

Benefits and Impacts of Lake Level Drawdown

by Dr. George Knoecklein

The following article was written by Dr. George Knoecklein, limnologist and principal, Northeast Aquatic Research, LLC. Dr. Knoecklein has been hired by the Highland Lake Watershed Association (HLWA) and the Town of Winchester to provide professional water-quality testing and analysis as well as to recommend Best Management Practices for the preservation and protection of Highland Lake. He completed an analysis of water quality data from 1938-2008 entitled "Evaluation of Lake Level Drawdown At Highland Lake, Winchester, CT" for the Winchester Water Level Committee in November 2008. Presently, he is conducting a comprehensive aquatic plant survey of Highland Lake for the HLWA. The survey is important to have as a baseline study to compare with future plant surveys; this information would provide the HLWA with information needed to take appropriate preventative or restorative actions. The HLWA is attempting to understand how aquatic plants impact lake ecology and the quality of recreational use of the lake. The aquatic plant study will also help us plan for future maintenance of water quality. Clare Stevens

Analysis of the literature for benefits and impacts of drawdown focused on two primary sources, Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Report by Mattson, et al, produced by Massachusetts Executive Office of Environmental Affairs, and Restoration and Management of Lakes and Reservoirs, Third Edition, by Cooke, et al. These two documents provide a detailed literature search of the impacts of drawdown, presenting case studies as well as an assessment of necessary information requirements to conduct successful drawdowns.

Benefits of Water Level Drawdown

1. The principal benefit of a water level drawdown is to kill aquatic plants that grow in shallow water by exposing the root systems to drying and freezing.
2. The most important secondary benefit of water level drawdown is to allow access to the shoreline for structural maintenance, debris cleanup and sediment removal.
3. Protect shoreline structures from ice damage.
4. Oxidize and compact exposed sediments.

5. Shift the composition of near-shore sediments from fine to coarser grained.
6. Increase flood storage capacity of the lake.

Potential Detriments or Impacts of Water Level Drawdown

1. May not have the desired plant control effect; repeated drawdowns can cause shift from sensitive to tolerant plant species.
2. Sediments exposed to rain can transport nutrients to the lake that can fuel increased algal production if not flushed from system before next growing season.
3. Shallow wells located near the shoreline can lose water supply during a deep drawdown.
4. Water-level lowering can impact invertebrates that are unable to migrate with the changing water conditions (such as mollusks).
5. A lower water level can move fish that require vegetation for concealment out to deeper water where they are susceptible to predation.
6. A lower water level can result in a smaller volume, allowing higher rates of predation.
7. If the overwintering lake volume is very small, under-ice oxygen stress can occur.
8. If water levels are not returned to normal conditions in time, certain fish species may not be able to reach spawning areas.
9. A water level drawdown may expose and harm hibernating reptiles and amphibians that are buried in lake sediments.
10. May restrict access and cover for aquatic mammals and birds.
11. Limits human access where peripheral sediments are soft.
12. Although largely dormant in winter, hydrologically connected wetlands may experience some changes in species composition and relative abundance if dewatering occurs.
13. Limits the availability of near-shore ice cover for skating.
14. Refill can lift dried organic sediments that are now buoyant, causing floating mud islands.
15. Exposed areas that retain nutrients or areas that have nutrient-rich ground water may grow filamentous algae after refill.

<http://www.hlwa.org/drawdownfall09.html>