

Culver Lake Biomanipulation Project

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Culver Lake is a 550 acre, 65-foot deep lake located in Sussex County, NJ. Although characterized by very low phosphorus concentrations the lake had a longstanding serious problem with blue green algae blooms leading to deteriorating water quality and diminished recreational usage. Based on data developed by Princeton Hydro it was shown that the lake's problems were largely the result of the presence of excessive numbers of the filter feeding fish, alewife. Princeton Hydro initiated a series of surveys designed to support a biomanipulation restoration program that would address and correct lake water quality impacts directly related to the introduction of alewife. The surveys focused on the development of a comprehensive database that would be used to implement a biomanipulation ("top down") restoration and management program for Culver Lake.

The sampling activities implemented by Princeton Hydro involved collection of phytoplankton and zooplankton data using a variety of towed nets and plankton traps. The fish community was sampled using a variety of passive and active gear: trap nets, gill nets, mid-water trawls, and electro-fishing equipment. The data were synthesized and analyzed using various fishery statistical tools. The results were then used to create a fish stocking and zooplankton stocking program.

The fish stocking program involved the introduction of both brown trout and hybrid striped bass. The stocking of the predatory fish under our direction led to the re-creation of the "two-story" fishery that resulted in a significant decline in alewife numbers. Subsequent fishery studies documented the control of the alewife population. A zooplankton stocking effort was then initiated. This involved the introduction over a three year period of *Daphnia* and *Ceriodaphnia*.

Data collected since the completion of the biomanipulation projects show the lake's water quality has improved dramatically, all without the use of any algaecides or herbicides. Transparency increased from a summer mean of less than one meter to over three meters, blue green algae blooms significantly diminished, and the lake's zooplankton community shifted from small-bodied, omnivorous forms to large-bodied, herbivorous forms. Overall, the lake's water quality and its recreational fishery improved.

