

THE FRIENDS OF LAKE WARNER AND THE MILL RIVER

2019 FALL / WINTER NEWSLETTER

Beavers—We Need Them! by Rema Boscov

Three cheers for beavers! For beavers? Those pesky varmints that block culverts and flood roadways? It turns out we need them, now more than ever. They cause problems, but they also offer some valuable climate solutions, including carbon sequestration.

According to Jason Johnson, the Executive Director of the Friends of Lake Warner and the Mill River, Lake Warner has at least a dozen beavers. There are two populations, and their destruction is more visible than the good they do. One population lives on the island owned by Tom Harris in the middle of the lake. “Tom has lost many trees to beavers on the island which hosts two lodges on one of its banks,” Johnson says. “Another population lives upstream, at the head of the lake where the Mill River comes in as a single channel. They’ve drowned out a hemlock forest, done a lot of work damming up a shallow forested stream.”

Is this a good thing? “It slows down the water and any sedimentation heading toward the lake. That keeps the lake from getting shallow. And it increases the depth above the dam and makes the river deeper. Fish like different depths of water,” Johnson says. In addition, “Stopping the fine sediment prevents turbidity and allows for transparency.”

Especially important in this time of climate crisis, the sedimentation and felled trees that make up the dam can store a lot of carbon, for a long time. Dams have been known to last 50 years and can be as long as 1500 feet. Behind the dam, water spreads out from streams and river banks, creating wetlands that eventually fill with silt and plants, leaving open grass-filled areas known as beaver meadows. The beavers then move upstream to begin the process over again.

If a dam breaks, some of the stored carbon is released to the atmosphere. But beavers can make quick repairs. They respond to the sound of running water, which causes them to use their four constantly-growing incisors, two top and two bottom, to gnaw and fell trees.

Beaver dams provide many ecological benefits. They create conditions favorable to pond life, increase insect populations, elevate the water table which can then sub-irrigate nearby farmland, and increase the amount of organic carbon, nitrogen and other nutrients in the stream channel, encouraging vegetative growth. Wetlands offer food and resources for insects and birds, Johnson explains. Slowed streams “create rearing habitat for juvenile fish to feed and grow.” Quiet pools can become breeding grounds for broadcast-spawning fish. And beaver meadows, with their soil rich from rotting leaves and wood, contain huge amounts of stored carbon.

Scientists estimate that, before Europeans trapped beavers for the castoreum in their



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Please attend a FoLW meeting!
Held the first Tuesday of each
month at the North Hadley Con-
gregational Church
at 7:00 p.m.
You’ll be glad you did!



Please make donations to:

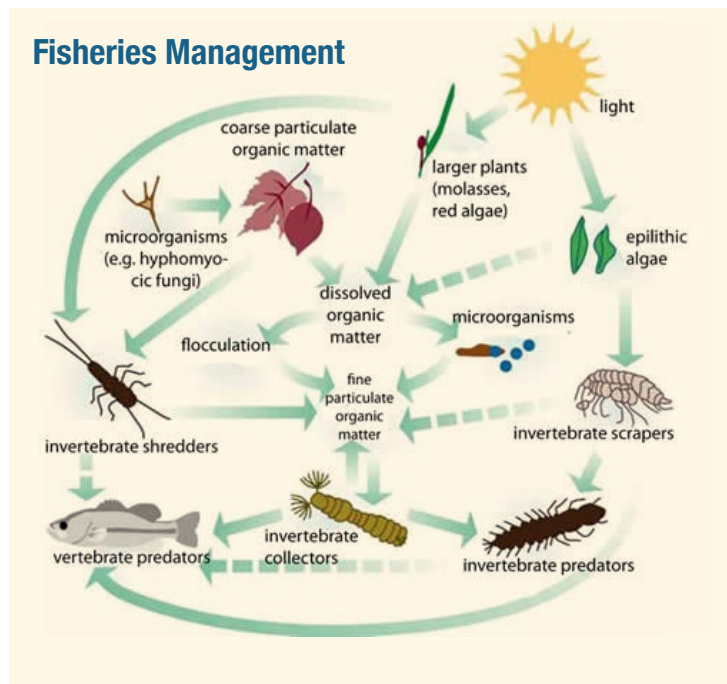
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scent glands prized by perfumers, and pelts for clothes and stylish hats, causing near extinction in the early 1800s, North America hosted between 60 and 400 million beavers, creating habitats that would have sequestered many thousand tons of carbon. Now, they estimate the population to be between 6 and 12 million. “That’s a huge ecosystem change,” Johnson remarks.

Because of their contributions to the ecosystem, beavers are considered a keystone species. But what about the inconveniences they cause? “It’s shocking how much damage they can do,” Johnson says.

In an attempt to regulate beaver activity, various kinds of “beaver deceivers” exist—pipes to keep the flow open and wire fences to keep beavers away from culverts. Wherever human habitation and construction collides with beavers, difficulties can arise. At the same time, “They are important regulators of ecosystem processes,” Johnson says. “Overall, in a more naturally managed ecosystem like Lake Warner, they don’t seem to be causing problems.”



This summer, a nine-pound largemouth bass was caught in Lake Warner. It is not unusual for large members of many species to be caught in Lake Warner as it is a highly productive lake. In ecology, productivity refers to the rate of generation of biomass in an ecosystem. High levels of nutrients lead to large amounts of primary production by photosynthesizing plants which provides the basis for secondary production by consumers like insects and animals. This secondary production is the generation of biomass of the consumer organisms in a system. Secondary production is complex in wetland and lake ecosystems involving many levels and interconnected loops or pathways that energy is transferred.

Lake Warner has not been managed since the 1961 reclamation of the lake by the Massachusetts Division of Fisheries and Wildlife. From 1913 until 1951, over 200,000 fish of all sizes and species were stocked into the lake. The Director of Massachusetts

Division of Fish and Wildlife Charles L. McLaughlin wrote to Representative John Clark on 10/2/1962 a Preliminary report of the reclamation of Lake Warner, Hadley; Factory Hollow Pond, and the Mill River, Amherst. Excerpts of the report are detailed below. (Rotenone was a fish poison commonly used for reclamation at the time.)

” The rotenone was added on September 17th, with Lake Warner and Factory Hollow Pond being sprayed simultaneously from boats. Rotenone was also added to the streams, commencing from East Leverett on Roaring Brook and working downstream. Lake Warner proved to be very fertile, as expected. A total of 3 ½ tons of fish were actually picked up and the estimated total kill was about 6 tons. This amounts to almost 200 pounds of fish per acre which is well above the state average. Blue gills constituted 67% of the total weight recovered from the pond, yellow perch 17%, white suckers 6%, brown bullheads 4%, largemouth bass 3%, and smaller amounts of carp, golden shiners, black crappie, and chain pickerel. Several large channel catfish were also recovered. Most of the largemouth bass recovered were relatively large individuals, with an 8 pounder topping the list. Bass reproduction and intermediate sized fish were scarce indicating the unbalanced structure of this bass population. All carp recovered were large individuals.”

Following the reclamation in 1962, 1,345 Large Mouth Bass size (7-12”) were stocked into Lake Warner. In 1963, 1,000 Large Mouth Bass (7-14”), and 100 Large Mouth Bass 14+” were stocked into Lake Warner. The Lake was not surveyed again until 1981 by Massachusetts Division of Fisheries and Wildlife, at that time the management objectives were to 1) Maintain as a largemouth bass fishery. 2) Maintain the largemouth PSD (proportional stock density) at 50%. Management recommendations were to 1) Leave the pond as it is. The largemouth population has good recruitment, growth and stock density. Yellow perch have good growth with fish up to 12 inches. 2) Consider weed control if necessary.

The Massachusetts Division of Fisheries and Wildlife conducted an electrofishing survey of Lake Warner in 2015. Thirteen species were collected during this survey. This sampling effort was not intended to provide a population estimation of the lake or to predict fisheries production in the lake. It provides a “snapshot” of lake conditions at this time. The high diversity of species collected, the large size of individual bass collected and quantity of forage fish indicate a very productive lake ecosystem, with a high diversity of native fish species and self-reproducing populations of historically stocked species.

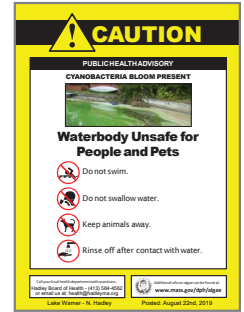
Lake ecosystems like Lake Warner can become “over productive”, enriched by too many nutrients that leads to algal blooms, excessive plant growth and low dissolved oxygen. We are currently balancing on the edge of this productivity threshold. Aquatic plant beds and rich littoral zones are important components of healthy fish habitat. The large trees that have fallen into the lake recently (not due to beavers by the way!) are providing cover, complexity and a diversity of habitats for fish and other animals. We want

to manage excessive growth of vegetation in portions of the lake while still maintaining high quality and diverse habitats. Aquatic plant management can be very expensive and the results can be short lived. We are rejecting the use of herbicides which are used as a management tool in many lakes across the commonwealth.

Coming up with ecologically sound solutions to severe conditions is challenging. At this time the fish population seems to be thriving. By managing invasive plants through hand pulling, and exploring alternatives to control nuisance native vegetation, we are getting closer to managing excessive plant growth. We will continue to monitor temperature and dissolved oxygen levels in the lake throughout the year. Maintaining relationships with the Massachusetts Division of Fisheries and Wildlife and the USGS Cooperative Fisheries Research Unit assist us with scientifically based management recommendations.

Cyanobacteria Advisory

On August 21st, 2019 the Friends of Lake Warner was informed by the Hadley Board of Health that the presence of algae had been confirmed in toxic concentration by the Massachusetts Department of Environmental Protection (DEP) and Department of Public Health (DPH) within Lake Warner. The Board of Health (BOH) immediately issued an advisory notice. The advisory notice was posted on the information board at the lake, town hall, and other conspicuous locations on August 22nd 2019. The notice was also posted on the Hadley town health department page, Friends of Lake Warner webpage, and social media platforms. Friends of Lake Warner are required to maintain a permanent copy of the advisory at the boat ramp kiosk until the advisory is lifted via DEP, BOH, and Hadley BOH. There has been some encouraging news coming from the state regarding increased funding for testing and possible future aid with resolving the issue in cases like this for the town and Friends of Lake Warner.



Further inquiry by The Friends of Lake Warner determined that the advisory was given even though initial sampling of questioned bodies of water are not performed. The assessment is done “via pictures,” and descriptions are sent to DPH/DEP and responses are based on that assessment. The lake will be reassessed in two weeks visually with information, then sent to DPH/DEP. If the departments determine the lake visually cleared of the algae then DEP/DPH will assist with sampling of the water. Then the sample needs to come back twice at a low enough level for the lake advisory to be lifted.

The EPA has a mobile testing van will travel around the region testing selected waterbodies. The Friends of Lake Warner will continue to communicate with DEP and DPH to stay informed with up to date information regarding harmful algal blooms. We will keep you posted via the boat ramp kiosk, our newsletter, and through our webpage at friendsoflakewarner.org

Sustainability Festival 2019 by Michele Morris-Friedman

The Friends of Lake Warner continued its tradition of outreach at the 2019 Sustainability Festival on April 27. Thanks to volunteers Kevin Skelly, Jason Johnson, Ginger Goldsbury, Andy and Michele Morris-Friedman, Tom Harris (and canine companion, Ben) and to all the passers-by that braved the cold, windy and wet weather. (As luck would have it, the weather mellowed just as we broke down the tent and table.) In keeping with the theme of sustainability, two of our volunteers biked to the event.

We found kindred souls among the visitors, and had some extended discussions about the impacts of agricultural practices on water run-off. We also talked to an artist who expressed interest in doing a plein-air day on the lake. We would love to hear from artists and photographers who might be interested in participating.

New Kiosk at the Boat Ramp



The Friends of Lake Warner and the Mill River would like to thank Sheriff Patrick J. Cahillane, Lieutenant James Foley and the inmates at the Hampshire County Jail and House of Corrections for constructing an informational kiosk for use at the public boat ramp. The kiosk is well-built, attractive and is there to keep the public informed about the condition of and activities going on at Lake Warner. The Friends would like to thank Tom Harris and James Sector of Architectural Timber and Millwork for their help with installation. Thanks to the Community Preservation Committee and the citizens of Hadley for funding this project.

Lake Drawdowns by Jason Johnson

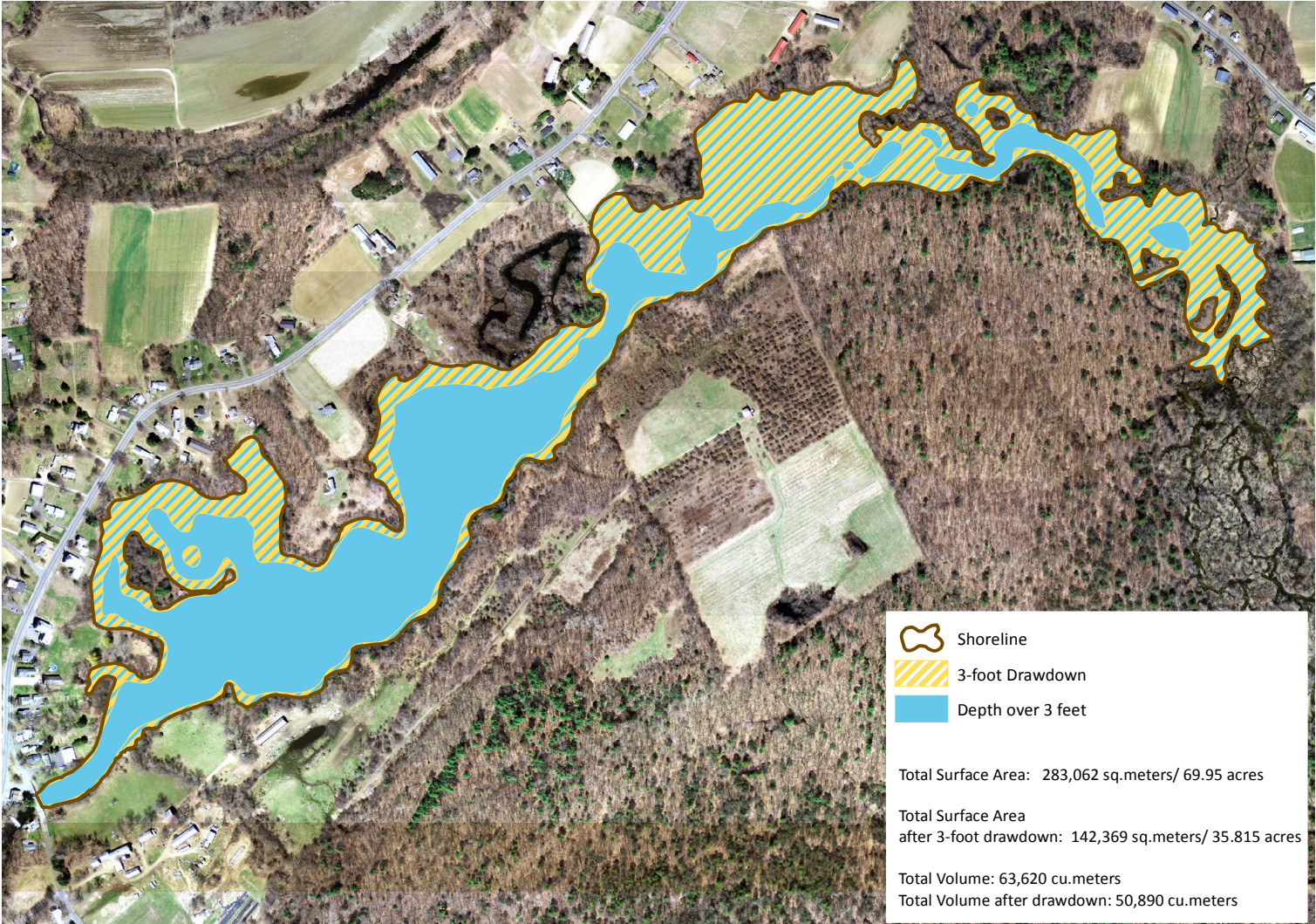
One of the requirements of the 2017 dam repair at Lake Warner was the replacement of the 1947 slide gate which controls water levels at the dam. An additional benefit of an operable slide gate was potentially to use it to maintain a seasonal drawdown of the lake as a way to control aquatic vegetation. The board of the Friends of Lake Warner has desired to utilize the best scientific knowledge available to manage the lake. Recent studies by the USGS Cooperative Fisheries Research Unit at the University of Massachusetts Amherst have published information that seasonal drawdown may have significant impacts to the ecology of lakes. In light of this research, we are at this time deciding not to utilize seasonal drawdown as a tool to manage aquatic vegetation in Lake Warner.

Seasonal lake drawdowns have been used for many years in Massachusetts for reducing ice damage to docks and infrastructure along lake shorelines. Drawdowns have also been used for management of aquatic vegetation that can interfere with recreational use of lakes and reservoirs. The guidance for drawdowns has come from the GEIR (General Environmental Impact Report) on Eutrophication and Aquatic Plant Management in Massachusetts published by the Executive Office of Environmental Affairs in 2004. This document was intended

to provide lake managers and conservation commissions with information to make informed decisions about permitting management activities regarding aquatic plants as it relates to the Wetlands Protection Act.

Research on winter drawdowns has been limited and needed an updated synthesis. Given the widespread use of drawdowns as a management tool, a current review was needed to update and synthesize knowledge about the impacts of drawdowns. Jason R. Carmignani and Allison H. Roy published such a synthesis in 2017 with “Ecological Impacts of winter drawdowns on lake littoral zones: a review.” in the Journal Aquatic Sciences 79:(803-824). Mr. Carmignani has just defended a PhD Dissertation on this subject using lakes in Massachusetts for the study, Dr. Allison H. Roy is the Assistant Unit Leader for the Massachusetts Cooperative Fish and Wildlife Research Unit. While Lake Warner was not specifically studied under this project, lake level monitors have been installed at Lake Warner by the Coop Unit in order to track changes in seasonal lake water levels.

Changes in water levels create a disturbance that affects the structure of the littoral zone (a narrow or broad fringing wetland with extensive areas of aquatic plants sorted by their tolerance to different water depths). The littoral zone extends from the high-water mark to the depth of the photic zone (depth of light



penetration). The transparency or light penetration in Lake Warner averages around 4 feet. High flows and flooding from the landscape provide nutrients to the littoral zone. The littoral zone is home many plants and animals, provides spawning and rearing areas for fish and creates habitats where many species of invertebrates spend a portion of their lifecycle. Sediments settle in these areas and nutrients are transformed. The dewatering of these areas stimulates plant growth and nutrient consumption creating the patterns we see in complex wetland systems, i.e. different species, sizes and shapes of habitats. Many of the animals in lakes are dependent upon the wetlands of the littoral zones, since the rooted plants provide habitat and food. A large and productive littoral zone is considered an important characteristic of a healthy lake. Reducing water levels changes the natural fluctuation and impacts the habitat and inhabitants within the littoral zone in many ways.

Lake morphology or shape is determined by depth, slope, shoreline exposure, and fetch (the amount of distance the wind can blow in a constant direction). Dams affect the lake environment in several ways, during the springtime they limit flooding which carries nutrients into littoral zones and they reduce the natural fluctuation of water levels that many plants and animals depend on. Over time they reduce the areas of wetlands from broad littoral zones to narrower bands of vegetation. Lake Warner has been nearly continuously dammed for over 300 years; the resulting littoral zone is a reflection of that. Lake Warner is a shallow lake, a November 2018 bathymetric survey by Masswildlife allowed us to calculate that a 3-foot drawdown would dewater 34 acres of the lake, nearly the entire littoral zone of the lake.

While sediment dewatering can result in nutrient uptake, the subsequent erosion of sediments during drawdown or during refilling can cause increases in nutrient availability in the lake. There are already considerably high levels of nutrients entering the lake from the watershed and we must try to reduce as much as possible the amount coming from the sediments. While initial phosphorus binding capacity is higher than with submerged sediments, over time increasing oxidation and desiccation reduces the adsorption capacity of those sediments resulting in desorption or release of phosphorus to the water.

Algae blooms may be increased by increased availability of nutrients. While the review did not find correlations between drawdown and algae blooms, the conditions that may be created, like nutrient availability, creates an environment hospitable to algal growth. Algae are highly mobile, and have rapid turnover rates, meaning that blooms can happen quickly and over multiple times during the year.

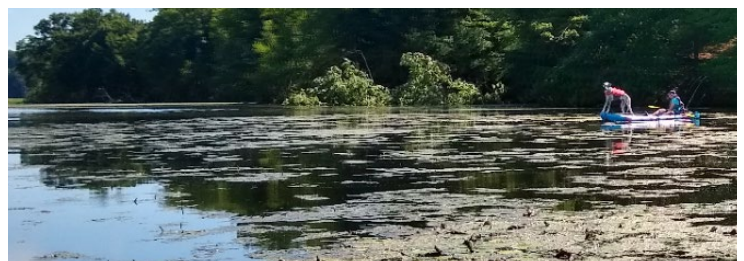
Winter drawdown can also affect dissolved oxygen. While dissolved oxygen levels are dependent upon groundwater and inflow rates, water volume loss due to drawdowns also lowers dissolved oxygen concentrations during the winter months. This could increase the possibility of a winter kill event, where snow and ice cover reduce or eliminate photosynthesis, oxygen levels plummet killing the fish in the lake.

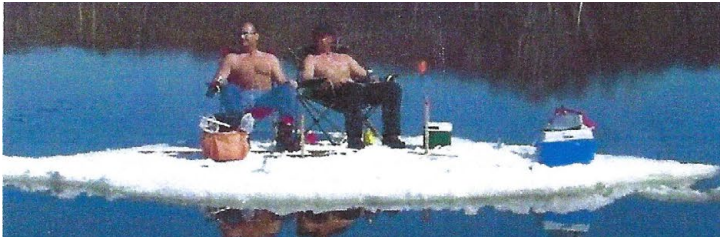
The literature review also summarizes drawdown effects on overall biomass and diversity of macrophytes, invertebrates and fish communities. These communities are all reduced by drawdown with increasing effects correlated with increased drawdown amplitude. The paper suggests further research needs and gaps to fill suggesting that with winter drawdowns being one of the few tools available to manage nuisance aquatic plants (with other tools such as herbicides and mechanical harvesting having different impacts on lakes), that understanding the impacts of drawdowns are critical to compare ecosystem consequences of different management approaches.

Considering the ecological implications including that a relatively mild drawdown can have significant impacts on the littoral habitat, and that there are cumulative or carry-over effects of annual winter drawdown such as decreasing nutrient adsorption in the sediments, we have decided to hold off on utilizing drawdown as a management tool in Lake Warner to manage aquatic plants. We are going to continue to monitor the lake, striving to understand our specific lake conditions according to the bathymetry of the lake, the environmental conditions, and how the biological community interacts given the various depths of habitats in Lake Warner.

Big Year for Water Chestnut Management

This year had the highest amount of water chestnut removed from the lake since 2014's record harvest of 6,000 lbs.. The effort was fueled by 119 volunteer hours that pulled 4,022 lbs. between June and September. During the month of June smaller plants were collected throughout the lake resulting in small harvests totaling 160 lbs. (this equals about 2,500 individual rosettes.) A sub-sample of plants were weighed following each harvest in order to calculate harvested amounts. During July, the lake's population of water chestnut increased with large patches developing in the mid-lake coves; over 500 lbs were collected totaling 3,600 individual rosettes. It took most of July to clear these portions of the lake. By the time we got to the upper lake in August, fully grown patches of water chestnut made up half of this year's harvest of just over 2,000 lbs. September was spent collecting re-sprouts and any missed plants, and was somewhat limited by the cyanobacteria advisory that caused us to cancel one of our public pulling events. Overall the **4,022 lbs** consisted of an estimated **18,000 individual rosettes** that kept an estimated **359,560 nuts from entering the lake !** We are so grateful to those volunteers that came out and helped us during our three public pulling days. **Thank you so much ! We need more help with this effort. More eyes on the water is so helpful. Please come out and help us next year!**





Ice Fishing Derby

The Thirteenth Annual Family Ice Fishing Derby sponsored by RB's Bait Shop was held at Lake Warner on February 3rd 2019. Over 100 people gathered starting at 6:45am to compete for cash prizes. The smells from cooking grills wafted over the frozen lake throughout the day. Coming in first place was Mike with a 1.9lb Chain Pickerel winning \$250. Second place went to Delany, winning \$150. In the kid's division Rey Rex and Sean Parsons both won \$20. A raffle for a \$600 Power Auger was won by Joe Rex. Despite a light fishing day, a good time was had by all, and the lake was left spotless when the event was over. Keep your eyes open for notification of this year's event which is usually held on Super Bowl Sunday, but determined ultimately by ice thickness.

Donate to Friends of Lake Warner via UMACC

Do you work at UMass? The Friends of Lake Warner is registered with the UMass Amherst Community Campaign, so UMass employees can donate through payroll deduction. To make your donation to Friends of Lake Warner through UMACC, go to <https://www.umass.edu/umacc/> and click the "Give Now!" button. After signing in, choose Friends of Lake Warner from the drop-down list of charitable organizations. You can choose to donate any amount (with a minimum of \$26) and choose your preferred method of payment right there on that page before submitting your pledge.

Donations can also be sent in with a printed form:

https://www.umass.edu/umacc/sites/default/files/2019-20/umacc_paper_pledge_form.pdf Use the code 1537.



Please Join The Friends of Lake Warner and The Mill River. We Need You!

We are a non-profit, citizen community organization. • Members receive a bi-annual newsletter. • Members are invited to participate in our activities, workdays and social events. • Your tax-deductible dues support our efforts to preserve, clean and maintain our lake. • Your dues also support the printing cost of our brochures and newsletters.

I want to join ☐ Individual membership - \$25 ☐ Family membership - \$35 ☐ Sustaining membership - \$100

Name _____ Phone _____

Street Address _____ City _____

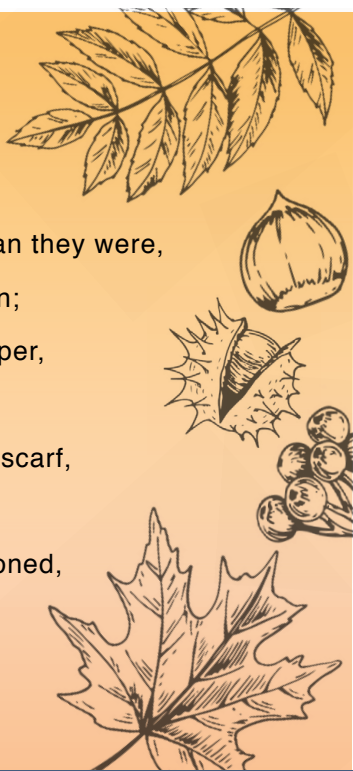
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Please make checks payable to: Friends of Lake Warner (FOLW) Checks should be mailed to: Friends of Lake Warner, PO Box 11, Hadley, MA 01035

Autumn

by Emily Dickinson

The morns are meeker than they were,
The nuts are getting brown;
The berry's cheek is plumper,
The rose is out of town.
The maple wears a gayer scarf,
The field a scarlet gown.
Lest I should be old-fashioned,
I'll put a trinket on.



Upcoming Events

- November 2nd and 3rd**
Carr's Cider Tasting at Mt. Warner Orchard
Wagon rides from sugar shack - 12 noon to 4:00 p.m.
- November 7th**
Annual Community Celebration and
Holiday Gathering at the lake - 5:00 p.m.
- Later this winter – lookout for notice!**
Ice Fishing Derby - Usually on Super Bowl Sunday