouri rivers in Nebraska need to be closely inspected and identified.

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