

UNDERWATER AERATION AND ARTIFICIAL FLOATING WETLANDS TO TREAT WATER QUALITY NUTRIENT ISSUES IN PONDS

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Hopkins Pond, New Jersey, experiences cyanobacteria blooms due to thermal stratification, and eutrophication caused by excessive phosphorous levels. In 2013, a diffused aeration system was installed in the pond designed to maximize water lift rate and transfer rate of dissolved oxygen by the release of extremely fine air bubbles along the pond bottom. The rising bubbles draw bottom water along with them to the surface creating an artificial circulation. This circulation mixes water that otherwise would thermally stratify, and increases the dissolved oxygen content throughout the water column. Oxygenating deeper waters near the pond bottom also results in a decrease in the release of phosphorous from the sediment. In addition to the aeration system, as a demonstration project, we designed and installed 350 square feet of artificial floating wetlands (AFWs) using a biological filter substrate and wetland plants for nutrient removal. AFWs reduce nitrogen and phosphorous in a water body using natural microbial action in the filter substrate and uptake by obligate aquatic vegetation. Microbiological activity plays a major role in nutrient removal in wetland systems and the large surface area of the woven floating wetland material provides a tremendous amount of substrate for the growth of bacteria. The AFWs are anchored offshore in water depths that exceed the normal habitat requirements for the plant material and yet are able to continue to provide the same water treatment ecosystem services as their land based counterparts. Since installation of these treatment devices phosphorous levels dropped from 0.126 mg/L down to 0.08 mg/L.

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