

Perch Sites of Calling Male Bird-Voiced Treefrogs, *Hyla avivoca*, in Oklahoma

Stephen M. Secor*

Department of Zoology and Oklahoma Biological Survey, University of Oklahoma, Norman, OK 73019.

The bird-voiced treefrog, *Hyla avivoca*, inhabits shallow wetlands in the Atlantic Coast drainage system and the Mississippi River and Gulf Coast drainage systems (1). Within Oklahoma, *H. avivoca* occurs in the extreme southeastern corner of the state inhabiting shallow swamps that are closely associated with the Little River (2). The life history of *H. avivoca* is not well known and there is little information available regarding the composition of breeding aggregations. Within Oklahoma, male *H. avivoca* have been reported calling from April (3) to July (4). These and other accounts (5-11) have noted that male *H. avivoca* typically call from elevated perches along the edges of swamps.

Male *H. avivoca* were observed calling at two breeding sites in Oklahoma during May and June of 1985. This note quantitatively describes the perches at these sites from which male *H. avivoca* called. These sites were two shallow swamps north of the Little River in McCurtain County, Oklahoma. The first, Little River Swamp (Sec. 14 T7S R24E), was located 8.4 km northeast of Idabel, Oklahoma. This 4.24-ha swamp was characterized by standing dead trees and a surrounding band of hardwood forest. The water contained thick mats of smartweed (*Polygonum hydropiperoides*). Maximum depth of the water was 1.75 m in May and 1.50 m in June. Along the edge of the swamp many small trees, primarily water elm (*Planera aquatica*), grew out of the water typically within 2 m of the shoreline. The second site, Cypress Swamp (Sec. 18 T7S R24E), was located 5.6 km north of Idabel. This 1.33-ha swamp was dominated by large bald cypress trees (*Taxodium distichum*) and was also surrounded by a band of hardwood forest.

Maximum water depth was 1.75 m in May and June. Trees at this swamp were not confined to its edge and were found up to 35 m from the shoreline.

Calling *H. avivoca* were censused at Little River Swamp on four nights (May 23 and 26, June 21 and 25) and at Cypress Swamp on three nights (May 24 and June 23 and 27). Observations were made after sunset from 1900 to 2230 CST. Once an individual was located its snout-vent length and weight were recorded and the perch from which it was calling was marked and numbered. The following morning, the site was revisited and the following measurements and characteristics were noted for each marked perch: height from the ground or water surface; distance from the shoreline to the point directly below the calling perch (positive value if over water, negative value if over land); perch diameter; type of vegetation from which the frog was calling; and distance to the nearest other marked calling location.

Snout - vent lengths of sampled male *H. avivoca* ranged from 29.7 to 40.5 mm ($T = 35.29$, $SD = 1.57$, $n = 84$). Weights of these frogs ranged from 1.7 to 3.1 g ($T = 2.31$, $SD = 0.32$, $n = 84$).

Height of the calling perches from the two swamps ranged from 0.06 to 7.0 m ($T = 1.44$, $SD = 0.94$, $n = 95$). Although demonstrating considerable range, the majority (54.7%) of male perched 1 to 2 m above the substrate (Fig. 1a). Male *H. avivoca* have been noted elsewhere calling from perches 0.46 to 1.83 m above either the ground or the water surface (6, 7, 9, 10, 12). Godwin and Roble (13) observed that male *H. chrysoscelis* in Kansas called from sites averaging 1.05 m high (range = 0.0-6.0, $SD = 1.13$, $n = 398$); these figures are similar to those of calling male *H. avivoca* in this study.

Distance from the perch to the shoreline

* Present address: Department of Biology, University of California at Los Angeles, Los Angeles, CA 90024
Proc. Okla. Acad. Sci. 68:71-73 (1988)

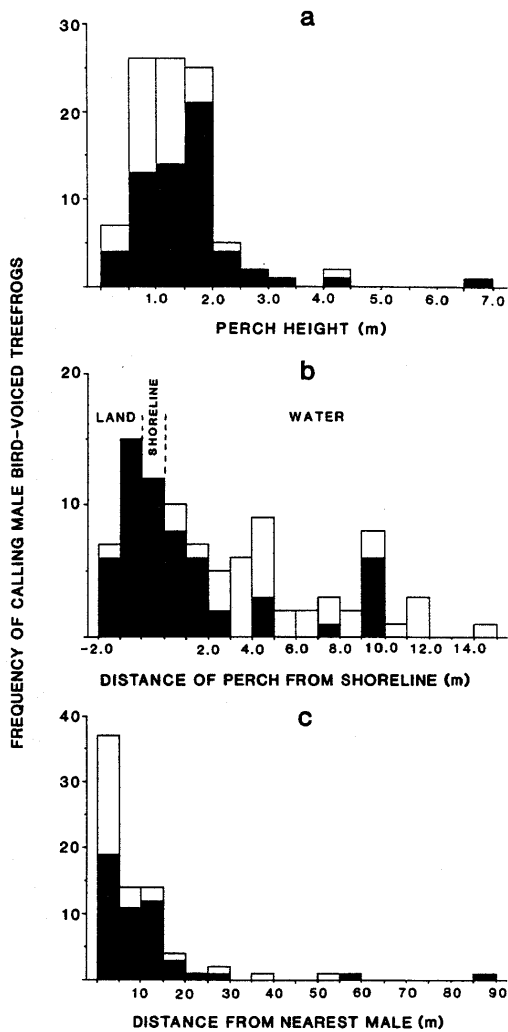


FIGURE 1. Histograms representing the frequency of calling male bird-voiced treefrogs, *Hyla avivoca*, for a) perch height, b) distance of perch from shoreline, and c) distance from nearest male. Solid portions of the bars represent treefrogs found at Little River Swamp and open portions for treefrogs found at Cypress Swamp.

ranged from 2 m over land to 15 m over water ($T = +3.14$, $SD = 4.01$, $n = 95$). All but one of the treefrogs at Cypress Swamp called from perches over water, while perch sites were more evenly distributed over water (45.9%), shoreline (19.7%), and land (34.4%) at Little River Swamp (Fig. 1b).

Male *H. avivoca* called from a variety of perches, ranging from vines having a diameter of 3 mm to trunks of large trees with diameters up to 490 mm ($T = 32.9$, $SD = 66.6$, $n = 93$). A majority of the frogs (87%) called from either narrow branches (< 50 mm) or vines (< 13 mm). A mean perch diameter of 58.8 mm ($SD = 69.9$, $n = 166$) was calculated for calling male *H. chrysoscelis* in Kansas (13).

These frogs called from several different types of vegetation. At Little River Swamp, water elm (*Planera aquatica*) and vines (primarily *Smilax*) accounted for over 65% of the perches. Water elms, vines, and dead branches (of unknown type) were the major perch types (61% of the perches) at Cypress Swamp. Other perches included red maple (*Acer rubrum*), bamboo (*Arundinaria gigantea*), shagbark hickory (*Carya ovata*), sugarberry (*Celtis laevigata*), swamp dogwood (*Cornus amomum*), sweetgum (*Liquidambar styraciflua*), white oak (*Quercus alba*), black oak (*Q. velutina*), and American elm (*Ulmus americana*). These treefrogs did not appear to be selecting specific types of vegetation from which to call. The frequency of perch types is probably dependent upon the relative abundance of the different trees, vines, and other perch types that occur within the appropriate habitat. The high abundance of water elms along the shore of Little River Swamp is reflected in higher percentage of their use as calling perches by male *H. avivoca*.

The mean distance between neighboring calling males at Cypress Swamp was 3.92 m (range = 0.80 - 29.7, $SD = 5.52$, $n = 28$) while at Little River Swamp males called on an average of 7.79 m (range = 0.27 - 86.5, $SD = 1.47$, $n = 51$) from each other (Fig. 1c). At Little River Swamp on 21 June, 25 *H. avivoca* were calling along 215 m of shoreline (0.12 frogs/m). On 23 June, 20 *H. avivoca* were calling along 175 m of shoreline (0.11 frogs/m) at Cypress Swamp.

Fellers (14) noted that the distance between calling males of each of five hylids, *H. chrysoscelis*, *H. cinerea*, *H. regilla*, *H. squirella*, and *H. versicolor*, was fairly consistent on a given night. The same was true for the male *H. avivoca* calling at Little River Swamp. At Cypress Swamp, the fallen branches at the south end provided many potential perches

resulting in the clumping of calling males in that area of the swamp. Fellers (14) listed minimum distance between calling males ranging from 1.0 m for *H. crucifer* to 1.70 m for *H. cinerea*. I encountered two *H. avivoca* calling within 0.27 m of each other in May at Little River Swamp and one calling within 0.80 m of two other calling males in June at Cypress Swamp.

During the study, both swamps were occupied by large numbers of green treefrogs (*Hyla cinerea*). Male *H. cinerea*, which were two to three times as numerous as male *H. avivoca*, called throughout the evening censuses. I observed little overlap in the calling perches between these treefrogs at the two swamps. *Hyla cinerea* typically called from branches, trunks, and logs less than 0.5 m above the water surface. Only six (6.3%) male *H. avivoca* were found calling from perches less than 0.5 m high. *Hyla cinerea* were also calling from over-water sites that were further from the shore at both swamps than those occupied by *H. avivoca*.

Other studies have documented the separation of calling zones of sympatric hylids. Goin and Goin (15) noted that, when occurring together in northern Florida, *H. cinerea* called from palmettos and low shrubs, while squirrel treefrogs (*Hyla squirella*) were perched higher in the trees. In sympatric situations, the barking treefrog (*Hyla gratiosa*) usually calls from a floating position in open water, in contrast to *H. cinerea*, which does not call at all from the water (16). Call site separation is probably a contributing factor in the reproductive isolation of these frogs. The sympatric populations of hylids in southeastern Oklahoma provide invaluable opportunities for continued research in the population and social dynamics of these frogs.

ACKNOWLEDGMENTS

Appreciation is extended to the B. Ward family for providing living accommodations during this study and to J. Alexander for permission to study at the Cypress Swamp. I thank T. Heger and J. Graham for their assistance in the field; J. Caldwell, J. Krupa, and M. Paulissen for their comments on this manuscript; and the Department of Zoology, University of Oklahoma and the Oklahoma Biological Survey for use of equipment. This work was supported by a grant from the Oklahoma Department of Wildlife Conservation to the Oklahoma Biological Survey.

REFERENCES

1. P.W. Smith, Cat. Am. Amphib. Reptiles, 28.1-28.2 (1966).
2. J.J. Krupa, Proc. Okla. Acad. Sci. 66: 37-38 (1986).
3. A.P. Blair and H.L. Lindsey, Jr., Southwest. Nat. 6: 202 (1961).
4. S.M. Secor and G.D. Schnell, *Evaluation of Wetland Habitats in Oklahoma's Gulf Coastal Plain*, Tech. Report, Okla. Dept. Wildl. Conserv., 1985.
5. A.F. Carr, Jr., Univ. Florida Publ. Biol. Sci. Series 3: 1-118 (1940).
6. B.J. Davis and N. Hollenback, Southwest. Nat. 23: 161-162 (1978).
7. F. Harper, Am. Midl. Nat. 16: 275-310 (1935).
8. J.J. Krupa, S.M. Secor, and G. Sievert, Bull. Okla. Herpetol. Soc. 10: 8-10 (1985).
9. M.J. Lodato and M.H. Kerr, J. Herpetol. 8: 259-260 (1974).
10. M.V. Parker, J. Tenn. Acad. Sci. 26: 208-213 (1951).
11. A.H. Wright and A.A. Wright, *Handbooks of Frogs and Toads*, Comstock Publ. Co., Ithaca, NY, 1949.
12. J.S. Mecham, J. Elisha Mitchell. Sci.Soc. 76: 64-67 (1960).
13. G.J. Godwin and S.M. Roble, Herpeto-logica 239: 141-146 (1983).
14. G.M. Fellers, Anim. Behav. 27: 107-119 (1979).
15. C.J. Goin and O.B. Goin, Ecology 34: 406-408 (1953).
16. R.S. Oldham and H.C. Gerhardt, Copeia 1975: 223-231 (1975).