Journal of the Arkansas Academy of Science

Volume 46 Article 24

1992

Maternity Colony of Gray Bats in a Non-Cave Site

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LIGON, J.D. 1970. Behavior and breeding biology of the Red-cockaded Woodpecker. Auk 87: 255-278.

LIGON, J.D. 1971. Some factors influencing numbers of the Red-cockaded Woodpecker. *In* Ecology and management of the Red-cockaded Woodpecker (R.L. Thompson, ed.). Tallahassee, Fla. Bur. Sport Fish. and Wildl. and Tall Timbers Res. Sta., pp. 30-43.

LIGON, J.D., P.B. STACEY, R.N. CONNER, C.E. BOCK, and C.S. ADKISSON. 1986. Report of the American Ornithologists' Union committee for the conservation of the Red-cockaded Woodpecker. Auk 103:848-855.

MURPHEY, E.E. 1939. Red-cockaded Woodpecker *Dryobates borealis* (Vieillot) *in* Life histories of North American woodpeckers (A.C. Bent, ed.), Bull. 174, U.S. Nat. Mus., pp. 72-79.

NEAL, J.C. and W.G. MONTAGUE. 1991. Past and present distribution of the Red-cockaded Woodpecker and its habitat in the Ouachita Mountains in Arkansas. Proc. Ark. Acad. Sci. 45:71-75.

PIANKA, E.R. 1983. Evolutionary ecology, 3rd ed. Harper & Row Pub., N.Y., 416 pp.

RAULSTON, B.E. 1992. Effects of cavity restrictors on Red-cockaded Woodpeckers. M.S. thesis, Univ. of Ark., Fayetteville, 34 pp.

RODGERS JR., S.P. 1990. Predation of domestic fowl eggs by Red-bellied Woodpeckers. Florida Field Nat. 18(3):57-58.

RUDOLPH, D.C., R.N. CONNER and J. TURNER. 1990. Competition for Red-cockaded Woodpecker roost and nest cavities: effects of resin age and entrance diameter. Wils. Bull. 102:23-36.

STICKEL, D.W. 1963. Interspecific relations among Red-bellied and Hairy Woodpeckers and a Flying Squirrel. Wils. Bull. 75:203-204.

U.S. FISH AND WILDLIFE SERVICE. 1985. Red-cockaded Woodpecker recovery plan. U.S. Fish & Wildl. Serv., Atlanta, Ga., 88 pp.

WALTERS, J. R. 1991. Application of ecological principles to the management of the Red-cockaded Woodpecker. Annu. Rev. Ecol. Syst. 22:505-523.

WOOD, D.A. 1983. Observations on the behavior and breeding biology of the Red-cockaded Woodpecker in Oklahoma. *In* Red-cockaded Woodpecker Symposium II. (D.A. Wood, ed.) Fla. Game and Freshwater Comm., Tallahassee, pp. 92-94.

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A MATERNITY COLONY OF GRAY BATS IN A NON-CAVE SITE

Colonies of the endangered gray bat, *Myotis grisescens*, are primarily found inhabiting caves in the limestone karst regions of Arkansas, Missouri, Kentucky, Tennessee, and Alabama (Barbour and Davis, 1969). There are only two previously published accounts of gray bats inhabiting non-cave sites. In 1964, Hays and Bingman reported the presence of a maternity colony in a storm sewer in Pittsburg, Kansas, and Gunier and Elder (1971) studied a maternity colony roosting in an old barn in Missouri. In 1988, another maternity colony was found inhabiting a storm drain in Newark, Independence County, Arkansas. The town has a population of approximately 1100 and lies at the extreme eastern edge of the Ozark Plateau.

Because of the endangered status of the gray bat, precautions were taken during our activities to provide minimal disturbance to the colony. The physical and structural characteristics of the drain were studied in winter or after emergence when the maternity colony was not present. Temperatures at the roost site were monitored by means of a temperature transducer connected to a microprocessor-based data acquisition system mounted at the tunnel entrance. The population was estimated by direct count upon emergence.

The western inlet of the storm drain, at the intersection of Front and Main Streets, measures 7 m across by 1.7 m in height. The tunnel itself is 160 m long and runs southwest under the sidewalk, Highway 122, and Paraquete Road after which it empties into a creek bed by means of two rectangular concrete culverts approximately 1 m high by 2 m wide.

Since there are two openings to the drain as well as several sidewalk grates and drain openings to the street, air circulates through the drain and ammonia levels do not build up. Gasoline fumes from a service station, however, are sometimes present.

The walls and ceiling are constructed of reinforced concrete with the exception of an older section along Front Street where sandstone blocks make up the lower walls. The horizontal ceiling is not a uniform height above the floor, but is constructed in sections, some of which are lower than others. The floor of the sewer consists of coarse gravel and small cobbles. In some parts of the drain the floor is nearly level, but in others there are depressions and gravel bars so that the height of the floor may vary by as much as .5 m across the width of the drain. The topography of the floor changes from year to year depending on the water flow. At the time of the survey, the maximum height measured from gravel to ceiling was 1.9 m, 1.45 m above the water level. The minimum height above the floor was 1.1 m, .89 m above the water. The width of the drain also varies from a maximum of 4.6 m to a minimum of 3.3 m. The sewer is smallest in height and width in the section under Highway 122.

Water is present in the drain all year, but depth varies depending on floor topography and precipitation. During heavy rains water depths of over 1.5 m completely flood the tunnel west of Hwy. 122 as well as the outlet culverts.

Unlike natural caves, the temperature near the ceiling of the drain can fluctuate up to 10 degrees Celsius per day. In sunny weather there is a regular cycle of heating and cooling in the drain dependent on changes in air temperature and heating of the pavement and concrete. Heat from above is transferred to the roost environment through the concrete even on days when the air is cool.

There are two roost sites in the storm drain as determined by ceiling stains. It is not known if the maternity colony uses both sites, but they do serve as night roosts and hibernation sites for a small group of gray bats. Maternity colonies require warm temperatures to promote rapid growth of the young. In natural caves, rooms with domed ceilings to trap the colonies' heat are chosen for bearing and raising young. Such roosts are generally located over water to provide humidity and protection from disturbance and predation (Tuttle, 1975). The primary roost site of the maternity colony in Newark exhibits these same characteristics. It is located 50-65 m from the outlet of the drain in the section between Paraquete Road and Highway 122, where the sewer attains its maximum height and width. There the ceiling rises forming a rectangular dome. This heat trapping dome, along with the increased dimensions of the site, prevent flood waters from reaching the ceiling. Permanent pools of water up to 0.7 m deep are present beneath the roost site. In the summer when the maternity colony is present the temperatures at the primary roost site average 34 degrees Celsius and may rise to 40 degrees.

The smaller secondary roost site is located 50-53 m from the entrance on the west side of Hwy 122. The floor is nearly level and generally has 1-2 cm of water flowing over it. The lack of the ceiling dome and the narrowed dimensions of the drain downstream make this site prone to flooding. The flat ceiling is slightly eroded with exposed reinforcing rods and a deep crack between ceiling sections that is used as a hibernation site by 20-30 gray bats. Ceiling holes at the primary site are also used in this manner. Natural caves chosen as hibernacula have high humidity and an average temperature of 7-10 degrees Celsius (Barbour and Davis, 1969). The bats may chose a site 10-15 degrees warmer in the fall and then remain there as the temperature drops to the 0-5 degree Celsius range. In the same manner, temperatures in the storm drain drop gradually as days get colder. In the coldest months, temperatures may fall to 8.5 degrees or below. They do not remain stable, however, as they would in a cave. On warm days temperatures rise. Under these conditions, the bats do not remain torpid but become active, move about, and may emerge to feed.

Maternity colonies prefer caves near a river or reservoir over which the adults feed. Few are located more than 4 km from a major body of water. Forested lands are also used as forage areas by newly volant young and by adults on their way to the water (Tuttle, 1976). The maternity colony at Newark is also located near several bodies of water: the White River 4.5 km to the south, the Black River 7 km to the east, and Dota Creek 3 km to the northeast. Upon emergence, most members of this colony appear to head northeast toward Dota Creek, the closest water source, foraging in the trees as they go. Others, however, feed in the area and use the storm drain as a night roost.

Disturbance to colonies is one of the major causes of the decline in gray bat populations (Tuttle, 1979). The storm sewer population, estimated in both 1989 and 1990 to be close to 8000, appears to be stable, however, disturbance to the Newark colony is a real threat because it is located in a town. Children have been known to kill the bats as they emerge from the west entrance. The fear of snakes thought to live in the drain and fear of the bats themselves have kept people away from the maternity roost site, although children do play in the west drain entrance. Noise from people, street traffic, and trains does not seem to affect the colony, as it has been returning to this roost for many years.

LITERATURE CITED

BARBOUR, R. W., and W. H. DAVIS. 1969. Bats of America. Univ. Ky. Press, Lexington, 286 pp.

GUNIER, W. J., and W. H. ELDER. 1971. Experimental homing of Gray bats to a maternity colony in a Missouri barn. Amer. Midl. Natur. 86:502-506.

HAYS, H. A., and D. C. BINGMAN. 1964. A colony of Gray bats in southeastern Kansas. J. Mammal. 45:150.

TUTTLE, M. D. 1975. Population ecology of the Gray bat (Myotis grisescens): factors influencing early growth and development. Occas. Pap. Mus. Nat. Hist., Univ. Kans. 36:1-24.

_____. 1976. Population ecology of the Gray bat (Myotis grisescens): factors influencing growth and survival of newly volant young. Ecology. 57:587-595.

_____. 1979. Status, causes of decline, and management of endangered Gray bats. J. Wildl. Manage. 43:1-17.

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NEW RECORDS OF VERTEBRATES IN SOUTHWESTERN ARKANSAS

The vertebrate fauna of southwestern Arkansas is less well known than that of other regions of the state; this possibly reflects the distance of the region from major universities. The geographic area is located almost entirely within the West Gulf Coastal Plain natural division (Foti, 1974). Recent work relative to the vertebrate fauna of the southwestern quadrant of Arkansas has alleviated some of the regional bias in information on vertebrates (Baker, 1985; James and Neal, 1986; Robison and Buchanan, 1988; Robison *et al.*, 1983; Sealander and Heidt, 1990; Sewell, 1981; Steward *et al.*, 1986, 1989a,b). This report documents new records of distribution and provides notes on natural history of selected vertebrates from southwestern Arkansas.

Field collections and observations were made by the authors and students at Henderson State University. Fishes were obtained by use of seines, amphibians and reptiles by overturning cover materials or driving down roads on rainy evenings (with the exception of a turtle caught on a trotline), and mammals were collected as road-killed specimens or by use of museum special or Sherman traps. Birds were recorded photographically.

Specimens of fishes were fixed in 10% formalin and stored in 40% isopropanol. Amphibians and reptiles were preserved in the same manner as fishes, or preserved by use of a freeze-dryer. Specimens of mammals were prepared as standard skins and skeletons. All specimens were deposited in the collection of vertebrates at Henderson State University.

Class: Osteichthyes

Most published studies of the distribution of fishes in southwestern Arkansas have focused on the Ouachita River drainage, reviewed by Baker (1985) and Robison et al. (1983). Studies based in the Red River drainage are few. Sewell (1981) reported fishes of the upper Saline River (above Dierks Lake) and Cloutman and Olmsted (1974) surveyed fishes of the Cossatot River. Robison and Buchanan (1988) mapped additional records from thesis work (Cokern, 1979; Etheridge, 1974; Johnson, 1978). The following species represent new records within the Red River drainage.

Semotilus atromaculatus (Mitchell), the Creek Chub, Family Cyprinidae. One record taken from the Saline River was collected prior to 1960 (Robison and Buchanan, 1988). The present occurrence of the creek chub in the Saline River is confirmed by a single specimen from Howard County south of Dierks Lake near Bluff Creek, in March 1991.

The extreme headwaters of the Cossatot River provided the only other specimens of the creek chub from the Red River drainage (Cloutman and Olmsted, 1974). New records include a specimen taken in April 1991 from Bois d'Arc Creek (a tributary to the Red River) in Hempstead County, about 3 km southwest of the junction of Arkansas Highways 73 and 195. An additional specimen was collected in February 1991 in Little River County from the Little River just south of the dam forming Millwood Lake.

Centrarchus macropterus (Lacepede), the Flier Sunfish, Family Centrarchidae. Robison and Buchanan (1988) indicated records of the flier sunfish in the Red River drainage from Bodcaw Creek (Hempstead County) and Dorcheat Bayou (Columbia County). These streams enter the Red River in Louisiana. A specimen collected in March 1991 from Hempstead County represents the westernmost record for Arkansas and is marginal to the general species range. The location of collection (a tributary to Yellow Creek on Highway 32, about 4.5 km northeast of the Millwood Lake Dam) documents the flier sunfish in the Little River drainage.