"When one tugs at a single thing in nature, he finds it attached to everything else in the world."

- John Muir

FOREWORD

Dominating the shallows of many lakes are large flowering plants. Essential as fish and waterfowl habitat, these underwater prairies are so intricately bound to the food web of lakes that eradicating them for boating or swimming has not always been successful or desirable. A comprehensive study of the ecology of macroscopic plants was needed to move forward with developing new management strategies.

This study, conducted by the DNR's Bureau of Research, details the seasonal wax and wane of plants and associated life in Halverson Lake. Nestled in Wisconsin's hilly southwest, this shallow impoundment is important not for its recreational value, but as a model to understand plant community interactions unhampered by excessive runoff, pesticides, speed boating, and other disturbances. Frequent reference to relevant literature on aquatic plants broadens the base of the study.

This treatise forms the core of several publications dealing with innovative approaches to plant management. Drawdown and bottom blanketing, removable screening, and mechanical harvesting are subjects of previous works by the author. Forthcoming articles will detail (1) impacts of harvesting lake vegetation on Halverson Lake, (2) mechanical harvesting programs in Wisconsin, and (3) creative lake-use plans for managing with macrophytes. The latter is introduced in the concluding section of the present work.

I hope that this technical bulletin will ultimately serve lake managers as a useful reference source for information and ideas on macrophytes and their ecology.

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ABSTRACT

The community structure and interactions of submerged macrophytes were examined from 1977 through 1983 in Halverson Lake, a shallow 4-ha (10-acre) impoundment in southwestern Wisconsin.

Divers sampled macrophytes along transects; an Ekman dredge, suspended multiple-plate samplers, and plant nets gathered macroinvertebrates; fishes were boom shocked; and plankton were vertically collected with a net or Kemmerer sampler.

Vascular plants covered 40-70% of the bottom in June-August, stratified vertically into three layers, and spread in zones to a depth of 3.5 m (11.5 ft). Standing crop reached 130-200 g/m^2 (dry weight) in July and consisted mostly of Berchtold's, curly-leaf, and sago pondweeds (*Potamogeton* spp.), coontail (*Ceratophyllum demersum* L.), and water stargrass (*Heteranthera dubia* (Jacq.)).

Macroinvertebrates congregated on or beneath macrophytes, where they were grazed by bluegills (*Lepomis macrochirus* Raf.) and largemouth bass (*Micropterus salmoides* (Lacepède)). Bluegills also consumed macrophytes. Black crappies (*Pomoxis nigromaculatus* (Lesueur)) ate zooplankton offshore. Rotifers dominated the net zooplankton. Blue-green algae amassed after June, in response to nutrient runoff and macrophyte decay.

Submerged macrophytes functioned to create microhabitats and microclimates inshore, selectively shelter fishes and their prey, replenish detritus and benthic algae eaten by invertebrates, diversify the zooplankton, and improve water clarity by stabilizing sediments and storing nutrients.