

The Tinmouth Pond Milfoil Project: A Non-chemical Strategy for Controlling Eurasian Watermilfoil (*Myriophyllum spicatum* L.) in Tinmouth Pond, Vermont

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Abstract

The Tinmouth Pond Milfoil Project (TPMP) is a comprehensive, integrated approach to manage the invasive exotic aquatic weed Eurasian watermilfoil (EWM, *Myriophyllum spicatum* L.) and improve water quality in Tinmouth Pond, VT (78 acres, max depth 11 ft). First noted in 1998, EWM had significantly expanded its coverage by 2002. The TPMP uses two solar-powered circulators as the primary in-lake management tool and includes hand harvesting, benthic barriers (0.03 acres), and EWM fragment retrieval. One circulator was installed in June 2006 and the other in May 2008. Anticipated benefits include cyanobacteria bloom control through epilimnetic circulation, and EWM control through depletion of ammonia-N from enhanced sediment oxidation. There have been no cyanobacteria blooms and water clarity has noticeably improved since the circulators were installed. Because of the lake's shallow depth, the entire lake bottom is within the photic zone. Annual plant surveys conducted since 2005, based on transects using point-intercept frequency and diver observations, document decreases in both frequency of EWM on transects and percent coverage. Many remaining EWM plants look yellowish and unhealthy, consistent with ammonia-N limitation. At the same time, percent coverage by native plant species has steadily increased since 2005. Furthermore, native plant species richness has also increased since 2005, contrary to the typical paradigm in lakes with an EWM infestation. The TPMP's non-chemical strategy has proven effective so far; even with light availability throughout the lake, EWM presence is limited to relatively few scattered plants, and EWM neither dominates nor outcompetes native plants.

Session K-2: Reservoir Hydromodification

Friday, October 28
3:30 pm – 5:00 pm
Room 206A

Effects of Reduced White River Inflow on Lake Tapps Water Quality

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Abstract

Large volumes of water were diverted from the White River to Lake Tapps, Washington, for power generation from 1911 to 2004. During years 2004 through 2006, White River inflows to Lake Tapps were significantly lower (summer average of 159 cfs) compared to the 1982-2003 summer average inflow of 917 cfs. The reduction of river inflows to Lake Tapps raised concerns about maintaining acceptable water quality in the lake. To investigate the effects of reduced White River flows to Lake Tapps water quality, we monitored several sites in Lake Tapps during summer months in 2004 through 2006. Lake Tapps can be classified as an oligotrophic lake, with average summer total phosphorus and chlorophyll values of 8.4 and 2.3 µg/L, respectively. Algae in Lake Tapps are limited

by phosphorus and are not light limited. Lower volume flows to Lake Tapps means lower lake phosphorus concentrations because increased water retention time in the lake increases the loss of phosphorus to lake sediments and the inflow phosphorus concentration is lower at lower inflow. Lake Tapps water quality will not benefit from increased White River inflows above those needed to maintain the lake level. The increased water retention time in the lake, however, has increased transparency depths in recent years, which may allow macrophytes (milfoil) to grow in a larger area of the lake.

Flow Routing with Bottom Withdrawal to Improve Water Quality in Walnut Canyon Reservoir, California

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Abstract

Walnut Canyon Reservoir is a small 3,000 acre-ft source water reservoir for the City of Anaheim, California. The reservoir receives untreated water from the Metropolitan Water District of Southern California and is principally used as a raw water storage supply (and emergency storage) for the Lenain Filtration Plant. The reservoir is stratified through the summer, with anoxia and elevated concentrations of dissolved Mn, phosphate, total N, and sulfide present in the hypolimnion. Water quality modeling using DYRESM-CAEDYM was conducted to evaluate different management strategies for the reservoir. Simulations evaluated: (1) diffused aeration, (2) hypolimnetic oxygenation, and (3) flow routing with bottom withdrawal. Meteorological data from nearby CIMIS stations were used to drive the hydrodynamic component of the model, with the model calibrated using available profile measurements and discrete sampling from April-July 2010. Diffused aeration, hypolimnetic oxygenation, and flow routing with bottom withdrawal were all predicted to improve DO conditions and lower concentrations of dissolved Mn, P, and other elements, although flow routing with bottom withdrawal could be implemented by the City without incurring significant capital and operating costs. As a result, this strategy was implemented in the spring of 2011. Results from water column sampling this spring and summer will be compared with conditions last year and with model simulations. Although measurements are ongoing, preliminary findings indicate that flow routing with bottom withdrawal can serve as a practical and effective alternative to other engineered solutions under favorable hydraulic and source water quality conditions.

Will a Shift in Algal Composition in Response to Artificial Whole Lake Mixing Help Achieve the Chlorophyll a Standard?

Craig Wolf

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Abstract

In 2008, a new management strategy was implemented on Cherry Creek Reservoir, Colorado to help achieve the chlorophyll a standard (18 g/L). The destratification system was designed to mix the reservoir and minimize thermal stratification, to reduce the favorable growing conditions for cyanobacteria, and to reduce internal phosphorus loading by oxygenating the bottom sediments. Encouraging patterns in the data indicate the destratification system will be effective in achieving some of the objectives, but achieving water quality standards remains uncertain. The destratification system has