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GENERAL NOTES

SPIDERS COLLECTED IN SOUTHEAST ARKANSAS USING PITFALL TRAPS PLACED IN PINE-HARDWOOD FORESTS THAT RECEIVED VARIOUS FORESTRY TREATMENTS — A PRELIMINARY LIST

Very little collecting of spiders has been done in Arkansas using pitfall traps, (Heiss, Spiders collected from pitfall traps in Newton and Union County, Arkansas, unpublished Master's thesis, Univ. Ark., Fayetteville, 1977). Due to the fact that the investigators must leave the traps in place for an extended period of time, most individuals who research large areas of the state are unable to suitably use this procedure; however, this study was conducted over only a two county area with one of the investigators on site for the entire period that the research was initiated. Since pitfall trap investigations have not occurred previously in nonagricultural areas of Arkansas, it is believed that this study will elucidate not only differences of spider fauna under various forestry practices but also will allow for comparisons and correlations of fauna in agricultural vs. nonagricultural areas.

Spiders were trapped in 1984 using pitfall traps with rain covers. Each trap consisted of a 1 qt. metal oil can, open at both ends to form a cylinder and buried open end up and level with the surface of the ground. A 16 oz. plastic drinking cup was placed into the cylinder. The cup held the preservative — 5 fl. oz. of a 1:1 mixture of antifreeze and water. The cup was easily removed and the contents collected without disturbing the ground around the trap. A 1 ft. square rain lid, held 1 in. over the cup, reduced the amount of rain entering the trap. Traps were emptied weekly and the spiders sorted by forest treatment and then placed in 80% ethyl alcohol. The weekly catches from all traps within each treatment were pooled for storage.

The Drew County treatments consisted of 9 pine-hardwood stands (mostly loblolly and shortleaf pines mixed with oaks, hickories, and sweetgum). Three stands were clearcut and site prepared in the summer of 1981, then planted in January to produce an evenaged stand of loblolly pine. Three stands were selectively harvested in the summer of 1981 to produce an all aged stand of loblolly pine. The 3 remaining stands were not cut and served as checks. Twenty traps were randomly placed in each treatment on an established 1-chain (66 ft.) grid. Traps were sampled from May 11 through October 31.

The Bradley County treatments included 3 study areas. Study area one was in a forest type of mixed pine-hardwoods that included three 15-20 ac. clear-cuts, each site prepared in 1982 using a different procedure, but replanted in 1983 to loblolly pines. The 3 treatments included: Sheer, rake and windrow in January; Drum-chop in September; and Hexazinone herbicide applied in May 1983 using a spot gun to place 4 spots of chemical around each pine seedling. An adjacent stand served as the check. Fifteen traps were placed in each treatment on a transect, with a 66 ft. trap spacing. Traps were sampled from June 6 through October 31.

Study area two consisted of a 50 ac. clearcut sprayed in May of 1983 with hexazinone and broadcast burned in July, then replanted in March of 1984 with loblolly pine. An adjacent stand of mostly mixed hardwoods was the check. Twenty traps were placed in each stand on a transect, with a 66 ft. trap spacing. Traps were sampled from June 6 through October 31.

Study area three was a 40 ac. 7-year-old evenaged loblolly pine plantation treated with hexazinone by air in 1983 to release the pine samplings from the hardwood competition. An adjacent unsprayed area of the plantation served as the check. Fifteen traps were placed in each treatment on a transect, with a 33 ft. trap spacing. Traps were sampled from June 20 through October 31.

Thousands of spiders were collected, with ground inhabiting spiders such as those belonging to the families Gnaphosidae and Lycosidae being the most numerous. For this preliminary report 10 families and 65 species of spiders have been listed from the 2,039 spiders identified.

They are as follows:

Taxa	Numbers Drew County	Identified Bradley County	Taxa	Numbers Drew County	Identified Bradley County
AGLENIDAE			LYCOSIDAE		
<i>Agelenopsis pennsylvania</i> (C.L. Koch)	1		<i>Allocosa funerea</i> (Hentz)	9	
<i>Coras medicinalis</i> (Hentz)	1		<i>Lycosa anteleucana</i> Montgomery	5	8
			<i>Lycosa aspersa</i> Hentz	29	3
ANYPHAENIDAE			<i>Lycosa carolinensis</i> Walckenaer	5	10
<i>Anyphaena celer</i> (Hentz)	1		<i>Lycosa frondicola</i> Emerton	1	1
			<i>Lycosa gulosa</i> Walckenaer	83	
ARANEIDAE			<i>Lycosa helluo</i> Walckenaer	24	18
<i>Eustala anastera</i> (Walckenaer)	1		<i>Lycosa lenta</i> Hentz	4	1
<i>Neoscona arabesca</i> (Walckenaer)	1		<i>Lycosa punctulata</i> Hentz	34	18
			<i>Lycosa rubida</i> Walckenaer	120	40
CLUBIONIDAE			<i>Lycosa riparia</i> Hentz	4	1
<i>Castianeira amoena</i> (C.L. Koch)	2		<i>Pardosa distincta</i> Blackwell	47	
<i>Castianeira descripta</i> (Hentz)	2		<i>Pirata insularis</i> Emerton	60	
<i>Clubiona excepta</i> (C.L. Koch)	4		<i>Pirata maculatus</i> Emerton	1	
<i>Clubiona obesa</i> Hentz	1		<i>Pirata piratica</i> (Clerck)	1	1
<i>Marcellina piscatoria</i> (Hentz)	1		<i>Schizocosa avida</i> Walckenaer	60	
<i>Micaria longipes</i> Emerton	1		<i>Schizocosa bilineata</i> (Emerton)	49	1
<i>Strotarchus piscatoria</i> (Hentz)	2		<i>Schizocosa crassipes</i> Walckenaer	1	
			<i>Schizocosa ocreata</i> Emerton	13	1
GNAPHOSIDAE			<i>Schizocosa saltatrix</i> Hentz	18	1
<i>Callilepis pluto</i> (Banks)	28	27	<i>Tarentula aculeata</i> (Clerck)	1	
<i>Callilepis imbecillis</i> (Keyserling)	1	1	<i>Trabea aurantiaca</i> (Emerton)	1	
<i>Cesonia bilineata</i> Hentz	1	2	<i>Trochosa terricola</i> (Thorell)	2	1
<i>Drassylus creolus</i> Chamberlin and Gertsch	4	5			
<i>Drassylus depressus</i> Emerton	64	45	PISAUROIDAE		
<i>Drassylus aprilius</i> (Banks)	7	1	<i>Dolomedes vittatus</i> Walckenaer	1	
<i>Drassylus covensis</i> Exline	10				
<i>Drassylus virginianus</i> Chamberlin	5		SALTICIDAE		
<i>Drassodes neglectus</i> (Keyserling)	1		<i>Habrocestrum pulex</i> (Hentz)	2	
<i>Gnaphosa sericata</i> (C.L. Koch)	224	52	<i>Metaphidippus exiquus</i> (Banks)	1	
<i>Gnaphosa muscorum</i> (C.L. Koch)	1		<i>Neon nelli</i> Pockham	1	
<i>Herpyllus vasifer</i> (Walckenaer)	1				
<i>Lithophyllus temporarius</i> Chamberlin	2	2	THOMISIDAE		
<i>Psecilochroa capulata</i> Walckenaer	1	1	<i>Misumenops asperatus</i> Hentz	228	
<i>Rachodrasus exlineae</i> Platnick and Shadak	101	46	<i>Misumenops celer</i> Hentz	1	
<i>Synaphosus paludis</i> (Chamberlin and Gertsch)	11	5	<i>Misumenops oblongus</i> Keyserling	2	
<i>Zelotes duplex</i> Chamberlin	44	20	<i>Misumenops deserti</i> Schick	2	
<i>Zelotes hentzi</i> Barrows	362	17			
<i>Zelotes rusticus</i> (C.L. Koch)	11		ZORIDAE		
<i>Zelotes subterraneus</i> (C.L. Koch)	1		<i>Zora pumila</i> (Hentz)	1	
HAHNIIDAE					
<i>Neontistea agilis</i> (Keyserling)	1				

General Notes

The spider fauna collected are what we would have expected. Gnaphosids (ground spiders), Lycosids (wolf spiders), Thomisids (crab spiders), and Salticids (jumping spiders) are the families most likely to be wandering, hunting, ambushing, and stalking prey on the ground. Therefore, these spiders are more likely to fall into traps than other families of spiders that make webs or trap prey.

Fewer spiders have been identified from the Bradley County collection than from the Drew County collection which may account for the discrepancy in numbers reported for that county as compared with Drew County. The practices carried out in both treatments were also very different.

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POPULATION DECLINE OF THE ENDANGERED INDIANA BAT, *Myotis sodalis*, IN ARKANSAS

The Indiana bat, *Myotis sodalis*, is one of three Arkansas bat taxa listed as endangered (specifically, in danger of extinction throughout all or a significant portion of its range) by both the U.S. Fish and Wildlife Service and the Arkansas Game and Fish Commission. Other Arkansas bats also listed as endangered are the gray bat (*Myotis grisescens*) and the Ozark big-eared bat (*Plecotus townsendii ingens*).

The range of *M. sodalis* extends across the eastern United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to north-western Florida. Distribution is associated with major Karst regions and areas north of such regions (Hall, 1962). The present total population is estimated to number approximately 500,000, of which more than 85% hibernate at only six locations; two caves and a mine in Missouri, two caves in Indiana, and a cave in Kentucky. In Arkansas, Indiana bats are found primarily in the Ozark Mountain region, the only area of the state where caves are numerous.

Indiana bats hibernate in large dense clusters of up to several thousand individuals, in sections of the hibernaculum where temperatures average 3-6° C and having relative humidities of 66-95% (Barbour and Davis, 1969). In Arkansas, most Indiana bats have been found hibernating where temperatures were slightly warmer, ca. 8-10° C. Surface temperatures of large clusters taken with an infrared thermometer were usually within ± 0.5° C of the temperature of the cave wall or ceiling near clusters. These bats hibernate from October to April, depending on climatic conditions. Density in clusters is usually about 3,200 bats per m²; however, in one instance, we found as many as 5,000 bats per m² in a tight cluster in an Arkansas hibernaculum in late February.

Females depart hibernacula before males and arrive at summer maternity roosts in mid May (Humphrey et al., 1977). They raise their single young, born during June, under the exfoliating bark of trees in wooded riparian habitats. During September they depart for autumn swarming caves (Cope and Humphrey, 1977; Humphrey et al., 1977). The summer roost of adult *M. sodalis* is apparently in the vicinity of hibernacula, but where most spend the day is not known (Hall, 1962; LaVal et al., 1977).

Until 1974, little was known concerning the summer habitat and ecology of this bat. In 1974, the first known maternity colony was discovered, under the loose bark of a dead bitternut hickory tree in east central Indiana (Humphrey et al., 1977). The colony, numbering about 50 individuals, also utilized an alternate roost, located under the bark of a living shagbark hickory tree. The total foraging range of the colony consisted of a linear strip along 0.82 km of a creek. Further, foraging habitat was confined to air space from 2 m to approximately 30 m high, near the foliage of riparian and floodplain trees (Humphrey et al., 1977).

During the summers of 1977 and 1978, two additional maternity colonies were discovered, both also in east central Indiana (Cope and Seerley, 1977; Cope et al., 1978a). The two colonies had maximum estimated populations of 100 and 91 respectively, including females and young. Indiana bats were also captured at four additional locations in the same area, but outside the known range of the two maternity colonies. Habitat in the area was similar to that described for the first maternity colony discovered in 1974 (Humphrey et al., 1977). The foraging area of one of the two colonies was found to extend along approximately 1.2 km of stream.

Summer foraging habitat of maternity colonies is in mature riparian forest. Interestingly, Indiana bats have not been observed foraging over cleared portions of streams or over fields away from trees (Cope et al., 1974; Humphrey et al., 1977). In flying to a foraging area, Indiana bats apparently will not fly over open country or open water (Cope et al., 1978a).

Much of what is currently known about summer habitat and ecology of this species is included in the publication of Humphrey et al. (1977), and in unpublished reports by Cope et al. (1978a, 1978b). During recent years additional evidence has accumulated indicating that, during summer, *M. sodalis* are widely dispersed in suitable habitat throughout a large portion of their range. LaVal and LaVal (1980) reported mist netting lactating females and juveniles at 10 locations scattered over northern Missouri and cited a personal communication from J. Bowles indicating similar data from Iowa. Others have also reported capturing females and/or young during summer in Missouri (Easterla and Watkins, 1969), Illinois (Kessler and Turner, 1979, 1980), and Kentucky (Kessler et al., 1981; and Harvey and Kennedy, 1980, 1981).

Our attempts to locate summer colonies of Indiana bats in Arkansas by netting at several locations in various habitat types resulted in failure to capture female bats. Males, however, were netted at some cave entrances. In addition, several (as many as 10 per cave) male *M. sodalis* were observed in Arkansas Ozark caves during summer. It is likely that female Indiana bats from Arkansas hibernacula migrate northward in summer to maternity roost sites located to the north of the Ozark Mountains.

Between early August and mid-September, Indiana bats arrive in the vicinity of their hibernacula where they engage in swarming and copulation. Swarming continues into mid to late October. During this time fat reserves are built up for hibernation. In Missouri, Indiana bats were found to feed primarily on moths (LaVal and LaVal, 1980). Paradiso and Greenhall (1967) reported a longevity record of 13 yr 10 mo for this species.

Hibernating bats leave little evidence of their past numbers, thus it is difficult to calculate a realistic estimate of population decline for this species. It is likely that the Indiana bat population in Arkansas was never as high as reported from other areas. However, we do know that at least 10 Arkansas caves that previously housed hibernating colonies of Indiana bats are no longer inhabited by this species. We also know that one Newton County cave, that only a few years ago contained 7,000 hibernating Indiana bats, now houses less than 200.