ECOLOGY

Chairman: Alton A. Lindsey, Department of Biological Sciences, Purdue University, Lafayette, Indiana 47907

Marion T. Jackson, Department of Life Sciences, Indiana State University, Terre Haute, Indiana 47809, was elected Chairman for 1973

ABSTRACTS

Tornado Tracks in the Presettlement Forests of Indiana. Alton A. Lindsey, Department of Biological Sciences, Purdue University, Lafayette, Indiana 47907.——In our presettlement forests, many areas of windfall provided shelter and edges for wildlife, and habitat for early successional plant species. Some Indian villages and trails were located with reference to this fuel resource. One cluster of wigwams mapped during the General Land Office survey (1795-1847) was located immediately between a stream and a windthrow swath. White settlers placed their village of Windfall, Tipton County, near two areas of down timber on Wildcat Creek. Not long before 1838, a tornado occurred with the same location and course as the Palm Sunday tornado, 1965, that devastated Russiaville.

The deputy surveyors mapped 99 tornado tracks in Indiana; 44 were large tornadoes, more than one-fourth mile wide. Forty-six tornadoes had moved from west to east, 22 toward the southeast, 22 toward the northeast, and 9 toward the north. The average tornado mapped before 1847 bore nearly 20° farther east of north than the average of 211 tornadoes mapped by Schaal for the period 1916-1965. The early surveyors missed many windfalls because they traversed only the exterior lines of sections, and because the first work started in southern Indiana before surveyors were specifically required to record fallen timber. Hence, few were shown for the southwest corner of the state, where Agee noted greater numbers for 1916-1968 than the average for the state. Schaal considers the mean annual number for Indiana was the same then as now, or 23 tornadoes. If all deputy surveyors had found and mapped all tracks existing at the time of their survey, we could now determine how long the average windfall remained recognizable under seral development. Assuming that the average recognizable life of a track was 20 years, the 99 tracks mapped were 21.5 per cent of the number then existing.

A Sample Hydrologic Environmental Inventory of Tippecanoe County. Robert H. L. Howe, Eli Lilly and Company Tippecanoe Laboratories, Lafayette, Indiana 47902.——A series of hydrological environmental surveys was conducted and data were used for the mathematical formulation for the inventory purpose, using the Tippecanoe County aquatic structures. Interpretation was presented as based on long term samples and assays.

Effects of Ground Fire on Spring Wildflower Populations of Oak-hickory Forests. Ronald L. Helms and M. T. Jackson, Department

of Life Sciences, Indiana State University, Terre Haute, Indiana 47809.——Two forested areas, located in east-central Illinois and west-central Indiana, sustained ground fire in the spring and fall of 1971, respectively. The herbaceous stratum was sampled during the spring of 1972 by 32 square meter plots in the burned and unburned sections of each study site. Significant changes in density were recorded for 8 of 11 wildflower species in the spring-burned tract; 8 of 10 wildflower species had significant density differences due to fall burning. Frequency changes were significant for 7 and 6 species, respectively. Species characteristic of undisturbed forest conditions decreased substantially in density and frequency; whereas, species commonly found on disturbance forest sites increased markedly.

The Distribution of *Chaoborus* species in Four Bog Lakes in the Upper Peninsula of Michigan. CARL N. VON ENDE, Department of Biology, University of Notre Dame, Notre Dame, Indiana 46556.——Four bog lakes being studied in the Upper Peninsula of Michigan have different combinations of *Chaoborus* (Diptera: Chaoboridae, phantom midge) species. It was proposed that the distribution of *Chaoborus* can be explained by considering the influence of fish predation, zooplankton competition, and refuges for zooplankton. Fish can have a direct effect by preying on the *Chaoborus*, and an indirect effect by preying on the zooplankton, which in turn are preyed upon by the *Chaoborus*. It was hypothesized that the number and size of species of zooplankton present also is important in determining which *Chaoborus* species are present. The assumptions and hypotheses being tested by field data and laboratory experiments were outlined. The relevance of this investigation to present theories of the structure of aquatic animal communities was suggested.

The Distribution and Ecology of Cave Crayfishes in Indiana. H. H. HOBBS III, Department of Zoology, Indiana University, Bloomington, Indiana 47401.——Approximately 1500 caverns are known to be developed in the central Mississippian and eastern Silurian limestones of the southern one-sixth of Indiana. Two species, representing two genera of crayfishes, occur within the subterranean waters of many of these caves. *Cambarus* (*Erebicambarus*) *laevis* Faxon, a troglophile, is found in epigean and hypogean streams of both the Mississippian and Silurian cave areas. The troglobitic *Orconectes inermis* is represented by two subspecies and intergrade populations and is restricted to caves of the south-central Mississippian limestones. *Orconectes inermis testii* (Hay) has been observed only in caves of Monroe County and *Orconectes inermis inermis* Cope has been found within the cave systems of southern Indiana and northern Kentucky (between Monroe County, Indiana, and Hart County, Kentucky). *Cambarus laevis* is known from 46 caves in nine counties, *Orconectes inermis testii* has been observed in 14 caves in Monroe County and *Orconectes inermis inermis* is reported from 38 caves in six Indiana counties. *Cambarus laevis* is the most widely distributed of the cave crayfishes and is found not only in the slow moving, silt-bottomed streams commonly inhabited by *Orconectes inermis*, but also in the more swiftly flowing streams with gravel and bedrock substrates.

Study of Predation Strategy in a Cave Beetle. THOMAS C. KANE, Department of Biology, University of Notre Dame, Notre Dame, Indiana 46556.——The purpose of this paper is to gain insight concerning the predation strategy of the cave beetle, *Neaphaenops tellkampfil* (Coleoptera:Carabidae), which is the most abundant beetle in the caves of Central Kentucky. *Neaphaenops tellkampfii* apparently monopolizes the eggs of the common cave cricket, *Hadenoecus subterraneus* (Orthoptera: Gryllacrididae), which oviposits mainly in cave passages containing sandy substrate. Pitfall trap data showed that this beetle selects sandy substrate over muddy or rocky substrate when given a choice. It was also demonstrated that hole digging behavior occurs to a much greater extent in sand than in mud when a beetle is presented with equal amounts of both substrates. Finally, bait trapping data indicated that *Neaphaenops tellkampfii* may depend solely on cricket eggs in sandy areas since it comes to bait only on muddy substrate. This type of study lends itself to testing theoretical models of strategies for solitary predators.

Conservation vs. Management in Resource Preservation. JAMES R. KARR, Department of Biological Sciences, Purdue University, Lafayette, Indiana 47907.——Declaring an area a national park has classically meant the assumption of a passive policy of park management in the name of conservation. In the United States we found that this resulted in overpopulation of certain large species (*e.g.*, elk in Yellowstone) which required culling the herd to avoid overpopulation and eventual habitat destruction.

The same lessons were learned as early as 1956 by management personnel in Africa. However, during a recent visit to Tsavo National Park in Kenya I was appalled by the condition of the habitat in the drier eastern portion of the park due to a complex of factors including overpopulation by elephants. The situation was exacerbated by an unusually dry period last year.

I discussed the situation with several local biologists and learned that one of several factors responsible for the hesitancy of Government officials to selectively remove individual and/or families of elephants was the expected outcry from the American and European conservation movements. If this is true, and I feel that it is, it is our obligation to educate our citizens to the responsibilities of conservation through enlightened management. Only through enlightened management can we expect to preserve our natural resources.

A common approach is to appeal to the public to have "faith" in the knowledge of professional wildlife conservationists. Rather, I feel that we should educate our citizens in the principles of environmental biology and ecology so they can recognize the reason for management decisions rather than take those decisions on faith.