ECOLOGY

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ABSTRACTS

Factors Affecting Growth and Abundance of Young Walleye. Robert L. Ball, Indiana Department of Natural Resources, P.O. Box 16, Avoca, Indiana 47420.——An evaluation of growth and abundance of larval and juvenile walleye was conducted at Brookville Reservoir in east-central Indiana. Stocked larval walleye were collected by push-net, along with data on zooplankton abundance and limnological data at 5 stations for 3 years. Catch rates and survival of age 0 and 1 walleye were estimated from spring and fall shoreline electrofishing samples. Low water transparency reduced abundance of larvae at an uplake station. First year growth appeared to be related to water temperatures in May, with years having lower May water temperatures producing slow larval growth. Angler harvests of age 1 walleye dropped sharply as abundance of age 0 and 1 walleye increased. This was related to reduced first year growth due to increased intraspecific competition and low May water temperatures. Angler harvests of age 2 walleye were positively correlated with spring abundance of this age group.

Responses of Male Green Frogs (*Rana clamitans*) to Broadcasted Conspecific Calls. Jennifer J. Bucki and Stephen A. Perrill, Department of Biological Sciences, Butler University, Indianapolis, Indiana 46208.——A standard, single note mating call of *Rana clamitans* was repeatedly dubbed onto an experimental tape with 10 second intervals separating each call. Immediately after recording an unsolicited call from a subject, this experimental mating call was broadcasted to each subject from a distance of 50 cm. The subject's vocal response was recorded and other behaviors were noted. Analysis of the responses indicated no characteristic pattern for male green frogs. While the subjects' responses to the broadcasted calls were not predictable, all of the frogs' responses differed from their unsolicited behavior.

Stocking, Growth and Structural Changes over 20 years on Two Indiana State Forests. Burnell C. Fischer and David W. George, Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana 47907, Ben Hubbard and Janet Eger, Indiana Division of Forestry, Martin State Forest, Shoals, Indiana 47581.——Continuous Forest Inventory (CFI) plots established in 1965 on Ferdinand State Forest—106 plots and Martin State Forest—88 plots, were located and remeasured in 1985 and 1986 respectively. Large increases in stocking indicate that these forests are rebounding from past misuse. Oaks continue to dominate the sawtimber-sized tree class but other species are increasing in importance. DBH growth trends follow those for other Indiana CFI data bases with yellow poplar and the red oaks greatest and hickories the slowest. Stand growth rates (net growth + ingrowth) are much

lower than those estimated by county soil surveys, Ferdinand = 97 bdft/ac/yr and Martin = 126, but compare favorably to other southern Indiana studies. Forest structure is uneven-sized reflecting both residual trees from previous high-grade cuttings and variable species growth rates.

Tree Species Composition Related to Aspect and Slope Position Following Clearcut Harvesting on the Hoosier National Forest. David W. George and Burnell C. Fischer, Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana 47907.——There have been several studies on the response of tree regeneration after clearcutting in the central upland hardwoods region, but only limited analysis of species composition has been attempted. A large empirical data base (1801 plots) of the regeneration across an array of two easily attainable topographical factors, aspect and slope position, have been collected, and should relate to tree species regeneration. Data collected on the regeneration plots consisted of aspect, slope position and a tally of woody species in a dominant or codominant crown position. Species composition of an ordinal aspect and slope position matrix referred to as Upland Hardwood Site Quality Index (UHSQI) was divided into two age groups under 11 years and over 11 years (range to study 5 to 17 years) to identify any trends evident in the change of species composition. The UHSQI more clearly identifies tree species composition attributes of regenerated clearcuts on the Hoosier National Forest.

Nitrogen Fixation in Coarse Woody Debris. Paul C. MacMillan, Department of Biology, Hanover College, Hanover, Indiana 47243.——Preliminary results of acetylene reduction by samples of logs from Spring Mill State Park, indicate this is a potential source of increased N in coarse woody debris. Higher activity in maple and hickory wood and lower activity in oak wood, suggests an inhibition of N_2-fixation due to tannins in oak wood. Stimulation of acetylene reduction activity after incubation with a carbon supplement medium suggests the N_2-fixing bacteria were present in an inactive form in June. Higher activity at the soil-wood interface, than in other parts of the logs, suggests the N_2-fixing bacteria are from the soil, not from insect frass, fungal mycelia or plant roots. This study will monitor acetylene reduction activity in these same logs at 3-month intervals over a year.

Original Vegetation and Contemporary Landscape Patterns in Southern Elkhart County, Indiana. David J. Hicks and Marisa Yoder, Department of Biology, Manchester College, North Manchester, Indiana 46962.——US Land Office survey records from 1828 were analyzed to determine original vegetation patterns. Major vegetation types were beech-maple forest (occupied 78.8% of total area), oak-hickory forest (11.8%), dry prairie (3.7%), wetlands (3.4%) and floodplain forest (2.3%). Major land uses in 1978 were agriculture (78.1%), urban (8.3%), beech-maple woodlot (7.8%), floodplain and adjacent forests (4.2%), open water and wetlands (0.9%), and oak-hickory woodlots (0.7%). The average beech-maple woodlot had an area of 21.8 ha, and the average oak-hickory woodlot was 29.5 ha. Woodlots were randomly distributed with regard to each other and with regard to original forest type. Average distance between woodlots was 280 m.

Changes in the Potential Forage Fish Populations in Indiana Waters of Lake Michigan: 1973 Compared to 1984-86. Kevin J. McKeag and Thomas S. McComish, Department of Biology, Ball State University, Muncie, Indiana 47306.——The potential nearshore forage fish populations were sampled by bottom trawling at sites in Lake Michigan near Michigan City, Indiana from June through August of 1973 and 1984-86.

The total annual catch of adult fish, defined as age one or older, captured at combined sites was evaluated for the six major species composing the fish community.

The alewife (*Alosa pseudoharengus*) and trout-perch (*Percopsis omiscomaycus*) populations both declined dramatically at 71% and 87%, respectively, comparing 1973 to 1984-86. During the same period, yellow perch (*Perca flavescens*) increased 72 fold and bloater (*Coregonus hoyi*) increased over 3000 fold. By comparison, the spottail shiner (*Notropis hudsonius*) population was relatively stable and the rainbow smelt (*Osmerus mordax*) population fluctuated widely.

Significant changes have occurred in the near-shore fish community of extreme southern Lake Michigan in Indiana since the early 1970s. Although several factors may be involved, the major contributing factor is likely predator-prey interactions as a result of increased salmonid predator density.

Possible Mechanism of Female Choice in *Hyla Chrysoscelis*. MOLLY MORRIS AND STACIA YOON, Department of Biology, Indiana University, Bloomington, Indiana 47405.——A large male mating bias has been documented for a southern Indiana population of *Hyla Crysoscelis* in three out of four seasons studied. Preliminary observations suggest that female choice may have a significant influence on this non radom mating pattern. To explore the possible mechanisms on which females base their choice, both laboratory and field female discrimination experiments were conducted in relation to various parameters of the male's call and body size. In both the laboratory and the field experiments call rate is most important regardless of male size. However, when call rate is not variable frequency becomes significant.

Selected Metal Ion Concentrations in River Waters in Fulton, Kosciusco, Wabash and Whitley Counties. JAMES T. STREATOR AND ALLEN S. KRALL, Manchester College, North Manchester, Indiana 46962.——As part of a study of the quality of life in the four north eastern Indiana counties of Fulton, Kosciusko, Wabash and Whitley, the authors monitored the concentrations of five metal ions, pH and hardness in the three rivers that flow through these counties. Next summer, selected metal ion concentrations in standing bodies of water in these four counties will be monitored. Ions monitored included those of cadmium, chromium, copper, iron, potassium. Additionally, ions contributing to hardness, calcium and magnesium, and pH were monitored. The results and their significance will be presented.

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Seven Years of Change in Seedling Density Following Windthrow in an Old Growth Beech-Maple Forest in Northern Indiana. VICTOR RIEMENSCHNEIDER, Department of Biology, Indiana University at South Bend, P.O. Box 7111, South Bend, Indiana 46634.——Bendix Woods Nature Preserve, an old growth beech-maple forest, suffered extensive damage during severe windstorms on July 5, 1980. In May 1981, 100 random, 1.2m diameter plots were permanently marked and inventoried. All tree species less than one meter tall were counted each year in late April, May and September (1982-87). The average number of seedlings per hectare ranged from 15,208 in 1984 to 510,268 in 1985 with an average of 115,564. *Acer saccharum* and *A. nigrum* dominated the seedling level, ranging from 57 to 97% of total individuals. There was no significant difference in seedling numbers between plots inside and outside the windthrow area. The average number of seedlings per plot for maple and beech was greater outside than inside the damaged area. When maple was removed from total, there was a slight trend of increasing numbers with time. For a majority of species, the 100 random plots in the ca. 10 ha preserve were not a sufficient sample to determine seedling changes.