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6-23-2023

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Bajelan, Jamila and Geluso, Keith, "Westward expansion of the Evening Bat (*Nycticeius humeralis*) into Dawson and Lincoln counties of central Nebraska" (2023). *Transactions of the Nebraska Academy of Sciences and Affiliated Societies*. 541.

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Westward expansion of the Evening Bat (*Nycticeius humeralis*) into Dawson and Lincoln counties of central Nebraska

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Abstract

The Evening Bat (*Nycticeius humeralis*) is a small, migratory species of temperate woodlands in the eastern United States. Along its western distributional edge in the Great Plains, this species resides in wooded riverine corridors. In recent decades, the distribution of Evening Bats has expanded westward throughout the Great Plains. Herein, we report on two county records that further document the distributional expansion of Evening Bats into central Nebraska. In 2019 and 2022, Evening Bats were collected in Lincoln and Dawson counties, respectively, in woodlands adjacent to the Platte River. Increases in wooded habitats along prairie waterways likely has resulted in their westward movements in the Great Plains. With the continued westward expansion, this species should be looked for farther west beyond known distributional limits along prairie waterways throughout the Great Plains.

Keywords: Distribution, Evening Bat, expansion, Nebraska, *Nycticeius humeralis*, Platte River, riparian woodland

doi: 10.32873/unl.dc.tnas.43.1

The Evening Bat (*Nycticeius humeralis*) is a small, migratory species of temperate woodlands in the eastern United States that also inhabits wooded riverine corridors of the Great Plains (Watkins 1972, Watkins and Shump 1981, Sparks and Choate 2000, Andersen et al. 2017). Evening bats commonly roost in trees, as the species appears closely tied with wooded habitats (Watkins 1969, Menzel et al. 1999, Menzel et al. 2001, Boyles and Robbins 2006, Kaarakka et al. 2018). Adult females are known to migrate to bear and raise young in more northerly and westerly portions of its distribution (Watkins 1969, Benedict 2004, Geluso et al. 2008, Serbousek and Geluso 2009). However, some females in the Midwest, such as southwestern Missouri, do not migrate but remain in forested habitats throughout the year (Boyles and Robbins 2006). It is unclear if and how much male Evening Bats might migrate in the United States. In the southern Great Plains of Texas, Evening Bats generally occur in the southeastern half of the state with a few records from western Texas (Ammerman et al. 2012, Andersen et al. 2017, Barnes and Hoffman 2023). In the central Great Plains of Kansas and Oklahoma, Evening Bats generally occur in the eastern two-thirds of those states (Sparks and Choate 2000, Andersen et al. 2017, Robbins et al. 2021), but a single record exists from extreme western Kansas (Phelps et al. 2008). In the northern Great Plains, Evening Bats occur in southern and eastern Nebraska as well as extreme southeastern

South Dakota, where they reach their northwestern distributional limits (Lane et al. 2003, Andersen et al. 2017).

In recent decades, the Evening Bat has expanded westward in all states along its western distributional edge in the United States (Sparks and Choate 2000, Benedict 2004, Phelps et al. 2008, Serbousek and Geluso 2009, Andersen et al. 2017, Barnes and Hoffman 2023), including an individual recently captured in southwestern New Mexico (Andersen et al. 2017). In Nebraska, this expansion has been well documented, as the species is a relative newcomer to the state with a rich history of research documenting shifts in mammalian distributions. The first records of Evening Bats were collected in Butler County in June 1957 in east-central Nebraska (Jones and Vaughan 1959) and in three southeastern counties (Johnson, Lancaster, and Pawnee) in 1965 (Kunz 1965). In 1975, the species was documented in Webster County in south-central Nebraska (Czaplewski et al. 1979). By the mid-1990s, Evening Bats expanded north to Sarpy and Dixon counties as well as west to Merrick County (Benedict et al. 2000). In 2001, individuals were documented in another county (Knox) in northeastern Nebraska (Benedict 2004). In 2006, Evening Bats were captured in Harlan County in south-central Nebraska (Geluso et al. 2008), and in 2007, captures in Red Willow and Hitchcock counties further expanded the western distributional edge along the

Republican River in southwestern Nebraska (Serbousek and Geluso 2009). Lastly, Johnson and Geluso (2017) filled in several counties in south-central Nebraska including Buffalo (2013), Franklin (2004), Furnas (2004), Hall (2013), and Kearney (2013) counties, including a short westward expansion along the Platte River into Buffalo and Kearney counties. Herein, we report on additional records that further document the continued expansion of Evening Bats along the Platte River in central Nebraska.

On 17 October 2019, a female Evening Bat was collected in Lincoln County, Nebraska, from along the Platte River, 3.3 kilometers west of Brady (41.02072°N, 100.40593°W; **Fig. 1**). The riparian forest was dominated by large Plains Cottonwoods (*Populus deltoides*) among other deciduous trees. This specimen was deposited in the natural history collections at the Sternberg Museum, Hays, Kansas (FHSM #43491). Other individuals were observed flying on 26 May 2021 at this site near Brady, but none were captured in mist nets. On 19 May 2022, we captured two *N. humeralis* on Jeffrey Island in Dawson County, Nebraska, 12.6 kilometers west of Overton (40.70521°N, 99.68521°W; **Fig. 1**). Both females were pregnant and contained two embryos each, with the largest uterine swellings 11 and 10 mm in crown-rump length. Both specimens and young were deposited in

the University of Nebraska State Museum in Lincoln, Nebraska (ZM#32246 and #32247). Bats were collected while flying over small pools of water a short distance from the main channel of the Platte River in an area dominated by Plains Cottonwoods. Eastern Red-cedar (*Juniperus virginiana*) also occurred in the understory along with dogwoods (*Cornus* spp.). The nearest published records are from Buffalo County, just to the east of Dawson County, at the Blue Hole State Wildlife Management Area along the Platte River (Johnson and Geluso 2017). The record in Lincoln County was 93.2 km from Blue Hole State Wildlife Management Area, whereas the record in Dawson County was 24.8 km from this wildlife management area.

Increases in trees and wooded habitats along prairie rivers likely has resulted in the westward movement of Evening Bats in the Great Plains. During the last half century, river flow alterations (e.g., creation of dams) have, in part, contributed to the establishment and invasion of trees along prairie rivers, including the Platte River (Tomelleri 1984, Martin and Johnson 1987, Johnson 1994). Woodland increases along rivers have resulted in the westward expansion of other woodland mammals in the Great Plains (e.g., Benedict et al. 2000, Geluso 2004, Roehrs and Genoways 2004, Geluso et al. 2005, Forrester et al. 2019). For example, Benedict et al. (2000) reported

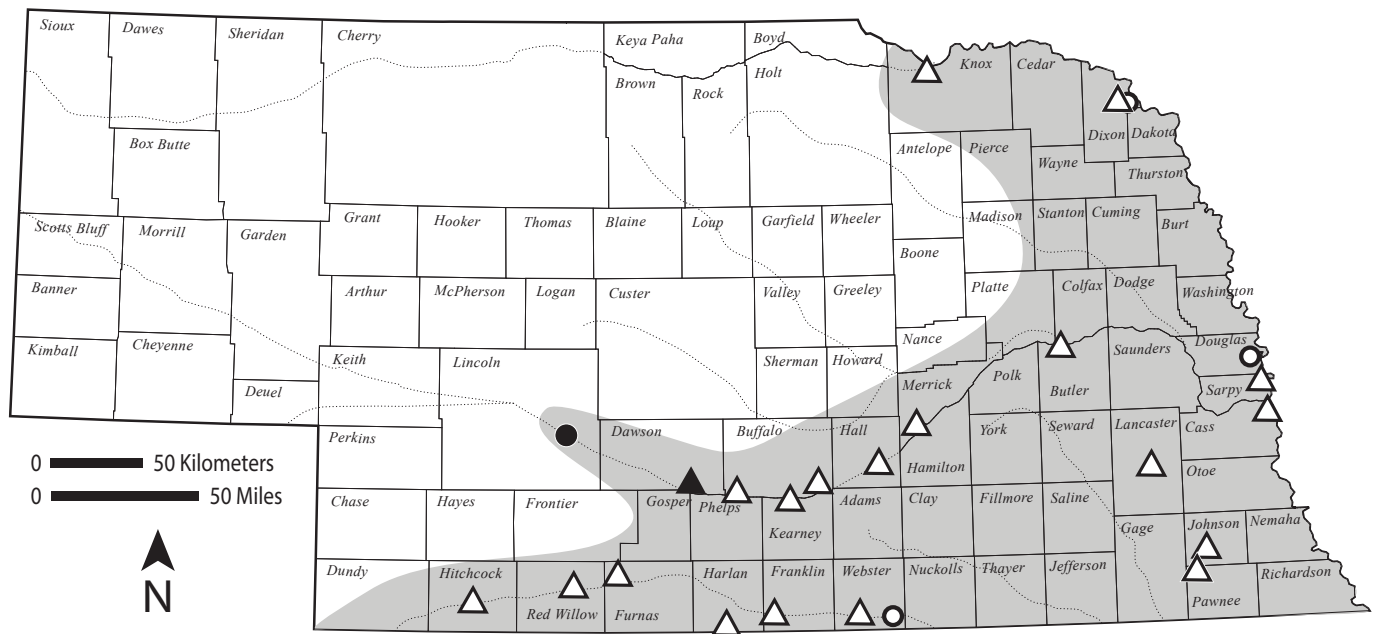


Figure 1. Two new distributional records of the Evening Bat (*Nycticeius humeralis*) in Nebraska. Open symbols represent previously published records, and closed symbols represent new records presented in this paper. Circles represent geographic records, and triangles represent reproductive records (i.e., pregnant females, lactating females, and volant young with cartilaginous epiphyseal plates in wing bones). The closed triangle also indicates a new geographical county record. The shaded area represents the current approximate distribution of Evening Bats in Nebraska.

that most mammals shifting distributions in Nebraska were moving westward mainly in riparian woodlands along rivers. Those species included the Virginia Opossum (*Didelphis virginiana*), Woodchuck (*Marmota monax*), White-footed Mouse (*Peromyscus leucopus*), Gray Fox (*Urocyon cinereoargenteus*), Northern [Long-eared] Myotis (*Myotis septentrionalis*), and Eastern Red Bat (*Lasiurus borealis*; Benedict et al. 2000). As trees continue to mature and establish, especially in more western portions of prairie rivers in the Great Plains, we predict the Evening Bat will continue to move westward and might soon be documented along waterways in eastern Colorado. Migratory behaviors of northern and western populations likely aid in their continued propensity to find habitable woodlands at the edge of their range, as non-migratory species likely would expand at slower rates. Future studies should focus on searching for Evening Bats in western parts of Texas, Oklahoma, Kansas, and Nebraska. In addition, surveys should be conducted in northern South Dakota, Iowa, southern Minnesota, and southern Wisconsin to monitor whether Evening Bats continue to expand their range northward.

Acknowledgements — We thank J. Geiser and D. Zorn for access to lands to survey for bats. We thank T. Labeledz (University of Nebraska State Museum) and C. Schmidt (Fort Hays Sternberg Museum, Hays, Kansas) for museum related matters. We thank two anonymous reviewers for helpful comments to improve this manuscript. This manuscript initially was written as a graduate student requirement in the Mammalogy Class in autumn of 2022 at the University of Nebraska at Kearney.

Literature Cited

- Ammerman LK, Hice CL, and Schmidly DJ. (2012) *Bats of Texas* (College Station: Texas A&M University Press).
- Andersen BR, Geluso K, Otto HW, and Bishop-Boros L. (2017) Westward expansion of the Evening Bat (*Nycticeius humeralis*) in the United States, with notes on the first record from New Mexico. *Western North American Naturalist* 77: 223-229.
- Barnes EF and Hoffman JD. (2023) Significant range expansions in eight species of North American mammals. *Occasional Papers of the Museum of Texas Tech University* 385: 1-29.
- Benedict RA. (2004) Reproductive activity and distribution of bats in Nebraska. *Western North American Naturalist* 64: 231-248.
- Benedict RA, Genoways HH, and Freeman PW. (2000) Shifting distributional patterns of mammals in Nebraska. *Transactions of the Nebraska Academy of Sciences* 26: 55-84.
- Boyles JG and Robbins LW. (2006) Characteristics of summer and winter roost trees used by Evening Bats (*Nycticeius humeralis*) in southwestern Missouri. *The American Midland Naturalist* 155: 210-220.
- Czaplewski NJ, Farney JP, Jones JK Jr, and Druecker JD. (1979) Synopsis of bats of Nebraska. *Occasional Papers of the Museum of Texas Tech University* 61: 1-24.
- Forrester AJ, Peterson BC, Ringenberg JM, Schlater SM, and Geluso K. (2019) Continued westward expansion of Woodchucks (*Marmota monax*) in Nebraska. *Western North American Naturalist* 79: 574-580.
- Geluso K. (2004) Westward expansion of the Eastern Fox Squirrel (*Sciurus niger*) in northeastern New Mexico and southeastern Colorado. *The Southwestern Naturalist* 49: 111-116.
- Geluso K, Mollhagen TR, Tigner JM, and Bogan MA. (2005) Westward expansion of the Eastern Pipistrelle (*Pipistrellus subflavus*) in the United States, including new records from New Mexico, South Dakota, and Texas. *Western North American Naturalist* 65: 405-409.
- Geluso K, Damm JP, and Valdez EW. (2008) Late-seasonal activity and diet of the Evening Bat (*Nycticeius humeralis*) in Nebraska. *Western North American Naturalist* 68: 21-24.
- Johnson OJ and Geluso K. (2017) Distributional and reproductive records of bats from south-central Nebraska. *Occasional Papers of the Museum of Texas Tech University* 347: 1-15.
- Johnson WC. (1994) Woodland expansion in the Platte River, Nebraska: patterns and causes. *Ecological Monographs* 64: 45-84.
- Jones JK Jr and Vaughan TA. (1959) The Evening Bat in Nebraska. *Journal of Mammalogy* 40: 246-247.
- Kaarakka HM, White JP, Redell JA, and Luukkonen KL. (2018) Notes on capture and roost characteristics of three female Evening Bats (*Nycticeius humeralis*) in southern Wisconsin: an expanding species? *The American Midland Naturalist* 180: 168-172.
- Kunz TH. (1965) Notes on some Nebraskan Bats. *Transactions of the Kansas Academy of Science* 68: 201-203.
- Lane JE, Buck CL, and Brigham RM. (2003) The bat fauna of southeastern South Dakota. *The Prairie Naturalist* 35: 247-256.
- Martin CW and Johnson WC. (1987) Historical channel narrowing and riparian vegetation expansion in the Medicine Lodge River Basin, Kansas. *Annals of the Association of American Geographers* 77: 436-449.
- Menzel MA, Krishon DM, Carter TC, and Laerm J. (1999) Notes on tree roost characteristics of the Northern Yellow Bat (*Lasiurus intermedius*), the Seminole Bat (*L. seminolus*), the Evening Bat (*Nycticeius humeralis*), and the Eastern Pipistrelle (*Pipistrellus subflavus*). *Florida Scientist* 62: 185-193.
- Menzel MA, Carter TC, Ford WM, and Chapman BR. (2001) Tree-roost characteristics of subadult and female adult Evening Bats (*Nycticeius humeralis*) in the Upper Coastal Plain of South Carolina. *The American Midland Naturalist* 145: 112-119.

- Phelps KL, Schmidt CJ, and Choate JR. (2008) Presence of the Evening Bat (*Nycticeius humeralis*) in westernmost Kansas. *Transactions of the Kansas Academy of Science* 111: 159-160.
- Robbins LW, Tyburec JD, Timpone JC, and Brack V Jr. (2021) Bats of Oklahoma. *Center for Bat Research, Outreach, and Conservation, Indiana State University* 9: 1-100.
- Roehrs ZP and Genoways HH. (2004) Historical biogeography of the Woodchuck (*Marmota monax*) in Nebraska and northern Kansas. *Western North American Naturalist* 64: 396-402.
- Serbousek MR and Geluso K. (2009) Bats along the Republican River and its tributaries in southwestern Nebraska: distribution, abundance, and reproduction. *Western North American Naturalist* 69: 180-185.
- Sparks DW and Choate JR. (2000) Distribution, natural history, conservation status, and biogeography of bats in Kansas. In J.R. Choate (Editor), *Reflections of a Naturalist: Papers Honoring Professor Eugene D. Fleharty*, pp. 173-228. (Fort Hays Studies, Special Issue 1, Hays, KS)
- Tomelleri JR. (1984) Dynamics of the Woody Vegetation along the Arkansas River in Western Kansas, 1870-1983. M.S. Thesis, Fort Hays State University, Hays, Kansas.
- Watkins LC. (1969) Observations on the distribution and natural history of the Evening Bat (*Nycticeius humeralis*) in northwestern Missouri and adjacent Iowa. *Transactions of the Kansas Academy of Science* 72: 330-336.
- Watkins LC. (1972) *Nycticeius humeralis*. *Mammalian Species* 23: 1-4.
- Watkins LC and Shump KA Jr. (1981) Behavior of the Evening Bat *Nycticeius humeralis* at a nursery roost. *The American Midland Naturalist* 105: 258-268.