

Aquatic Studies at Indiana Dunes

By Douglas A. Wilcox

The dunes along the southern tip of Lake Michigan are remembered in scientific circles for the pioneering work in ecology conducted there by such notables as Henry Chandler Cowles and Victor E. Shelford. Less well-known is the fact that the areas between the dunes generally contain water, exhibiting a variety of forms which includes peatlands, marshes, sedge meadows, hardwood swamps, interdunal and intradunal ponds, and small streams and rivers. Despite human settlement of the area long before Indiana Dunes National Lakeshore was established, many of the aquatic resources in the park retain much of their natural character. Unfortunately, some areas have been and continue to be threatened by human activities.

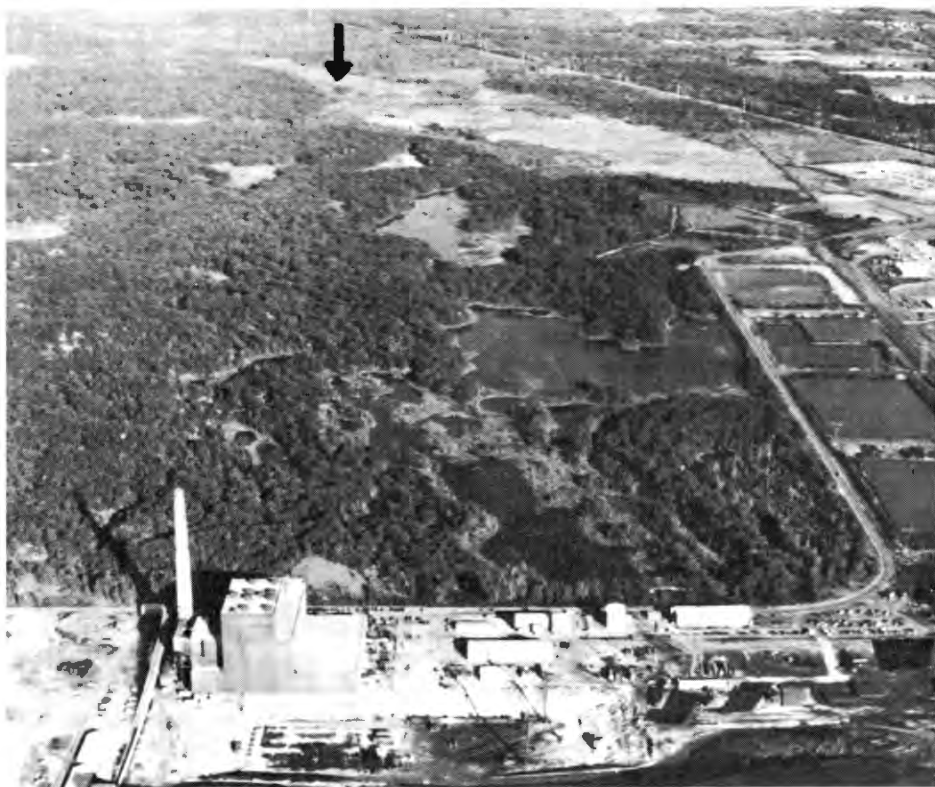
These threats resulted in the establishment within the park of a Science Division, consisting of a Chief Scientist and four professionals specializing in water resources, air resources, biology, and plant ecology, respectively. The issue attracting the most publicity and receiving the most attention from this science division was a threat to Cowles Bog National Natural Landmark from dewatering of the nearby construction excavation of Bailey Nuclear-1, a nuclear power plant whose construction had been delayed since 1977 by the Nuclear Regulatory Commission. Coupled with the dewatering issue was a problem of the opposite extreme, flooding of part of the wetland by seepage from fly ash settling ponds operated by the same electrical generating company.

The seepage problem was resolved by an agreement between the Department of the Interior and the power company that the company would seal the fly ash ponds. The dewatering threat persisted. Studies of the Cowles Bog National Natural Landmark began in 1979 with the intent of characterizing the true nature of the wetland, identifying any existing threats and impacts, and predicting the impacts that might result once nuclear plant construction resumed and dewatering of the excavation was increased.

Results indicated that the peatland was a minerotrophic, groundwater-fed fen, rather than a precipitation-fed bog, and that the groundwater source was a confined aquifer under hydrostatic pressure. As data continued to be collected, it became evident that Cowles Bog fit the definition of a spring mire: a convexly mounded peatland forming over a spring head, the height of the convex peat mass being a function of the hydrostatic head of the spring and the containing volume of the peat.

This discovery became very important when the power company determined that it would be necessary to actively pump water from this same confined aquifer at the excavation site as part of the dewatering activities. U.S. Geological Survey computer modeling predicted that the pumping could cause a decrease in the hydrostatic head under Cowles Bog, resulting in several possible negative impacts to the wetland. Before further research efforts were fully geared up or a full-fledged confrontation erupted, the issue was defused; the power company announced the termination of its construction plans for economic reasons in the late summer of 1981.

While the Cowles Bog controversy was raging, the other aquatic resources of the park were not neglect-



Cowles Bog wetlands are shown in this aerial photograph; the power company is in the foreground and the National Natural Landmark is indicated by the arrow in the background.



Pinhook Bog is a road salt-impacted area, showing skeletons of dead tamaracks and invading cattails.

ed. Monitoring of small streams and ditches and the Little Calumet River for numerous water chemistry parameters was coupled with aquatic fauna studies, especially on the "Little Cal," a salmonid migration stream integral to the Indiana Department of Natural Resources Great Lakes fishery program. Monitoring of beaches and streams for bacterial contents has resulted in numerous requests to county health departments to take action against landowners with faulty septic systems. High bacteria levels on several occasions at one of the Lake Michigan swimming beaches were traced to sewage treatment plants on the Little Cal that were unable to handle combined sewer loads during heavy rainfall periods. Studies conducted on many of the 150 interdunal/intradunal ponds in the 240 hectare Millar Woods section of the park have identified threats from human activities around the park periphery. These threats include an industrial landfill and road salt-laden runoff from a parking lot.

Road salt runoff has proven to be responsible for one of the most evident environmental impacts found in the park. Pinhook Bog, which occupies an ice-block depression in the Valparaiso moraine, appears to be isolated from mineralized groundwater flow and to rely on precipitation for its water supply. Runoff from a sodium chloride (NaCl) road salt storage pile located on I-80/90 adjacent to the bog drastically altered the water chemistry of a portion of the bog, resulting in the death of many native bog plants and the invasion of more salt-tolerant plant species. The major study conducted here has shown an obvious correlation between aquatic vegetation changes and the salt concentrations of the water held in the root zone of the floating peat mat. More importantly, the salt concentrations in the root zone have been shown to be decreasing as heavy rainfalls have leached the salt to lower levels. The native vegetation, especially the sphagnum mosses, have responded to the recovering water chemistry by reappearing in areas where earlier they had been eliminated.

The recovery of Pinhook Bog can be attributed, in part, to the working relationship between science and management. Recommendations from science to park management resulted in the termination of salt storage activities at the site by the highway department and alteration of the highway drainage system to reduce direct runoff from the highway into the bog. This has allowed natural processes (precipitation) to ameliorate the problem.

The Cowles Bog study, the Pinhook Bog study, and nearly all the other studies conducted by the Science Division are in response to the needs of park management. Intelligent management decisions must be based on accurate information, which is often available only after detailed study by professionals in the field. In that light, future water-related work at Indiana Dunes will involve continuation of many of the current studies and the addition of a few more. Emphasis will be placed on studying changes in the Cowles Bog wetlands following termination of fly ash pond seepage and identifying the nature of materials that leach from the industrial landfill into the surface and groundwater systems in Miller Woods. As with much of the work done by the Science Division at Indiana Dunes, input from several staff disciplines can enhance the value of the research being conducted, reflecting the importance of adequate science staffing at the park level.

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