ECOLOGY

Chairman: WILLIAM B. CRANKSHAW, Ball State University

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ABSTRACTS

Temperature and Moisture Relationships of Green County, Indiana Strip Mine Areas. R. MICHAEL DINKEL and FRED ROTHWELL, Indiana State University.—Temperature and moisture are physical factors which must be taken into consideration when one considers the reclamation of strip-mined land by means of forestation. During the spring and summer of 1968, temperature and moisture readings were made on and in the vicinity of the Green County spoil bank location. These were measured periodically and data was compiled in order to determine the significance of varying temperature and moisture relationships on the viability and growth of tree seedlings introduced on the spoil bank and coal-mine areas.

Ecological Site Preference and Taxonomic Differences within Two *Acer saccharum-Acer nigrum* Complexes Found in Parke County, Indiana. ALFRED G. CRASKE, JR., Indiana State University.—A study was conducted on the ecological site preferences and taxonomic differences within two *Acer saccharum-Acer nigrum* complexes found in Parke County, Indiana. A suitable means of identification was determined for the two species based on leaf characteristics. A significant difference was found between flood plain and slope and flood plain and upland populations based on leaf morphology. The flood plain was found to have significantly higher pH and phosphorus values and significantly less canopy cover than those values for slope or upland. No significant differences were found between slope and upland for the ecological parameters. Sugar maple, black maple and the intermediates were found to represent three populations. The intermediate population represented the central portion of a continuum of leaf characters running from black maple to sugar maple. *Acer nigrum* Michx. f. showed a definite site preference for the flood plain. *Acer saccharum* Marsh. showed a definite site preference for the slope and upland. It would thus appear that the character of site preference would be valuable for identification and should be incorporated into discriptions of the two species.

Effects of Thermal Discharge on the Phytoplankton and Macroinvertebrates of the Wabash River. JERRY L. GERWIG and WM. B. CRANKSHAW, Ball State University.—The effects of thermal discharge on the phytoplankton and macroinvertebrates were studied on the Wabash River in Sullivan County, Indiana. The temperatures recorded in the normal river water ranged between 72 and 78 degrees F. Temperatures recorded in the heated-water zone varied from 87 to 74 degrees F.

Nineteen genera and nine families of green algae (Chlorophyceae), blue-green algae (Myxophyceae), and diatoms (Bacillariophyceae) constituted the phytoplankton population. Green algae represented 95 to 97 percent of the algal population, blue-green algae represented 2 to 3 percent, and diatoms represented 1 to 2 percent regardless of the station or the average number of organisms per liter of water. The invertebrates collected were mainly various insect larvae and nymphs.

Effects of Effluent on the Fish Population of Mill Creek, Rochester, Indiana. FREDERIC MORGAN, Ball State University.—This is a report of preliminary data showing the effect of city and light industrial effluent on fish life. Mill Creek is located in North-Central Indiana. It begins as the overflow of Lake Manitou and runs approximately five miles to the Tippecanoe River, passing through the city of Rochester.

Fish were collected from eleven stations: four sites above the major sources of effluent, three sites scattered through them, and four sites below them. The fish were collected by blocking off a measured segment (60 m) of the stream with quarter-inch knotted minnow seines and making two sweeps with an electric seine. At the eleven sites, production of fish varied from a high of 41.1 g/m^2 at station number four above the sources of effluent to zero at station number seven. Downstream in the last four stations the fish population slowly started to recover: .03 g/m^2, .05 g/m^2, .8 g/m^2, and 3.1 g/m^2. From all sites we removed 1166 fish representing 31 different species. The number of species per site varied from nineteen at station four above the sources of effluent to zero at station seven. A recovery was noted in the four downstream sites: 3, 5, 7 and 11.

During the past twelve months, water samples were taken at four sites and analyzed for D.O., temperature, hydrogen sulfide, hardness, turbidity, anionic detergent, total phosphate, nitrite, nitrate, ammonia and pH.

A Study of Selected Physiochemical Properties of Two Indiana Main-Stream Reservoirs. PAUL T. MCKELVEY and CHARLES E. SMITH, JR., Ball State University.—Selected physiochemical properties of Lake Shafer and Lake Freeman, two shallow, narrow main-stream reservoirs near Monticello, Indiana, were determined from November, 1967, through June, 1968. Bi-monthly sub-surface samples from eight stations, four on each reservoir, were analyzed.

These reservoirs were found to have certain properties resembling those of rivers, e.g., width, depth, carbon dioxide concentration, and the absence of distinct thermal stratification. Other properties, typical of natural lakes and/or large reservoirs were, e.g., total alkalinity, dissolved oxygen, nitrate, pH, and sulfate. Phosphate, nitrite, and turbidity values were intermediate between those of rivers and natural lakes and/or large reservoirs. Total alkalinity, nitrate, and phosphate cycles were also noted.

Lake Shafer and Lake Freeman were considered eutrophic based on the high nutrient levels, especially nitrate and phosphate, present in their waters.

Pattern of Mesic Forest Succession at the Western Border. R. O. PETTY, Wabash College.—Data and analysis are presented for forest stands which depict the successional trends currently underway at the western extension of the mesophytic forest. Emphasis is given to the performance of several significant species, especially *Quercus velutina, Acer saccharum* and *Fagus grandifolia.* A model of successional pattern is offered to explain the several cliseral shifts which have occurred during the post-glacial period, as seen in palynology and in the phytosociology of west-central Indiana.

The Effect of Inorganic Sediment on Macroinvertebrate and Fish Populations of a Central Indiana Stream. JAMES R. GAMMON, DePauw University.—The composition and density of populations of macroinvertebrates and fish were studied during 1967 and 1968 in a 1.5 kilometer section of Deer Creek which received wastewater from a crushed limestone quarry. Heavy deposits of sediment which accumulated during 1966 were swept downstream by floods during late 1966 and early 1967. Little sediment accumulated in pools below the quarry during 1967 because of unusually high levels of stream flow throughout the year and because the quarry settling ponds were dredged regularly. Nevertheless, 35 tons of sediment entered the stream from the quarry during 1967.

The standing crop of fish in three pools downstream from the quarry averaged only 55% of those in two pools upstream in June 1967 (224 Kg./ha. compared to 417 Kg./ha.). Carpsuckers and gizzard shad were almost completely lacking downstream, while carp, redhorse and suckers were reduced in numbers. By early August many small individuals had migrated into the pools below the quarry and the standing crops rose to an average of 255 Kg./ha. compared to 362 Kg./ha. in the upstream pools.

The quarry settling ponds received relatively little attention following a thorough dredging in early August 1967 and became completely filled and, therefore, inoperative by late fall of 1967. Heavy concentrations of stonedust entered Deer Creek throughout 1968 as a result. By August 2, 1968 over 3300 tons of sediment were contributed to Deer Creek. The standing crop of fish in June 1968 in the pools below averaged only 25% of those above (100 Kg./ha. compared to 400 Kg./ha.).

The macroinvertebrate populations in several riffles above and below the point of pollution were sampled monthly during months of stable water levels. The density in the riffles below averaged less than 50% of that above. All orders, families, genera and species seemed to be reduced equally in abundance.