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Zooplankton Population Structure in Three Reservoirs Near the Ouachita Mountain-Gulf Coastal Plain Interface

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maternity site was accomplished by sifting through guano piles and recovering skeletal and mummified remains of juvenile *Tadarida* during the fall of 1982.

Several hundred newborn *Tadarida*, many with umbilicus still attached, were observed and voucher specimens collected in June, 1983 (specimens deposited in UALRMZ). The colony shared its maternity and hibernating quarters with approximately 500 (October estimate) big brown bats, *Eptesicus fuscus*. *Eptesicus* roosted near the apex of the attic or high up on the sloping rafters in more open areas, segregating themselves from the free-tails. However, in both October, 1982 and March, 1983, several *Eptesicus* and *Tadarida* were observed roosting side by side on rafters halfway between the two colonies and during the maternity period juveniles and adults of both species often shared roosting sites. Apparently *Eptesicus* has occupied these same areas of the attic during maternity periods as skeletal remains of juveniles and adults littered the manure piles below. Mixed roosting of these two species in man-made structures has been reported as a common occurrence from the western states according to Barbour and Davis (Bats of America, p. 209, 1969).

The third maternity site was located in the old lion house of the Little Rock Zoo in Pulaski county. The exact size of the colony was unknown, but Zoo personnel reported the accumulation of dislodged juveniles on the floor of the building as a daily occurrence during the pre-volant maternity period. Roosting sites selected by this colony were similar to those previously described. A portion of the colony overwintered in the building as evidenced by the capture of adult females in mist nets which had been set up to remove sparrows from the building in February, 1983 (pers. comm., Bob Cooper, Zoo Director).

The close proximity of this colony to the University of Arkansas Medical Science campus probably explains the 1962 occurrence of an adult female *Tadarida* captured while roosting on the latticework of a research building (Sealander and Price, 1964).

The presence of these colonies have resulted in two additional county distribution records (Faulkner and Garland), firmly established the species as a resident mammal and extended the known northern distribution of the bat approximately 40 kilometers within the state.

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ZOOPLANKTON POPULATION STRUCTURE IN THREE RESERVOIRS NEAR THE OUACHITA MOUNTAIN - GULF COASTAL PLAIN INTERFACE

Zooplankton are important food for young-of-the-year and certain adult fish and may serve as an indicator of trophic status (McNaught, Verh, int. Ver. Limnol. 19:724-731, 1975). In 1979, the National Reservoir Research Program and the Waterways Experiment Station of the U.S. Army Corps of Engineers conducted a cooperative study of the effects of reservoir operations on tailwater environments. The study included seasonal measurements of water quality and zooplankton populations in three reservoirs (Pine Creek Lake, Oklahoma; and Gillham and Greeson Lakes, Arkansas).

The lakes are in different river drainages near the interface of the Ouachita Mountains and the Gulf Coastal Plain physiographic provinces. Pine Creek and Gillham Lakes are multi-purpose, flood control impoundments in the Little River system. Pine Creek Lake (2,023 ha) is a mainstem reservoir on the Little River in southeast Oklahoma; Gillham Lake (554 ha) impounds the Cossatot River in southwest Arkansas; and Lake Greeson (2,940 ha), is a Corps of Engineers hydroelectric project on the Little Missouri River in the Ouachita River basin in west central Arkansas. Selected physicochemical characteristics of the three lakes include low conductivity (34-52 umhos/cm), low alkalinity (6-13 mg/1 as $CaCO_3$), and nearly neutral pH (ca. 6.5).

In 1979, zooplankton densities were estimated for Pine Creek Lake from April through November, for Gillham Lake from June through October, and for Lake Greeson from May through October. Vertical tows at depths of 15-10 m, 10-5 m, and 5-0 m were made with an 0.08-mm mesh, 0.3-m closing net. Samples were immediately preserved in 3% formalin. Two 1-ml subsamples were later placed in a Sedgwick-Rafter counting cell where all organisms were identified and counted. Dry weight biomass estimates (from the upper stratum) were calculated by regression equations (Dumont et al., Oecologie 19:75-97, 1975). Cladocera and Rotifera (except Conochilidae) were identified to species, and Copepoda were identified to suborder. All estimates were expanded to number and milligrams per cubic meter.

Daphnia rosea, D. catawba, Leydigia quadrangularis, and *Synchaeta* sp. were found only in Gillham Lake, where a total of 12 species of cladocerans and 17 species of rotifers were collected. *Daphnia galeata mendotae* and *Keratella americana* were collected only in Lake Greeson, where 9 cladoceran and 17 rotifer species were identified. Nine cladoceran and 18 rotifer species were found in Pine Creek Lake. Copepoda ranked high in density throughout the study period (Table); however, comparisons of the copepod suborders (Calanoida and Cyclopoida) to the cladoceran and rotifer genera were not considered valid, and relationships were not analyzed. *Chaoborus* appeared in zooplankton collections from all three reservoirs.

Zooplankton densities in the upper stratum of Pine Creek Lake peaked in spring and early summer (Figure). Conochilidae were the most abundant zooplankters throughout the sampling period (Table), and composed over 50% of the population during April and July. However, *Daphnia parvula* (23%) and *Holopedium amazonicum* (29%) were responsible for the greatest biomass in April and July, respectively.

Population densities of rotifers, copepods, and cladocerans peaked in the upper stratum of Gillham Lake simultaneously in July. The populations progressively decreased through the fall. Conochilidae and *Kellicottia bostoniensis* were the most abundant zooplankters (Table). *Holopedium amazonicum* composed the greatest mean biomass, although it dominated the biomass (65%) only in June. *Hexarthra mira, Ceriodaphnia* spp., and *Daphnia ambigua* and *D. Laevis* contributed the greatest biomass in July, September, and October, respectively.

In Lake Greeson, the copepods peaked in May, rotifers in July, and cladocerans in September. Total zooplankton densities were highest and biomass lowest in the upper stratum during July (Figure), when *Collotheca* sp. made up 90% of the total density and 44% of the total biomass.

Table. Order of abundance of zooplankton ranked from 1-20, 1-21, and 1-19 respectively, from the upper strata (0-5 m) in Pine Creek Lake, Oklahoma, and Gillham and Greeson Lakes, Arkansas, 1979.

Taxon	Pine Creek	Gillham	Greeson
Cladocera			
Bosmina longirostris (O.F. Muller)	9	5	4
Ceriodaphnia spp.	16	8	18
Chydorus sphaericus (O.F. Muller)	20	21	
Daphnia ambigua Scourfield	13	14	13
D. catawba Coker			14
D. galeata mendotae Birge			15
D. laevis Birgel	17	17	
D. parvula Fordyce	8	16	17
Diaphanosoma leuchtenbergianum Fisher	7	10	8
Holopedium amazonicum Stingelin	14	12	16
Copepoda			
Calanoida	+	+	+
Cyclopoida	+	+	+
Nauplii	+	+	+
Rotifera			
Asplanchna priodonta Gosse	10	13	6
Branchionus sp.	15	18	
Collotheca sp.	11	6	1
Conochilidae	1	1	2
Filinia longiseta Ehrenbers	18	20	
Gastropus stylifer Imhol	5	19	12
Hexarthra mira (Hudson)	6	4	9
Kellicottia bostoniensis Rousselet	2	2	11
Karatella spp.	3	3	4
Platyias quadricornis (Ehrenberg)		21	
Ploesoma sp.	20	11	19
Polyarthra euryptera (Wierzejski)	4	7	3
Trichocerca cylindriea (Imhof)	12	8	7
T. capucina (Wierzejski et Zach.)	18	15	10

[1]Not verified

+ = Abundant but not ranked

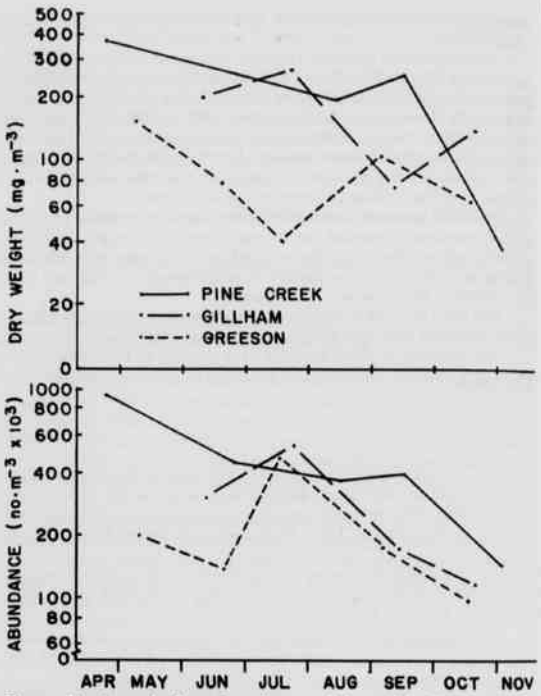

Figure. Total zooplankton abundance and dry weight biomass from the upper stratum (0-5 m) in Pine Creek Lake, Oklahoma, and Gillham and Greeson Lakes, Arkansas, 1979.

Food availability, as a function of particle size, appeared to regulate the zooplankton community structure in Pine Creek and Gillham Lakes. These reservoirs, from the western sections of the Ouachita Mountains, contain higher amounts of total organic carbon due to greater amounts of allochtonous materials, possibly from land use and soil types (J. Nix, Ouachita Baptist University, personal communication). Furthermore, zooplankton species composition was more closely related and population abundance and biomass estimates were higher in Pine Creek and Gillham Lakes than in Lake Greeson. However, fluctuations in zooplankton abundance were similar in Gillham and Greeson lakes, even though changes in the rotifer populations resulted in an inverse relationship of the biomass estimates between the two reservoirs (Figure). Lake Greeson, the least eutrophic of the three lakes, had cladoceran populations that were indicative of communities found at low nutrient concentrations, where according to Porter (Amer. Sci. 65:159-170, 1977), small species or species with high surface to volume ratios may be abundant.

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NEW COUNTY AND STATE RECORDS OF MOSSES FROM ARKANSAS

Bryophytes have been collected in Arkansas by only a few individuals. Although much is known about the distribution of bryophytes in the Ozark region of Arkansas (Wittlake, 1950b; Redfearn, 1964, 1966, 1968, 1970, 1972, 1979), little information is available for other regions of the state (Lowe, 1919; Scully, 1941; Moore, 1964). Wittlake (1950a) reviewed the early work concerning bryophytes of Arkansas. This paper reports new county and state records of bryophytes from Arkansas.

Most of the new county records are from collections stored at the University of Arkansas, Fayetteville, and were made by E. B. Wittlake between 1948 and 1951. These collections are currently being processed into modern storage facilities.

As a result of specimens processed thus far, 28 new county records are represented in Wittlake's (EBW) collection. Collections made by the second author (JEM) at Hot Springs National Park, Garland County represented five additional county records. Voucher specimens have been deposited at the University of Central Arkansas herbarium. Finally, three county records are from collections made by the senior author (SLT) and have been deposited at the University of Arkansas, Fayetteville herbarium.