THE FRIENDS OF LAKE WARNER AND THE MILL RIVER



2022 SPRING NEWSLETTER

MEADOWFED LAMB: AN EXPERIMENT IN SILVOPASTURE by Matt Kaminsky

Since our college years, my partner Rachel Haas and I have been stewing on the thought experiment of running livestock through apple orchards. We had run this thought experiment since before we knew there was actually a term for this method of farming: "silvopasture." Shepherding and cider orcharding were two types of farming we had a keen interest in. At the time, I was an orchardist in training, and my partner was handling a local flock of sheep. We shared the common love of all these things; cider & apples, as well as fine meat & wool. During our undergraduate studies at Hampshire College, lots of literature had been coming out about silvopasture, but none of it spoke about orchards and sheep. There wasn't a precedent for what we were envisioning. Our experiment began in 2019, when we started Meadowfed Lamb. It would be the entity under which we would practice silvopasture and market the products from our herd of Finnsheep. We are now in our third season of successful silvopasture grazing at the orchard.



Sheep graze at Preservation Orchard

Jonathan Carr and Nicole Blum, owners of Carr's Ciderhouse and Preservation Orchard (on the northern slope of the mountain) had been interested in implementing silvopasture on their farm for some time as well. When they asked us if we would like to begin keeping sheep at the orchard, it was a no-brainer. There are several practical and technical common goals that silvopasture helps us establish. The idea represents the harnessing of unused, renewable resources. The vegetation that grows thick in the orchard understory often serves little use to the orchardist. Fruit growers rely the use of diesel fuel to mow the aisleways at least once per year to maintain ease of harvesting. Additionally, some of the steeper terrain can be very dangerous to traverse on the tractor. There have long been issues with

IN THIS ISSUE

Meadowfed Lamb1-2
The Old Apple Tree Poem by Julia Taft Bayne 2
An Ode To Ice3
My Year of Climate Work 3-4
2021 Lake Warner
Virtual Summit 1.0 4-5
Harmful Algae Blooms5
Donors List6
How to Donate to FoLW 6
So Far as Anyone Knows
Poem by Kevin Skelly6
Membership Form6



The Friends of Lake Warner P.O. Box 11 Hadley, MA 01035 friendsoflakewarner.org poison ivy and other aggressive vine species in the orchard, which grazing animals can help keep at bay without the use of chemicals. Adding fertility to the soils would help give the apple trees some renewed vigor, as well as help the newly planted trees through their establishment phase.

Silvopasture is a legitimate strategy to accomplish all of these goals. Moreover, it serves the ecosystems of which is a part. Mount Warner is an important slope in the Lake Warner watershed. The farm's southern boundary touches the water's edge. Planting orchards at intervals down the slope stabilizes soil from eroding, captures groundwater and runoff, buffering the impact of nutrients entering the lake, which can add to algal growth and other trophic problems. Adding a rotationally grazed herd of sheep to these orchards ratchets up the amount of carbon that these orchards are capable of sequestering. As the sheep graze, they transform the biomass from photosynthesizing plants into stable forms of carbon by depositing manure and gently trampling it into the soil surface, which integrates into the soil, further fueling the growth of photosynthetic organisms in the farm system. These systems have more than one land-use function, and are more productive as a result.

We have arrived at a strategy of "strip grazing" when running them through the orchards. This involves close-mowing by hand between the trees so that a clean line of electronet fence can be set up right to the trunks, allowing the sheep to graze the row middles and refusing them access to the trees that we want them to avoid. Our goal is



for the sheep to achieve the ideal level of grazing in a given area after 24 hours spent in that space. We create modest sized paddocks, where the sheep will evenly graze down the available forage quickly and effectively, so that they can be moved to a new paddock the next day. We aim to arrange a strip paddock of a small enough size so that the sheep have to compete a bit with each other to really fill up. That competition encourages them to gobble up not

just the tasty clover, orchard grass, and rich broadleaves, but also the problematic vine species that are common in our orchards like Virginia creeper, poison ivy, oriental bittersweet, and grape at the same rate as they eat the more desirable grasses, clovers and other forbs present as well.

We favor this method over the other common method of installing individual "guards" on the trunks of individual trees enclosed within a much larger paddock. The heavy-duty guards necessary for that are expensive, cumbersome, and are usually incompatible with newly planted stock. Livestock are often clever enough to outsmart the guards, fiddling with or teasing them off in curiosity. Large grazing paddocks like this also lead to poor practices like overgrazing (leaving animals on a patch for too long) and understocking (too few animals on a large patch of grass), leading to incomplete, patchy grazing and wallowing.

It requires diligent care to make this system work properly, but when executed well, it affords farmers a more diverse and bountiful harvest from the same piece of land. The sheep love being in the orchard. They feel safer with trees around them rather than being out in the open. Trees provide shade and shelter from the elements, which encourages them to spend more time grazing, leading to faster growth and more effective management.

Follow along our story and find our products by visiting <u>www.meadowfedlamb.com</u> and by following <u>@meadowfedlamb</u> on Instagram.

THE OLD APPLE TREE by Julia Taft Bayne, 1845-1933 from Hadley Ballads, published in 1903

I.

I saw an aged apple tree in May, When all the air was shimmering with mist Of tender leaves, and pearl, and amethyst Shone in the grass where spring went on her way; Gnarled, crooked, old, the emblem of decay, Standing unwelcome at the spring's sweet tryst: "In vain alas! In vain the sun has kissed Thee, Nature's joyous Resurrection Day Finds no life here to waken, all in vain The great earth swells beneath, and on the head Fall Softly, coaxing fingers of the rain:" So mourned I for the tree I thought was dead. Yet June's first morning saw those boughs enclose A fragrant miracle of apple-blows!

Π

A thought it wafts to me which stays, and clings, A thought of those sad, unresponsive souls, To whose unseeing gaze Nature unrolls In vain her marvelous pictures, when the springs Wake life anew in all created things, And wind-flowers flutter white on all the knolls, When summer fills her roses' crimson bowls With perfume, and for joy the robin sings, When Autumn's altar fires are burning low, Or when the moon, sharp in the frosty sky, Etches the winter elms upon the snow, – They know it not, they eat, and drink, and die: Yet touched by God's own finger, in His spring, Their souls may burst to fragrant blossoming!

AN ODE TO ICE

By Stephen Braun

As I write this, in early January, ice has finally covered Lake Warner completely. It's been an on-and-off winter, with ice forming, then melting, and re-forming again. But with some deep cold coming it's likely this time the ice will thicken enough for ice skating or crosscountry skiing. Meanwhile, below the ice, life continues for many creatures, including fish, beavers, and muskrats.



That ice floats is one of those facts of life so obvious and commonplace it's easy to overlook how weird it is. Were it not for this weirdness we might not be here to muse upon its peculiar properties.

Most things, liquid or solid, shrink when they cool. That's because as the molecules from which they are made lose energy and slow their incessant vibration, they can pack together more tightly. This is also true for most liquids. As they cool, these liquids become more and more dense until they freeze, at which point they become denser still and drop to the bottom of the liquid. This is the case, for example, with carbon dioxide: frozen carbon dioxide (i.e., dry ice) not only sinks to the bottom of a glass of water, it sinks to the bottom of a glass of liquid carbon dioxide.

Water, however, doesn't follow this script. When liquid water is cooled, it contracts and becomes denser and you might expect until it reaches 39 degrees Fahrenheit. As the temperature drops below that point, a strange thing happens: the water starts to expand slightly, becoming less dense. When the water freezes it expands even more—by about 9% compared to 39-degree water.

This strange behavior is due to the shape of water molecules. You may recall from an old chemistry class that an H2O molecule looks like a Mickey Mouse head, with a large oxygen atom for a face and two smaller hydrogen atoms as ears. The oxygen atom is slightly negatively charged and the hydrogens are slightly positively charged, so water molecules have a polarity. They're a bit like extraordinarily tiny magnets. The negative end of one molecule tends to be attracted to the positive end of other water molecules—a relatively weak attraction called a hydrogen bond.

In warm water the molecules are dancing about with too much energy for the hydrogen bonds to have much effect. But as the water cools, the molecules start to respond to each other, linking together. Below 39 degrees F the hydrogen bond interactions have the effect of "fluffing up" the water making it less dense. Then, below 32 degrees, all those molecules organize themselves, and their magnetic poles, into configurations that require a minimum amount of energy. That structure takes up more space than warm liquid, hence ice floats.

Not only is this extremely valuable for ice skaters and ice fishermen, it turns out that life itself might not have evolved if ice did not float. Think what would happen if liquid water behaved like liquid carbon dioxide: whenever ice formed, it would sink and resist melting on the bottom of lakes and oceans. The ice would slowly accumulate until the entire body of water was solid, with only a thin layer of liquid appearing in summer or in southerly locations. This would prevent all sorts of vital ecologic and geologic processes from happening and might well have prevented the evolution of life itself, although Nature is nothing if not clever, so who knows? Still, a world with mostly-frozen bodies of water would pose far greater challenges to the evolution of complex organisms than our own wonderfully fluid planet.

Water's unusual properties also explain the phenomenon of "turnover." In lakes deeper than about 20 feet, the water forms distinct thermal layers in both summer and winter. In summer, once the water warms above 39 degrees it becomes less dense and rises. This forms a layer that resists the top-to-bottom mixing of water. As the water cools in the fall the thermal boundary disappears and for a short period of time the entire lake can mix under the influence of winds and the fact that the now-denser water sinks to the bottom of the lake. As the water cools further the density decreases again and a new layer forms, with cooler water and ice on top, which again prevents mixing. In spring the process reverses again, and the lake "turns over," which brings oxygen down and nutrients up, benefiting plants and animals alike.

Lake Warner, with a maximum depth of about 12 feet, probably doesn't experience much, if any, turnover, although the water in the deeper parts near the dam does stratify somewhat in summer and winter. But the ice now thickening on the lake's surface provides wonderful opportunities for winter recreation. The next time you're out skating, skiing, or fishing on the ice you might pause to consider how fortunate we are that water has the properties it does!

MY YEAR OF CLIMATE WORK

by Jeremy Barker-Plotkin of Simple Gifts Farm in Amherst

How do we, as farmers, adapt to the ongoing climate disruptions in a way that keeps our community well-fed and our soil in place in the face of alternating cycles of droughty and super-soaked weather? This week, I have been spent several hours in Zoom meetings, meeting with a group of farmers and service providers who, like me, are enrolled in the Climate Adaptation Fellowship. This was the capstone of a year in which I, and Caro Rozell (former Simple Gifts Assistant Farmer, current American Farmland Trust soil health rockstar, and my partner service provider for the Fellowship,) put some effort into working on strategies for dealing with the climate disruptions to come. Here are some of the things we have explored and our next steps.

No-till Farming Systems

We have put a lot of effort into developing our no-till cropping systems and transitioning into no-till production over the past 2 years. Reducing or eliminating tillage can help us to adapt to climate disruption in many ways. A healthy, high-organic matter soil acts as a sponge to absorb water when it is wet, and release it when it is dry, helping us to keep production up in both dry and wet conditions. Tillage is like opening the damper on the slow-burn woodstove of our soil, bringing air into the system that allows the organic matter to oxidize and burn off. Reducing tillage also keeps the soil structure intact, and often with a heavy mulch on top, which helps keep it from running off in increasingly frequent extreme precipitation events. But organic farming systems typically rely on cultivation, or light tillage, to control weeds, so we have really had to redesign our systems from the ground up to reduce tillage. In 2021, we had nearly 60% of our cropped land, and 80% of our total tillable acres, in no-till production, and we reduced tillage on all of our cropland. We were helped in this effort by a grant from the Mass. Dept. of Agriculture's Climate-Smart Farming program that partially funded some new equipment.



Caro came out and took samples to start to document our improvements in soil health. She has had a lot of feedback from other organic farmers who have transitioned to no-till who have told her that it took 4 years for their soil health to improve after transitioning to no-till, and we want to document that process on our farm.

Next Steps for No-till

We have applied for a grant for next year that would help us dial in our mulched no-till cropping system by measuring the amount of mulch that we are adding, documenting the weed control that we achieve in that system, and measuring the nitrogen availability in the soil. We found that nitrogen availability was a key limiting factor in the mulch system, but we don't want to add too much nitrogen, because nitrous oxide can be released, especially in wet, high-nitrogen conditions, and it is a greenhouse gas that is 265 times as potent as carbon dioxide. Another grant proposal would fund improvements to our spiky transplanter, adding coulters to the front that would cut a slit in the soil and make a more looser spot for the transplants to go in. And we have funding for Interlace Commons to help us identify and plant some woody perennials crops in the field. This alley cropping strategy will mean more carbon sequestration, more fungal soil to innoculate our neighboring crop strips, more habitat for pollinators and other beneficial insects, and in a few years, more delicious fruits and beautiful flowers for you all!

Energy Usage on the Farm

Another thing we did this year was conduct an energy assessment on the farm. While we have focused a lot of our time on converting our greenhouse heating to a renewable woodchip-powered boiler, and wanted some help in optimizing our system, the audit found that a staggering 72% of our energy use is electric, and that 52% of our energy usage is for refrigeration. The audit gave us some suggestions for reducing our energy use to reduce our carbon footprint by up to 10 tons of carbon per year. These suggestions are mostly fundable through USDA's Natural Resources Conservation Service, and we have applied for that funding. We also used that audit to take a preliminary look at what it would take to get our electric use on an all-solar basis. Converting all of our electricity to solar would save us closer to 70 tons of carbon emissions per year, but it would be a big project for us financially! We'll keep you posted on all of this.

THE 2021 LAKE WARNER VIRTUAL SUMMIT 1.0 FOR WATERSHED MANAGEMENT KNOWLEDGE-SHARING AND INNOVATION CONTEST

by Kevin Skelly and Melissa Frydlo

This past September, the Friends of Lake Warner developed and hosted an online watershed summit to discuss the current state of Lake Warner and future projects which might serve to enhance the health of the lake. The objective was to collaborate and learn from great minds within the environmental fields, namely ecology as well as best practices within agriculture and watershed management. We created a critical mass for idea formation, through education, demonstration and contemplation on recent academic and commercial advancements. The advancements lean toward identification and development of low oxygen levels, high bacteria levels, cyanobacteria blossoms, and overgrowth of invasive plant species solutions. Experts from various, related fields presented their research and findings.

Melissa Frydlo, a Friends of Lake Warner member since May 2021, brought this idea to the FoLW Board of Directors. The Board wholeheartedly approved and immediately began working on the event. The project intent was to build community and bring intrinsic value to the Friends of Lake Warner membership. Event highlights include sixteen highly, scientific presentations, which are posted on the FoLW website, three thousand two hundred dollars was raised, the Hadley Town Administrator, Carolyn Brennan attended, the program received publicity through Hadley Media and scholarship was provided to Sarah Traore, a Fulbright Scholar from the University of Massachusetts Natural Resource Program.

As the watershed summit and innovation contest program and community grows it will improve exponentially. This will be achieved through the attraction of more presenters, presenter retention, attraction of more innovation contest participants and event registrants to listen, learn, join and generate thought-provoking questions. This program was supported through donations from local businesses, individual sponsors (perhaps you were approached), volunteers and greatly appreciated by all those who were involved.

In conclusion, the Friends of Lake Warner were able to build community by bringing people and organizations together throughout the Pioneer Valley. Namely, UMass, Smith College, Mount Holyoke, The Conway School of Landscape Design the Connecticut River Conservancy, Kestrel Land Trust, and others to share this important work through water quality testing research, weed pulling, fundraising, and planning to continue to maintain and prevent eutrophication of this prized, local, natural resources in safer, cleaner ways. The event and the work we did through the year was truly inspiring. You can watch the summit presentations, proudly brought to you on our website at <u>https://friendsoflakewarner.org/the-2021-watershed-summit/</u>. We will see you at the next event!

HARMFUL ALGAE BLOOMS: THE PROBLEM & A MODEST PROPOSAL

by Dr. Allison Ryan

Harmful Algae Blooms in both marine and freshwater are increasing dramatically globally and locally. Concerns are mounting about their sometimes serious, even devastating, negative impacts on the health of wildlife, pets, people, and ecosystems as well as on recreation, fisheries, and local economies in general.

HAB refers to rapid overgrowth of green algae or Cyanobacteria (aka blue-green algae) which are both single-celled photosynthetic organisms which are usually normal minor components of healthy ecosystems. These blooms can wreak havoc either because they produce potent toxins or because they simply block out sunlight and deplete oxygen in the water by their sheer biomass creating " dead zones".

HABs are difficult to predict precisely but in general they are promoted by warmer temperatures, shallow, stagnant waters, and excess nutrients, especially phosphorus. It requires fairly sophisticated methods to detect whether (and which of the hundreds of known) toxins are in fact present in a particular bloom. Even identifying blooms as Cyanobacteria (potentially toxic) versus "ordinary", generally benign, green algae can be very challenging. Cyanobacteria come in a myriad of forms!



Sometimes ID is easy (top left), sometimes not (top right). Timely access to expert opinion and microscopic analysis is unfortunately quite limited and we are therefore often simply advised "when in doubt, stay out".

The natural history of most blooms includes a phase of rapid growth (over days), a phase of persistence (over weeks) and a phase of dying , which results in sinking to the bottom where degradation of both the organisms and whatever toxins they contain occurs, carried out by other species of bacteria. This last phase depends on several factors but typically at least 90% of the toxins are degraded within a few weeks. But some can persist in the sediment for many months. Toxins not degraded by these other bacteria are remarkably stable –not deactivated for example by boiling or any of the standard drinking water treatments.

Options for Mitigation of HABs include:

- Decrease nutrient runoff
- Easier said than done! But let's keep trying!
- Agitate / aerate
- Sink the blooms -some promising approaches
- Kill with algicides
- Maybe ok for algae but NOT a good idea for Cyanobacteria because that would simply release the toxins into the water and air
- Suppress growth with an algiSTAT

Barley Straw for HAB Mitigation

- Found effective as algiSTAT –suppressing growth of many algae and most (but not all) of the most worrisome Cyanobacteria species
- Very effective under controlled conditions, variable results in field tests
- Eco friendly, natural, no known effects on other organisms
- Not an herbicide, not regulated
- (Fairly) simple protocols, inexpensive
- Quite popular for small bodies of water- aquariums, ornamental ponds, golf course water features, animal water troughs
- Works by slowly releasing various substances including hydrogen peroxide during its decomposition in water in presence of sunlight
- Achieving very low concentrations- 2ppm of H2O2

Several organizations and stakeholders in the Valley are currently developing a pilot project to deploy barley straw in a few local bodies of water as soon as feasible.

We would be happy to hear your feedback and provide further information. Contact rallisonryan@yahoo.com. Please use subject line: Barley Straw Project.

SPRING FOLW EVENTS AND RELATED EVENTS

FOLW Board meetings:

First Tuesday of each month, 7pm (virtual) Contact friendsoflakewarner@gmail.com for the link.

FOLW Virtual Community Presentation Wednesday, March 2, 7pm Contact friendsoflakewarner@gmail.com for the link.

Hadley Clean-Up Day - April 9, 2022 Organized by the Hadley Climate Change Committee. FoLW will participate in cleaning up along the lake and tributaries. Volunteers welcome to work alongside us. Contact <u>friendsoflakewarner@gmail.com</u> to participate.

Hadley Climate Day - April 23, 2022

Organized by the Hadley Climate Change Committee. Look for more information closer to the date on town website, FoLW events and Facebook pages.

Spaghetti Supper Fundraiser - Late March or early April In conjunction with North Hadley Congregational Church. Look for announcements by FoLW and the NHCC.

Water Chestnut Harvesting Kick-Off: Saturday, April 30, 10 am.

So , what to do?

THANK YOU FOLW DONORS

We are truly grateful for the contributions we have received over the past year from our loyal individual donors and local businesses.

Your donations will continue to support: the monitoring of the lake and river for nutrient pollution in an effort to monitor and control eutrophication; community engagement and education; boat maintenance to support ongoing water quality testing; and permitting for grant funded projects; to name just a few.

2021 INDIVIDUAL DONORS

Courtney Afonso Harvey Allen **Rich Blajda** Stephen Braun Greg and Laurie Cannella Maria and Jack Davis Sue Delisle Marie Gallo Gail Garrabrants Ginger Goldsbury Hilda Greenbaum Tom Harris Jim and Gerry Harvey Gerald Hersh Janice Jorgensen Christine and Larry Jute's Carla Mokrzecki Barbara Morrell Susan Petelik Gordon Pullman

Cathy Service Deb Skelly Kevin Skelly Ed and Joan Smola Ben Snyder Fran Van Treese Carolyn Waskiewicz Benjamin Weil Kim Weber Eileen Wood Charitable Fund of Dr. and Mrs. Robin Wood Pat Zuchowski

LOCAL BUSINESS SPONSORS

Born-Digital Off The Wall North Amherst Motors Valley Malt V-One Vodka

HOW TO DONATE TO FOLW

Mail donations to: The Friends of Lake Warner P.O. Box 11 Hadley, MA 01035

Donate at our website:

http://friendsoflakewarner.org/donate/

Venmo donations using this QR code.





Before you, the universe knew no misery There never was any strife, No bullets, no war, Now the universe knows suffering. There's nothing you can do about it, So far as anyone knows.

Before you, the universe knew no happiness Now the universe knows love, Now the universe has eyes, Now the universe is beautiful, For the first time the universe cares, For the first time, So far as anyone knows.

You are the beauty of the universe, You are the eyes of the universe, You are the heart of the universe, You are the soul of the universe, So far as anyone knows.



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	\Box Individual membership - \$25	\Box Family membership - \$3	35 🗌 Sustaining membership - \$100
Name		I	Phone
Street Address		c	ity
State	Zip	_ Email	

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