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SHORT COMMUNICATION

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Abstract

The Slender Glass Lizard (*Ophisaurus attenuatus*) reproduces across parts of northern and central Kansas, but its distribution extends into southern Nebraska. In Nebraska, not a single aspect of reproductive activity has been reported for this species in the state. Herein, we report on the first documentation of reproduction in Nebraska. On 22 September 2021, we captured two hatchling Slender Glass Lizards at the Ash Grove Wildlife Management Area in Franklin County, Nebraska. We calculated that those individuals likely hatched around the first week of September. Presence and reproduction of Slender Glass Lizards at the study site likely was associated with ungrazed grasslands. Although Slender Glass Lizards were listed as extinct in the state prior to 2009 due to a lack of sightings for decades, a few recent observations have been reported in southern counties bordering Kansas. In Nebraska, additional surveys and studies are required to better understand the distribution and requirements for this species of conservation need in the state.

Keywords: Grassland, hatchling, Nebraska, *Ophisaurus attenuatus*, reproduction, Slender Glass Lizard

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The Slender Glass Lizard (*Ophisaurus attenuatus*) occurs from the Atlantic Coast, Virginia to Florida, westward to central parts of Texas, Oklahoma, and Kansas (Holman 1971, Ballinger et al. 2010). This species reaches its northwestern distribution in Franklin and Johnson counties of southern Nebraska (Hudson 1942, Lynch 1985, Ballinger et al. 2010, Fogell 2010). Western populations of Slender Glass Lizards inhabit tallgrass prairies, especially those with loose soils, but these lizards are uncommon or rare in grazed grasslands (Fitch 1989, Fogell 2010). Slender Glass Lizards generally copulate in April and May (Trauth 1984, Fitch 1989) and lay eggs in late June and early July, with an incubation period of about 7 weeks (Fitch 1989). Eggs generally hatch in late August in northeastern Kansas (Fitch 1989). Slender Glass Lizards reproduce across parts of northern and central Kansas (Fitch 1989), but to date, no record of reproduction has been reported from Nebraska (Ballinger et al. 2010, Fogell 2010). Herein, we report the first evidence of reproduction for Slender Glass Lizards in Nebraska.

On 22 September 2021, we captured two hatchling Slender Glass Lizards (**Fig. 1**) by hand at Ash Grove Wildlife Management Area in Franklin County, Nebraska (6.6 km S, 1.2 km W Franklin Post Office; 601 m elev.). Individuals were captured at about 1500 h Central Daylight Savings Time, with a temperature of 24.4°C, southwest winds at 14.5 km/h, and clear skies. We only measured one individual, but both individuals were approximately the same size. Snout-vent length of one lizard was 66 mm, tail length was 135 mm, and weight was approximately 1 g. Individuals were discovered within about 15 m of each other in an open low-lying area with dense grasses and milkweed (**Figs. 2 and 3**). The upland dry slope to the east contained large rocks, scattered trees, including Eastern Redcedars (*Juniperus virginianus*), and various grasses and forbs. Dry slopes to the west were dominated by Smooth Brome (*Bromus inermis*) and shrubs. The wildlife management area was not grazed and not burned for quite some time based on the encroachment of shrubs into grasslands in some areas of the property.

Figure 1. Hatchling Slender Glass Lizard (*Ophisaurus attenuatus*) in Franklin County, Nebraska, on 22 September 2021. Individual had a snout-vent length of 66 mm and was calculated to have hatched sometime in the last 5 to 27 days. Photograph by K. Geluso.

Figure 2. Site of capture for two hatchling Slender Glass Lizards (*Ophisaurus attenuatus*) in Franklin County, Nebraska. Individuals were captured in the dense low-lying area in the center of the picture with milkweed pods and dense grasses. Photograph by K. Geluso.

Our observations of hatchling Slender Glass Lizards in Franklin County represent the first observation of reproduction for this rare lizard species in Nebraska (Hudson 1942, Lynch 1985, Ballinger et al. 2010, Fogell 2010). On the basis of size, we calculated individuals were from 5 to 27 days old upon capture, as hatchlings are reported from 50 to 63 mm in length and grow at an average rate of 0.6 mm/day (Fitch 1989). In northeastern Kansas, average date of oviposition is 1 July (±1.8 days) with hatching dates in late August (Fitch 1989). Based on the average number of days (16 days) from when individuals hatched, these lizards likely hatched around the first week of September, which is about a week later than in northeastern Kansas (Douglas County; Fitch 1989). Average temperature, minimum temperature, and growing degree days decrease to the north and west (https://hprcc.unl.edu/maps) from northeastern Kansas to south-central Nebraska. For poikilothermic species, such as reptiles, that require heat in the environment to grow, cooler temperatures in southern Nebraska potentially delayed the hatching date. Other studies have demonstrated a latitudinal influence on growth and reproduction for Slender Glass Lizards, with populations growing faster and reproducing earlier at more southerly latitudes (Fitch 1989). However, more data are needed to support or refute our conclusions on when this species hatches in the state.

Although our site of observation only was 3.8 km north of the Kansas border, the estimated home range of juvenile glass lizards only is 0.16 ha (Fitch 1989). Based on prior research, data suggest these lizards inhabit areas near where they hatch, which would be in Nebraska and not multiple kilometers to the south in Kansas. Furthermore, we suspect that individuals were from the same nest, based on the proximity of hatchlings, individuals

Figure 3. Closeup of the habitat at the site of capture for two hatchling Slender Glass Lizards (*Ophisaurus attenuatus*) in Franklin County, Nebraska. Individuals were captured in the dense low-lying area in foreground with the milkweed pods and dense grasses. Photograph by K. Geluso.

being the same size, rarity of the species in the state, and the fact that female glass lizards lay multiple eggs from 5 to 16 in a single nest (Blair 1961, Trauth 1984, Fitch 1989).

In northeastern Kansas, presence of Slender Glass Lizards was strongly correlated with grassy areas, as species attained maximum densities on ungrazed pastures and was scarce in locations grazed by livestock (Fitch 1989). Even grasslands dominated by exotic grass, such as Smooth Brome, provided habitat used by individuals (Fitch 1989). In northeastern Kansas, decreased grazing on pastures resulted in increased lizard abundances (Fitch 1989). Eventually, encroachment of brush and trees in ungrazed grasslands led to a decrease in abundance after about two decades at the site (Fitch 1989). Presence and reproduction of Slender Glass Lizards at the Ash Grove Wildlife Management Area in Nebraska likely was associated with non-wooded, ungrazed grassland environments. Observations of pastures immediately surrounding the wildlife management area demonstrated that most grasslands were heavily grazed. Securing or protecting additional pastures from grazing should further benefit this species in southern Nebraska and result in increased abundances and additional reproductive sites for glass lizards. It is unclear whether our observations in a somewhat mesic low-lying habitat was a coincidence or attribute requisite for hatchlings at this northwestern edge of its distribution. In northeastern Kansas, however, of five distinct areas at a research site, the majority of Slender Glass Lizards were captured in bottomland field areas compared to four upland areas (Fitch 1989). Lowland habitats also are conducive for voles (*Microtus* spp.) and their underground tunnels, which were present at our site in Franklin County and known to be important sites for burrowing and laying eggs (Fitch 1989, Ballinger et al. 2010).

The Slender Glass Lizard is reported as Nebraska's rarest lizard and a species of greatest conservation need (Fogell 2010, Schneider et al. 2011, 2018). This species has never been common in Nebraska. Prior to 2009, actually only two specimens were known from the state, and those records were from the 1930s (Lynch 1985, Ballinger et al. 2010, Fogell 2010). Slender Glass Lizards were listed as extinct in the state for a period by the Nebraska Game and Parks Commission due to a lack of records for decades (Fogell 2010). Starting in 2009, a few sightings have been reported in counties bordering Kansas in south-central Nebraska (D. Fogell, personal communication; K. Geluso, unpublished data). Such observations suggest that Slender Glass Lizards may have recently recolonized Nebraska from populations to the south in Kansas. In central Kansas, Slender Glass Lizards are common along the Saline River in Ellis and Russell counties about 100 km south (Collins et al. 2010; Kansas Herp Atlas, https://webapps.fhsu.edu/ksherp). More data are needed to help support such a hypothesis, as the species might also have existed in the area in low abundances.

Our observations of the Slender Glass Lizards are not the first records from Franklin County in the last decade. Other recent records include an adult road-killed male collected on 2 September 2017 in the city of Naponee (Sternberg Museum, Fort Hays State University, Hays (FHSM), Kansas; FHSM#17617). Another specimen also is known from a few km southwest of Naponee (FHSM#16905), a male from 7 June 2010. These two records are about 15 km to the west and west northwest of our observation. A recent cover-object study (2016-2020) with reptiles 20.5 km to the west in Harlan County, Nebraska, of our site did not detect the species after four years in ungrazed upland pastures (Brown and Geluso 2022). It is unclear what factors limit the distribution and abundance of this species in southern Nebraska. Additional surveys and studies in the state are required to better understand the distribution and requirements for this species of conservation need in the state. Any observation of a Slender Glass Lizard in Nebraska should be reported to the Nebraska Game and Parks Commission, including date, location, behavior, and photograph, if possible.

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