

## **Rationale for Consideration of a Full Year Drawdown – Two Winters and One Summer**

As pointed out in the previous letter, the proliferation of plant growth and dying of those plants in our lakes relates directly to the aging process. When plants die they decompose into nutrient laden silt that falls to the bottom of the lake. In addition to the organic matter that accumulates, (analogous to leaves falling in your yard every fall), the silt contains the nutrients the plant has taken up during the year, most significantly phosphorus and nitrogen. The more of these nutrients (fertilizer) available in the silt the faster the plants grow the following growing season.

As lakes age this process of plants growing, dying, and leaving behind more nutrients, known as internal nutrient loading, accelerates. The process is further accelerated by boat traffic that churns the silt, releasing otherwise dormant bottom nutrients into the water column increasing the likelihood of algae blooms and increasing aquatic plant growth. For example, the average surface phosphorus concentration in our lakes is 30 mg/l, in the silt it's 1400. As bottom churning occurs nutrient loading increases by 50 X.

The long term consequence of this living and dying process is that the water is displaced by silt that's accumulating on the bottom of our lakes. The nutrients build to a point where aquatic plants take over water depths to 8 feet. In addition, algae blooms and fish kills, due to oxygen depletion, can become annual events.

This evolution is being seen on Big Green Lake in Green Lake County, the deepest lake in Wisconsin. The nutrient accumulation over time in Big Green Lake is causing oxygen depletion in deep portions of the lake and corresponding fish kills, even carp that are least effected by low oxygen levels are dying off. The lake is dying. Their lake district is working with the DNR to explore solutions. Their nutrient loading is not from aquatic plant growth but rather run off from adjacent farm land. The result is the same from either nutrient source, external from run off or internal from plant growth, the slow but inevitable deterioration of the health of the lake.

There are two possible means of minimizing and reducing silt and corresponding nutrient accumulation. One is to draw the lakes down over both a winter and a summer season. **In fact we would draw down for 18 months, two winters and one summer.** The other is via dredging. We will discuss both options below.

### **1) Draw down and biology**

- a) The science behind the benefits of summer drawdown to reduce silt is well documented in Wisconsin as well as other states in the Upper Midwest. By exposing the lake bed to summer heat and drying aerobic bacteria that feed on the organic matter and nutrients in silt multiply. As they multiply they literally consume the silt along with the phosphorus and nitrogen thus reducing the volume of material and the nutrient content simultaneously. The result has been reductions in silt levels of between 1.5 and 3 feet, adding to lake depth, and corresponding reduction in lake nutrients, a double benefit. The ideal summer condition to maximize the benefit is one with reduced rainfall.
- b) The additional benefit, of course, is that we would garner the AIS control benefit of two over winter time periods. **We would gain the benefit of both silt reduction and AIS reduction.**

## 2) Regulations and permitting

- a) We will have to apply to the DNR for a permit allowing us to reduce the lake level for the period proposed. It is expected that this permit will be issued as the DNR is in favor of us doing this draw down for the reasons described.

## 3) Dredging

- a) During any drawdown, whether over winter or longer, it will be the choice of each land owner to remove 100 square feet of silt, an area 10'X10'X1' area without a permit. The only requirement is that soil removed not be placed in a wetland.
- b) Dredging of quantities in excess of the amount above require a permit from the DNR. The requirements of that permit include soil testing to confirm that removed silt contains no hazardous materials. That test costs between \$750 and \$1850. If the test were to show hazardous material, unlikely with lake silt, the land owner would be required to handle any soil removed as hazardous waste, an expensive proposition. In addition, soil removed must be taken to a site acceptable to the DNR.
- c) We are collecting data on the feasibility and cost of mechanical dry dredging during a drawdown and will report that information as soon as available. According to Onterra, the DNR does not allow motorized vehicles on the exposed lake bed so we have to work through that limitation.

## 4) Property Value

- a) As discussed in the previous letter, undertaking efforts to slow the aging process in our lakes is prudent. Those efforts secure the aesthetic and recreational value of our properties.

## 5) FAQ: KNOWN

- a) Full year drawdowns to control aquatic plant growth and reduce silt volume have been advocated on impoundment lakes for decades and the results well documented. In almost all cases EWM volume has been dramatically reduced and lake level increased. As a point of clarification, the benefit of EWM reduction is seen with winter drawdowns. **A full year drawdown would have the same benefit by virtue of the winter portion of the drawdown but the summer period should be considered for silt and nutrient reduction purposes only, not AIS control.**
- b) Some growth of woody shoreline plants has been documented with over summer drawdown events. We may need to manually remove woody plants before refill if growth occurs.

c) Recreation

- i) For an over summer drawdown both boat landings would be taken out of commission and motorized boat use impractical. If a property owner wanted to carry a canoe, kayak, or SUP board to the water's edge to access the lake there would be no regulation preventing it. The channels between lake basins may or may not be navigable depending on water depth.

6) **FAQ: UNKNOWNNS**

- a) Amphibians that live in our lake would likely migrate to another water body such as our inlet streams if we do an extended drawdown. It's most likely that they would return to the lake after refill.
- b) The impact of an extended drawdown to the fish population is unknown. As stated earlier, it's most likely that big fish will get bigger and little fish get eaten by them because of the loss of places to hide. It is likely that we would want to do some stocking of fish after refill to bolster surviving populations.
- c) The actual results from a full year drawdown cannot be fully anticipated as each basin has unique flora, fauna, and water chemistry. Our plan to closely measure results by establishing base line data in 2020 and again after refill will inform us in terms of benefits and drawbacks. That information will influence future decisions on our remediation efforts.

7) **Next Steps**

- a) **Please see the recently published report from Onterra, our lake consultant, regarding our lake management history and the drawdown plan posted on the website. This will become an update to our Comprehensive Lake Management Plan.**
- b) We hope to answer all property owner questions as thoroughly as possible in advance of the formal vote at the 7/18/2020 annual meeting. **In lieu of a special meeting we plan to post a video of the technical presentation by Onterra done at last year's special meeting. If questions remain after reviewing information posted on the website under the Drawdown tab please leave a message under the Contact Us tab.**