

## IT'S ONLY NATURAL

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Articles written for *Norfolk Now* about Great Mountain Forest and the landscape of Norfolk Connecticut. Great Mountain Forest is 6500 acres of conserved working forest, in the towns of Norfolk and Canaan. The conservation project of three generations of the Childs and Walcott families, it is now run by a nonprofit foundation.

For a hundred and fifty years, during and after the American Revolution, this part of Connecticut was the heart of the American iron industry. Blast furnaces dominated the river valleys and the surround forests were harvested multiple times for the charcoal that fueled them. When the Childs and Walcott families began the conservation of Great Mountain Forest, there was no forest anymore. The forest was an aspiration in the minds of dedicated conservationists. Today it is a natural treasure and part of the history and legacy of land protection in the United States.









## IN THE OLDGROWTH HEMLOCK

There is a palpable quietness to a grove of very old hemlock, a sense grandeur that settles on you if you spend a little time beneath them. These stands are special places in Norfolk, and we have several on Great Mountain Forest. Some of these trees have been dated to the early seventeenth century, and so were saplings when the Pilgrims landed at Plymouth. They were mature trees by the late eighteenth century, when Europeans arrived in the northwest corner.

It's something of a mystery how these stands survived. This whole area was the heart of nineteenth-century iron production, and much of the forest here was cut to produce charcoal for local blast furnaces. There are old roads and colliers' hearths within a quarter mile of most of our old-growth and, though hemlock was not good charcoal wood, there were tanneries in the area too. They used whole forests of hemlock bark to tan leather.

We will likely never know what saved these trees from that onslaught – maybe it was as simple as disputed ownership – but now, in 2015, the rather sad fact is that these stands are falling apart. Some are outwardly healthy, but in the last few years many of our oldest trees have been wind-thrown or their tops snapped off. At four hundred years old, they have not yet reached their natural age limit, but there are new stresses affecting all the hemlock.

Last October we spent a day monitoring hemlock with Carole Cheah, from the Connecticut State Agricultural Research Station, trying to judge the encroachment of hemlock wooly adelgid and elongate hemlock scale. Hemlock makes up about forty percent of Great Mountain, as it does in many places locally, so like everyone we are concerned. That day we found no unaffected areas,

even in the coldest hollows, and this was discouraging, though not unexpected. Like everyone we are hoping that our elevation will buy us more time than other parts of the state, though there is no doubt about the long-term trend.

There is some good news. At Carole's monitoring site on Mountain Road, adelgid mortality was 96.4 percent this winter. Near the entrance to Haystack Mountain it was 98.1 percent, and on the Appalachian Trail on Lion's Head, it was 99.1 percent. In the short term the near-record cold winter has helped, but the northeast was unusual this last year, as every other part of the country was warmer than normal. Winters are getting warmer, and the adelgid particularly is a prolific breeder, and hemlock will succumb.

Their absence will change everything in this forest. In terms of management, losing hemlocks will restart the process of regrowth that began more than a century ago with active conservation at Great Mountain. This will mean a different ecology, a different aesthetic, and a number of management decisions too – whether we cut hemlock or leave them, whether we replant something new in some places, or wait for natural regeneration.

All this will shape the future forest, and so too will public understanding of our management practices here at Great Mountain. This is new. The previous century of conservation was a private undertaking, funded by family money, but now that we are a non-profit, our continued stewardship is reliant on public support and interest. Public perception is a paramount concern for all non-profits, but here in the forest there will be significant ecological ramifications because support defines our ability to conserve and manage.

I said this was new, but that's not entirely accurate. In a larger sense, human investment in the landscape is really the norm here in New England, past and present. It was human choice after all to cut this forest, and to save those few stands of ancient hemlock. It was human choice to begin stewarding Great Mountain Forest, in 1909, just as it was human choice, in 1951, to import those first ornamental Asian hemlock to Virginia, along with the adelgid. Cultural and ecological contexts play off of one another here in our forests, and this is what's important to me as I think about the consequences of hemlock pathogens, or the future of Great Mountain Forest, or simply enjoy the grandeur of ancient trees.





## A HIKE UP STONEMAN

There is a red-shouldered hawk cruising the field behind the office this afternoon, who wheels slightly as I step off the porch and into the yard. He has been around all spring and is very distinctive because he's missing some flight feathers on both wings. It gives him a gap-toothed appearance in the sky, particularly from certain angles. It's hard to say what happened, but there is a raucous murder of crows who live in the pines out back, so my guess is he got the worst of some avian rumble.

I'm on my way up Canaan Mountain, to the cairn called "Stoneman," so I go north on Canaan Mountain Rd, to the trailhead near the corner of Steep Rd. A black squirrel runs across the road in front of me. I see her cross here regularly in the mornings, so she must have a nest some place close. When I lived in Ottawa, there more black squirrels than gray, but this is the only one I've ever seen in New England. Jody Bronson (GMF Forest Manager) says there are a few others in the area, but this is the only one I've seen. Black squirrels are smaller than the grays, bigger than reds, but they seem to out-compete the grays, in the north anyway. If they establish a population here, it will be an interesting wrinkle in this ever-changing forest.

It's late afternoon, so there's not much going on in the new rabbit habitat cut as I walk by. At other times of the day, it's become a popular place for songbirds, deer, and grouse, as well as New England cottontails. I think that red-shouldered hawk likes it too, at least as much as the field

behind the office. It's not only the cut, but the edge-effect with the forest west of the road that creates all the wildlife interest.

I turn south onto the Great Mountain Forest Iron Trail at the corner. This is actually the middle of a trail that leads between Stoneman and Beckeley Furnace, down in Canaan, the northern part being on state land. The trail connects that remnant of the iron industry with the mountain view of the post-industrial landscape, both in Great Mountain Forest, and in the Housatonic Valley as well. The rabbit cut is visually messy, but ecologically beneficial. The land clearance that went along with charcoal making for Beckeley and other furnaces was of another order of magnitude and ecologically devastating. I like to keep this in mind while I'm walking, even while I enjoy the songs of the ovenbirds and chestnut-sided warblers, or the new blooms on the mountain laurel.

The trail crosses regrown fields that were part of the Root farm, back in the nineteenth century, and are now regrown in pine and mixed hardwoods. It then dips down and crossed one of the branches of Wangum Brook before starting the climb toward the summit. It follows an old road part of the way, and a lot of our current red blazes are painted over old axe blazes. Sam Hawley, a member of the GMF forest crew in the fifties, sixties, and seventies, kept the trail open when he lived on the mountain, but I'm sure parts have been used since the charcoaling days. There are one or two charcoal hearths evident along the way, and no doubt more in the woods.

The trail crosses open areas of smooth rock as it gets toward the top, where low-bush blueberries and mosses have the look of the White Mountains or the Canadian north. It's hard to say whether these areas have always been clear or if they are places not yet regrown, but they offer glimpses out in various directions. In one of them there's lots of coyote scat and places where they've pawed the mosses.

At the top, the view is in two directions. The best is back over GMF and Wangum Lake to the north, but when the leaves are off the trees, the view west over the Housatonic Valley is quite good. Then you can see the quarries below, various farms, and the lines of both the river and Route 7 – a whole host of past and present human use. When you consider that Robbins Swamp, which fills the heart of Falls Village, was used extensively by Native people soon after the glacier melted, the valley has seen the effects of human activity for seven or eight thousand years.



## READING THE NEW ENGLAND JUNGLE

Jean's Trail, on the western edge of Great Mountain Forest, makes a loop out through the "Raggy Lot," on what was once the Dean Farm. The Deans were from the Mount Riga area, probably explaining the name. Although the local term "raggy" means "charcoal maker" (and probably derives from the early association of Mount Riga with colliery), the land was never used for charcoal making, like so much of GMF. It was a farm all through the nineteenth century, and when Ted Childs bought the property for GMF in 1939 its fields had recently been abandoned.

Land records give us this general picture, but on this morning we are after something more specific. Michael Gaige, Jonathan “Yoni” Glogower and I are reading the landscape, trying to decipher part of the story written on the land itself since settlement. Yoni is a Yale graduate student, Michael is a consulting naturalist, and they are putting together a field book of interesting natural and cultural sites at GMF. There is a wonderful book called “Reading the Forested Landscape: A Natural History of New England,” by Tom Wessels, which is a primer on the technique they are using. Michael is a former student of Wessels and now himself an expert.

On this site one gets the immediate impression of being on an old homestead because GMF keeps it mowed. There’s a young sugar maple maybe 50 feet high growing in the opening, and stone walls line the trail, but the picture becomes more complete, and far more interesting, if you look more carefully. There are large sugar maple wolf trees, many of them associated with the walls, which likely gave shade as well as sap, when the area was open. There are apple and hawthorn trees, too, and in all these clues you begin to visualize the pastures and fields.

A hundred feet off the trail, there’s the wrought-iron tongue of a horse-drawn carriage leaning against a maple at the end of a wall. It’s near the farm’s cellar hole, now overflowing with bittersweet, ferns, blackberries and Japanese barberry. In the thicket, you might very well miss the cellar hole, but the wall leads you there, helping to define the spatial relations of farm life. It’s all a perfect example of what Mike refers to as “the New England jungle” taking back the land.

From the cellar hole we walk the wall northeast into a GMF plantation. This area was put in red spruce in the early 1960’s by Darrell Russ, the forest manager. In the late 1980’s, the current forest manager, Jody Bronson, thinned the spruce planting, which is now interspersed with sawn stumps and the remains of cabbagy, open-grown white pines that probably started growing when the farm was abandoned in the 1930’s. These were crowding the spruce in the 1980’s, and Bronson girdled them as he thinned, leaving them standing as snag trees for wildlife.

Oral history gives us names here, and Russ recorded that there were potato fields in this area, but it’s fascinating that most of the chronology and land use are clearly legible to Mike’s practiced eye. He points my attention to the small stones in the walls around this part of the plantation. These would not have been cleared and put in the wall if this had been pasture for livestock, so this is likely where the potatoes grew.

The pasture was on the other side of Jean’s Trail, to the north of the spruce plantation. Here the canopy is dominated by young hardwoods, like black birch and sugar maple, and a distinct change in forest type at the edges marks the boundary. The mostly open understory with a heavy ground cover of Canada mayflower is another indicator. The lumpy ground with small outcrops of bedrock also differentiates it from the smooth potato field.

Working with GPS units, Mike and Yoni map the various features and boundaries of the site. They will do a far more complete write-up than this brief sketch, but I am struck by the nineteenth-century image of this place. Last month I wrote about the view from the top of Canaan Mountain, and about what I called the post-industrial landscape left by the iron industry in GMF. Today I am thinking about Mike’s metaphor. We won’t find anything as dramatic as a Mayan ruin or a Toltec pyramid in the jungles of northwest Connecticut, but there are overgrown stories like this one nearly everywhere in this forest.





## TREE REGENERATION AND THE WORKING FOREST

Yesterday I asked Jody Bronson, Forest Manager at Great Mountain, to take me down to the log job we put on last summer. It was a well-planned and well-executed cut, and last year was a good acorn year, so we had hopes that there would be strong regrowth. Everything is still young, for growing trees takes decades, not seasons, but he had told me things looked good and I wanted to see what he was seeing. It was a half hour drive, as the cut is close to the Goshen town line, but it was a beautiful day, with a nice breeze and enough cloud cover to keep it cool.

The first thing you notice about any log job is that it's messy. To the untrained eye all the roughly cut tops left on the ground look careless, but these need to rot back into the soil to provide nutrients, and before that provide habitat for small animals and protection for the young trees that are sprouting. What you notice next about this particular log job is that beneath the surface messiness, there is a great deal of thoughtful work. There are no skidder marks to be seen, either to standing trees or to the ground beneath the slash. Wet spots have been carefully managed too, in order to hinder erosion, and the whole thing has an underlying orderliness. Norfolk native Henry Gundlach did the harvesting, knowing that a poorly executed job would damage regeneration for future foresters and loggers. Trees will regrow here, and in fact they have already started.

We walk to the east of the Number Four Trail and look at an old cellar hole, as well as the seedlings coming up. It's a very old place, probably nothing more than a log cabin in its day, and this may be the oldest house site on the forest. Someone spent a good deal of time farming here, though they

were probably squatting on iron company land, so Jody placed the skid road in order to stay away from the foundation. The site is worth protecting.

I'm not very good at seeing the individual seedlings in all the various undergrowth, but Jody points to oak, red maple, and cherry coming up; they will be bigger and easier to see a year from now. I stand for a moment and try to let the chronology of this place settle in. I think about the three hundred thousand board feet of wood we took out of here, and the decades it took that wood to grow. I also think about the fact that this land was cleared at least twice before last summer's logging. In that longer frame of reference these impossibly tiny sprouts do feel like they will be trees someday. I suppose it's possible to think of cutting trees as a sad thing, a kind of loss of all the years of growth, but one might say the same of this farm being taken back by the regrown forest. Maybe it's better to see all these things in a positive light – as the inevitable change that leads to new growth.

New growth is why we're here and on the west side of the road there's more to see, along with another sign of change in the forest. Deer browsing is a challenge to tree regeneration, just as to a growing garden, and we have a managed hunt at GMF for that reason. More recently, we have gained a resident moose population, and there are signs of both in the cut. There are two levels of browsing clearly visible, the deer fairly low on the young trees and the moose up above four feet. Moose need to eat up to fifty pounds of plants each day, so they aren't bothering with the little seedlings now. This may change as the cut matures, however, and we will have to wait and see.

Moose are a recent arrival and there is no hunt here in Connecticut. If their population grows, they may be a problem, though it's just as possible that they may not stay. Moose don't like warm weather, and this is very far south for them to live comfortably. Here again I think the long view is helpful. It's good not to get too possessive of trees that have only just begun to grow. At the moment the regeneration looks good on the ground, and the changing history of the forest's ecology will be interesting to watch, as all the plants and animals move through the stages of succession.



## ANOTHER KIND OF OLDGROWTH

### **Old-growth Communities on Balds and Rocky Outcrops**

Until roughly 13,000 years ago, glaciers scoured and sculpted New England's hills into the ridges, domes, and cliffs we find so familiar. The melting ice deposited soils in some places, but much of the post-glacial landscape was scraped, barren, and rocky, not unlike the arctic tundra today. Yet, even in the thinnest glacial till, plants colonized, and millennia of their living and dying created soils in most places. Over thousands of years, as the climate warmed, local tundra conditions gave way to boreal forests of black spruce and jack pine, and then to the mixed forest we now inhabit.

In some high and exposed places, however, harsh weather and periodic fires prevented soil development, and these "balds" harbor unique ecologies, especially for southern New England. I've written previously about the still-extant old-growth hemlock we have in Great Mountain Forest and elsewhere locally, and in these open places you will find other natural communities that are nearly as old. Regionally, Mount Everett and Race Mountain have bald tops, as does Canaan Mountain. Within GMF, Blackberry Hill and the point we call The Matterhorn are also unique rocky outcroppings providing open environments in the forest.

They offer berries, sun, and views for those who hike there, and also provide important landscape structure in an otherwise forested region. Their sunny, warm, dry environments can be wildlife rich – Canaan Mountain, for example, provides important habitat to locally rare timber rattlesnakes – though they also provide challenging ecological conditions for plants, as they are characteristically dry and acidic.



On these balds, “crevice” communities form in bedrock cracks where soil accumulates and moisture can be retained. The amount of colonization in an opening depends on the depth and moisture retaining abilities of the soil, with lichens forming on nearly bare rock, then mosses, graminoids, herbs, and finally shrubs, like low-bush blueberries populating areas with increasing amounts of soil.

It’s important to remember that plant life grows slowly in these places. You will find stunted oaks, with twisted branches and pruned canopies that may be decades old. The thin soils around the edges of rocky areas do not retain moisture, so trees and shrubs must emphasize root growth over stem and branch growth. This enables them to live within harsh parameters, but shapes them in specific ways.

Within these surrounding stunted trees, bedrock is typically covered by crustose, foliose, or fruticose groups of lichens, and these are the most ecologically interesting aspects of rocky balds in our area.

Crustose lichens are the flat growths that are nearly impossible to remove from the rock, while foliose lichens look more leaf-like, though still rather two-dimensional. Fruticose lichens, like *Cladonia* or reindeer moss, are more three-dimensional and hold more moisture than the others. *Cladonia* especially brings to mind the barren grounds of the Canadian north, and points to how unique these places are for southern New England.

All these lichens’ presence points to another unique quality of these rocky areas, and is the reason they should be entered with caution. Crustose lichens are rugged, but the others are fragile, easily crushed underfoot, especially in dry weather when they are in a stiff, cryptobiotic state. These sites also contain fragile pin-cushion lichen communities which are equally delicate. Every effort should be made to remain on trail or, if no trail exists, to stand on open bedrock or other vegetation.

These lichens communities are likely older than most of trees in the forest that surrounds them, though we don’t tend to think of things like mosses and lichens as being old-growth. Still, many of these communities represent centuries of growth and are ecologically just as precious as the oldest hemlock. Maybe they are more so, in fact, simply because they can be destroyed or damaged so much more easily. It takes a bit of effort to scale the human imagination down to see the ancient qualities of these humble plants eking out a living on these balds and barrens, but it’s worth doing as you enjoy the view and a handful of blueberries.



## CHARCOAL HEARTHES AND FOREST ECOLOGY

Soon we will get a first dusting of snow. If it's not enough to cover the ground completely, then the darker fallen leaves will be left poking up through the veil of white, and small contours on the ground will appear. The contrast will highlight slight topographical variations, particularly with the lower angle of the autumn sun helping to differentiate slope and flat, and this will be the time to go looking for the hundreds of colliers' hearths scattered throughout the local woods.

In Great Mountain Forest, there are several hundred of these level circular areas, usually 25 to 30-feet in diameter, where colliers smoldered charcoal. Generally they were built on gentle slopes where the excavated uphill section could be used to fill in below. This was hard work, and colliers used their hearths multiple times. Because of this repeated use, you can almost always find accumulated residual charcoal around the edges if you dig into the humus and leaf litter.

Colliers burned during the summer, piling four-foot billets of winter-cut hardwood into a kind of beehive oven, around a central support called the "Fagan pole." Flues were built into the pile, which was then covered in leaves and soil; opening and closing these flues regulated the smoldering process. The colliers' trade was not only the hard work of building hearths and cutting wood, but also the art of regulation and watchfulness.

Only a carefully tended hearth would produce pure crystallized carbon charcoal, free of water, gasses and resin—usually in about two weeks.

Colliers would generally build three or more hearths close together, and then construct a small hut nearby where they could keep constant watch. These huts were little more than holes dug in the ground covered by bent branches and bark, though some had rough fireplaces for heat.

Fireplaces and hearths are monuments to another age, static in time and relatively unchanged since they were abandoned a century ago, but the land use they memorialize is one of the single most important factors in understanding contemporary forest ecology. Because the effects of industrial charcoal making altered forest composition in ways that will be readable on the land for hundreds of years, these changes are not static in time, and continue to inform our understanding of the forest in which we live.

The most obvious result of charcoaling was deforestation. Approximately two acres (30 to 50 cords of wood) were needed for each burn and yielded about 660 bushels of charcoal. It took 250 bushels to make a ton of iron, so with scores of local furnaces operating, it didn't take long to work through the original forest.

To some degree, deforestation worked to the colliers' advantage, as wood over six-inches in diameter had to be split, so the original trees involved a great deal more work than the smaller ones that regrew. Typically trees down to three inches could be used, so 20 to 30-year-old stands with high stem density were ideal. This young growth was cut and recut throughout the nineteenth century, though in the end colliers overtaxed the forest's capacity to regenerate.

The forest did regrow, but charcoaling altered forest composition in favor of species, like oak, which like a lot of disturbance and sun to regrow. It also created a legacy of even-aged stands, which though regrown, are not as biodiverse or as resilient as more mature forests with wider age ranges of trees. Studies also suggest a variety of micro changes to soil chemistry due to a century of charcoaling. Hearth sites have elevated pH, as well as altered capacity for holding and exchanging nutrients like calcium, magnesium and potassium relative to surrounding soils. Hearth soils thus show reduced vigor, seen in the slow and poor growth of vegetation on them. This relative barrenness is another clue to finding hearths, which quite often have a lone tree growing in the center, in the soil less altered thanks to the presence of the Fagan pole. In all these ways the work carried on here 150-years ago defines the present, even in a quiet, snowy, December wood.





## HUNTING AND HISTORY ON CANAAN MOUNTAIN

It's the opening of deer season and a beautiful late fall day. The leaves are off the trees and the sun is casting long shadows out into the woods. Early this morning about a dozen hunters made their way into Great Mountain Forest, and though I'm at my desk today, they are on my mind. They are out there because they love being in the woods and because they like getting food off the land, but they will be carrying out an important part of our management and monitoring of the forest over the next three weeks as well.

Great Mountain Forest (GMF) was established, in 1909, as a game preserve and a model for wildlife restoration and management. That was the original idea here – that land unsuitable for agriculture could be reforested and still feed people. Waterfowl and white-tailed deer were reintroduced in the first decade, having been extirpated by unregulated hunting and habitat degradation during the charcoaling era. As late as the 1970's, wild turkeys were successfully reintroduced. The former effort was private, carried out by S.W. Childs and Frederic Walcott; the latter was part of statewide work, in cooperation with the Connecticut Department of Environmental Protection.

Forest management has come a long way from that earlier model at GMF, and forest health, water quality, and timber management are now the primary focus. Yet hunting still plays an important role because as the deer population rebounded, and because humans replaced many of the top predators in northeastern ecosystems, a regulated deer hunt became a necessary part of larger forest management. Without this, deer would exceed habitat limits as they have in many places around the state, to the detriment of larger ecosystems.

In this aspect of forest management GMF hunters are not only keeping the population down, but also acting as designated monitors. Every day they carry a "data-card" and record all the wildlife they see, including deer.

Good hunters move slowly through the forest, and they take the time to notice all the activity around them. This is what makes them successful, as well as ideal monitors for understanding populations.

For me, however, our hunters are more than just data collectors. They are part of a larger history of this forest, one which ties knowing and studying with finding food, and with human communities. It's this working relationship with the land that I'm thinking about this morning.

I'm an occasional hunter, but I've spent a good deal of time in their company, both here in New England and in the Canadian north. On my desk in front of me is a memento of the last time I was out with my Cree friend Willie Gunner, three years ago at a place called Lake Temiskamie. Willie is the President of the Cree Trappers Association, responsible for the organization that oversees hunting over a large part of Northern Quebec.

In traditional Cree culture Willie is also a *kaanoowapmaakin* (pronounced gah-new-whap-mah-gan), a steward responsible for a territory 6 to 8 times bigger than GMF. As with us here, it is his responsibility to see that his piece of the larger forest is left as good as or better than he found it. So he, too, spends lots of time monitoring animals and collecting information about what's happening on the land. He does this for forest health, and so people can eat.

Of course there are many significant differences between Cree hunting culture and hunting culture here in New England, but there are important similarities in that working relationship to the land. Good hunters tend to not only be very observant, but also very knowledgeable about animals and the larger habitats in which they live. This comes of the necessities of that working relationship, no different really from the knowledge needed to be a good farmer, or even to be a good ecologist. They also tend to care a great deal about the land – at least the good ones do. Often these days, hunters are called sportsmen, but hunting to me is very much a way of knowing and working the land.

On my desk, too, is a quartzite arrowhead that Jody Bronson found years back in a streambed not too far from the offices here on Canaan Mountain. This is an artifact from another cultural world, but it is also a connection back to a history of land use here on the mountain, one that stretches back thousands of years.



## A LEGACY OF CONSERVATION

The end of 2015 was dry, and before all the recent rain and snow the swamps and ponds were very low. It was nice to walk dry shod into new places, but ecologically the low water in the wetlands was worrisome. So many amphibians rely on being under water to survive the winter, and the low water table put stress on the whole system.

Yet the low water also offered an opportunity for reading parts of the landscape that you usually can't see. Tobey Pond is back to normal now, with water trickling over the spillway, but earlier, not too far from there, earthen berms had emerged with the falling water. The earthwork delineated small, rather curious looking lagoons along the shore, and these offered a clue to part of the early work at Great Mountain Forest.

Unlike stone walls and collier's hearths, and the many other remnants of farming and charcoaling, these structures are a vestige of conservation work, not settlement and industry. This alone makes them interesting, but their story reaches out beyond Norfolk, and is more interesting yet. We think of Tobey as a place for recreation, but a hundred years ago other things were happening there worth knowing.

"Tobey Pond looks like a lake in a zoological park," wrote Frederic Walcott to a friend, in 1912; "we have from two to five hundred ducks there all the time now; they have stopped over on their way South, attracted by our own ducks, numbering now more than two hundred and representing fourteen different varieties." By "our own ducks" he meant local birds, but also those brought back from Canada, and this is part of that larger story.

Walcott and S.W. Childs, who established the conservation effort here in at GMF, had paid professionals to travel north and bring back young ducks – canvasbacks, redheads, and pintails, among others. These were bred in captivity, and the earthwork is what's left of the pens built for these new residents. It is also a reminder of the two men's original intent which was to run a game preserve.



Forest management at GMF, aimed at the health of the whole, began as game management. This was aimed at bringing back certain birds and animals, and the berms, along with the presence of imported Canadian birds, are a reminder of how depleted this region was at the time. Waterfowl, deer, and much other wildlife were on the verge of being regionally extinct a hundred years ago, and this regional issue was also part of the work here.

Childs and Walcott brought the Connecticut Forest, Fish, and Game Commission to see Tobey Pond and all the new wildlife in the growing forest. They along with others, like Alain and May White who founded White Memorial Forest, lobbied to get the state to acquire public land for similar purposes. Part of the origin story of state forests and parks in Connecticut is thus held in those earthen rings beneath Tobey Pond.

Walcott went into politics and eventually became one of Connecticut's US senators, in 1929. He took his conservation interests to Washington, and was involved in a variety of efforts, though wildlife and particularly waterfowl remained a focus. The ecological disaster of the Dust Bowl caused huge disruptions in both the breeding and migration of geese and ducks and, by 1934, it was estimated that there were as few as 30 million left in the entire United States.

Walcott was instrumental in passing the Migratory Bird Hunting Stamp Act that year. Since then, hunters have been required to buy a stamp each year to aid conservation and more than 800 million dollars have been raised to protect more than 6.5 million acres of habitat to date. Walcott also worked with FDR in creating the Civilian Conservation Corp, which carried out a great deal wetlands rehabilitation and protection.

Wildlife in the northwest corner is plentiful to the point of being nearly un-noteworthy today, but the berms on Tobey Pond help tell the story of a time when that wasn't the case. They are a piece of the conservation legacy here in the forest – the on-the-ground effort to bring the region back – but a small reminder of the political legacy connected to that recovery as well.



### ART, SCIENCE, AND NATURE IN A RITE OF SPRING

Last Sunday's minus 19 degrees was a record, and I love that kind of cold, so I took a walk in the woods as soon as the sun rose. I came out at the east gate of Great Mountain Forest, and decided to look in the sugarhouse, since sapping had been on my mind all morning. As cold as it was, the temperature was going to rise sharply, and the coming week might well bring the start of one of my favorite seasons.

I stood outside the sugarhouse looking at the maple just outside the door, trying to judge its readiness. People have been asking how this strange winter will affect the sugaring, and you might expect that the warm winter would throw off the trees' natural cycles. You might also think that this would disrupt all the usual human calculations, but the truth is that there are very few usual calculations to be made. There is always mystery, not to mention a fair amount of educated guessing, in judging when the sap will come and how good a season it will be.

Sapping happens during a period of a few weeks, between mid-February and early April, when temperature fluctuations cause osmotic pressure to increase sap flow. This pumping action is caused both by expanding and contracting sapwood, but also because cooled sapwood cells dissolve carbon dioxide. When the temperature warms again, the cell walls and the carbon dioxide expand, and all this increases pressure within the tree. By drilling shallow holes into the sapwood, you can take off a

small portion of the flowing sap. Red squirrels do the same by nibbling at the buds, and cold, fresh sap is a refreshing drink.

The sap is sweet in this early season because the trees have not started to produce bitter-tasting chlorophyll. Starch stored in the roots over winter is converted to sugar, and is moved upwards through the trunk to provide energy for leaf-out on the outer branches. All these mechanisms are well understood, and yet it's the mix of sun and cloud, air and soil temperature that awakens the trees. Judging when all this will happen is much more an art than a science.

The rollers on the sugarhouse door protested when I opened them in the bitter cold. Soon the air inside would be filled with sweet-smelling vapor, but that day the only steam rising was my breath. The cast-iron arch looked very cold, and there was frost on some of the shiny stainless steel pans. The fire would be roaring in a week or so, however, and it would be time for the science of sugaring.

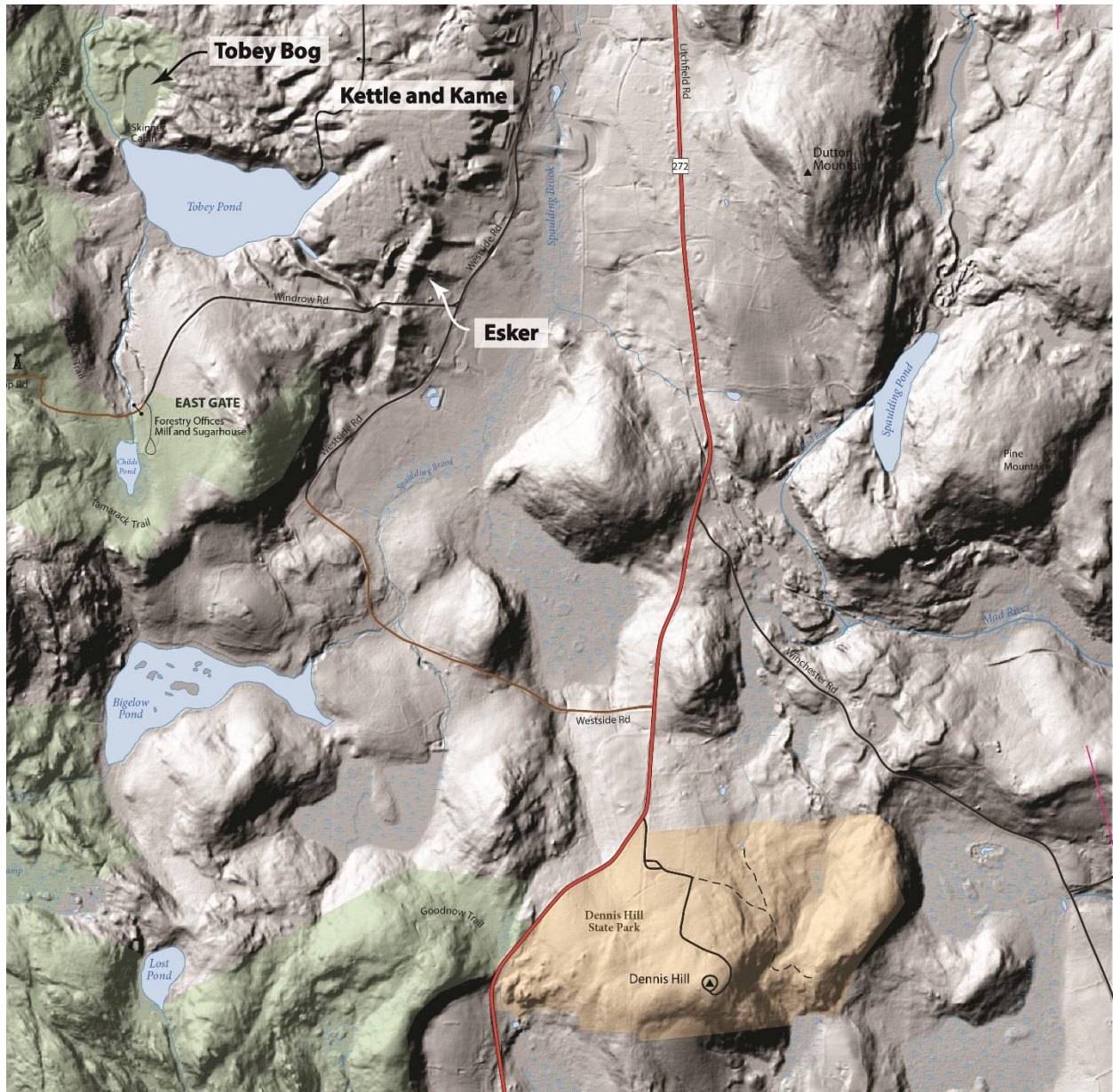
A bit of sap, viewed through a refractometer, reveals the sugar content. This is usually between 2 and 4 percent, with higher readings coming early in the run and then falling off afterward. Some trees hold higher sugar content for longer than others, but the aggregate drops during the season. Knowing the sugar content, tells the sugar maker how many gallons of sap it will take to produce a gallon of syrup, and anywhere from 25 to 40 is usual.

The sap-to-syrup ratio, in turn, makes it possible to calculate how much wood will be needed and how long it will take to empty the sap tanks. You wouldn't think that the difference between two and four percent would change things that dramatically, but it can mean the difference between going home at five and boiling long after dark.

A hydrometer is used to measure the specific gravity of the boiling sap, and at about 219 degrees (depending on barometric pressure) it becomes syrup. Tight control is needed to make sure the finished product is not watery but also does not crystallize. Letting the boiling syrup go past the crystallization point in the pan is the worst disaster that can happen in the sugarhouse, so care and precision are of the essence.

All this is a kind of cooking chemistry, and yet there is mystery here too. The sap still asserts its identity on the final product, as each run undergoes the caramelization process in the boiling pan, giving a different color to the syrup. John Burroughs once called the sap run a "sequel of the bitter frost; the sweet goodbye of winter," and I would add that the finished syrup is one of the best results of combining art, science, and nature in a rite of spring.





## THE HISTORY OF GLACIAL LAKE NORFOLK

A couple of months ago I wrote about the low water in Tobey Pond, and how it revealed interesting aspects of the pond's human history. Today I'm thinking about high water at the pond, and that's an entirely different story, one which unfolded even before Native people reached this area. You have to go back fifteen or sixteen thousand years to find the high-water mark around here, when most of the northwest part of town was under Glacial Lake Norfolk, and Tobey Pond was still deep below its surface.

Glacial Lake Norfolk formed when the ice retreated to the north and west, at the beginning of the Holocene Era. This began around twenty thousand years ago on Long Island Sound, but did not reach the Litchfield Hills for about five thousand years. Melt water mostly ran south into the ocean, but in a few places where the topography pushed water north, lakes formed momentarily in front of the glacier. This was the case with what is now the Blackberry River basin, when the ice still blocked



water from finding its way to the south-flowing Housatonic. The lake only lasted for a brief moment in geologic time, but its legacy is still visible today.

The water not only filled the basin around Tobey Pond, but spread back into the wetlands that are now between Westside Rd and Route 272, probably as far south as Dennis Hill Park. The top of Haystack Mountain might well have been an island for a while too, before the glacier retreated enough to let the water flow by and down into the valley in Canaan. The formation and eventual draining of the glacial lake caused a great deal of erosion and deposition in the basin, leaving us today with very interesting land formations.

There is a beautiful esker – the deposition left by a river under the glacier – between Tobey Pond and Westside Rd. The land there is basically all sand and gravel left from the ancient riverbed. If you walk the road down to Tobey Beach, you can pick out a little of the “kettle and kame” topography to the west as well. Kames are deposits that happen at the melting edge of the glacier, and kettles form when chunks of ice calve off and embed themselves in the soft ground, leaving holes when they melt and drain. The area north of the beach was the site of the old Norfolk Downs golf links, and the post-glacial topography likely made for challenging play.

When a kettle was formed by a big enough chunk of ice, and compacted soils or bedrock stopped drainage, the melt water would leave a body of water, and this is what created Tobey Pond. This was enhanced with the help of the dam at the west end, but Tobey is officially a kettle pond, which are scattered across New England. They become more and more common the further north you go, and if far enough north, then postglacial ponds and lakes are the defining feature of the Canadian Shield.

A couple of hundred yards northwest of Tobey Pond is another kettle, which did not drain or become a pond, and it is a rare thing in this region. Where peatlands are fairly common in northern New England and Canada, Tobey Bog is one of few true bogs in Connecticut. Its floating mat of sphagnum moss – probably more than thirty feet thick – comprises one of the most unique ecosystems we have in Great Mountain Forest in fact.

Bogs form in poorly drained kettles which do not have enough of a watershed to fill into ponds, and thus form closed – or at least mostly closed – systems. Limited input and outflow create a nutrient poor ecosystem with high acidity levels, and this selects for a specialized cohort of plant species that are adapted (sometimes uniquely so) to such harsh conditions. Here is where you find things like carnivorous plants that eat insects to make up for the extremely low levels of nitrogen in the acidic Sphagnum substrate.

From landforms and waterways, down to the level of highly adapted species, the legacy of the glacier and its retreat are everywhere around us. Ice and its aftermath, in fact, were the defining feature in Norfolk long before the town got its nickname.



### TOBEY BOG: THE CENTRALITY OF MARGINAL PLACES

Many of the articles I've written for Norfolk Now have concerned the interconnectedness of the natural world and human communities. By highlighting stone walls, collier's hearths and the remnants of early conservation work, I've tried to show that even the deepest woods here in the northwest corner of Conn. are part of a deeply historical landscape—a natural record of the good and bad decisions we've made in working the land.

Conservation and forest management are predicated on valuing human participation, and thinking historically is important in judging that participation. Yet writing last month about the geological and glacial underpinnings of that history, I was reminded that there are also places that, while not isolated from history, have remained at its fringes. Tobey Bog, is one of those places in my mind—consciously left alone, and so lightly touched that you can almost imagine a time before people arrived in this corner of the world.

The bog's five acres are surrounded by Great Mountain Forest's "North Forty" area, just northwest of Tobey Pond. Here the glacial processes I described last month created a kettle, which then became what's known as a *minerotrophic* peatland. This means that while the bog is completely closed to aboveground hydrology—streams or floodplains—it likely gets nutrient-rich seepage from groundwater. Traveling through the ground, water picks up minerals from eroding rocks and soil particles, and delivers them into this mostly closed system.

These kinds of bogs occur in southern New England – Beckley Bog is another local example – and are different from the *ombrotrophic* bogs which are completely isolated from everything except rain or snowmelt. These only occur from Maine northwards, where cooler temperatures restrict the loss of water from surface evaporation, and underlying geology cuts off all inflow. In warmer areas, these have long since dried up. In order to continue accumulating slowly decomposing peat, all bogs must gain what little water they get at a faster rate than they lose from evaporation and plant respiration, and this is why there are so few true bogs in southern New England, and we are lucky to have two so close at hand.

Peat is the key to bog ecology, and is created when overall plant production is greater than the system's ability to fully decompose organic matter. The weight of new vegetation presses partially decayed matter down deep below the surface and this, combined with hydrological isolation, creates the highly acidic conditions that make bog ecology so unique. Peat shapes the chemistry, and is also a deep physical structure, with Sphagnum moss tending to be the bulk of the floating mat. All the life in the bog floats on this buoyant layer and is adapted to the harsh chemistry.

The wooden walkway which extends 100-feet into the center of Tobey Bog also floats on this mossy structure, crossing the subtle transition from forest to wetland. It begins in dense patches of highbush blueberry and invasive glossy buckthorn, as well as bog and fragile fern, then turning the corner, the bog opens and the whole interior is scattered with stunted trees—red maple, larch, white pine and black spruce.

The latter are particularly notable as they are a boreal species usually found much farther north. This gives the area a distinctly subarctic feel, connecting it to the north, which has also historically been on the margins of human activity. Vast portions of the Canadian Shield are known generically as muskeg, an Algonquian term meaning “grassy bog,” and have also been largely ignored, until recently, by all but the Native inhabitants.

Despite its ecological fragility, Tobey Bog is protected by the forest. It is not in danger of development, nor is it threatened by nutrient addition from nearby septic fields and surface fertilizers, like numerous other wetlands. Yet, it will be especially vulnerable to climate change, like all peatlands, as warming temperatures increase decomposition rates and evaporation.

Globally, the boreal region holds a vast biomass stored in various peatlands, and their synchronized decomposition, due to warming, will release many tons of sequestered carbon. This will exacerbate the greenhouse effect, and put all these places front and center. We will continue to leave Tobey Bog to its own processes and life cycles, preserving it as a rarity in Southern New England, but it is no longer a place on the margins of our choices.





## THOUGHTS ALONG THE CHATTLETON ROAD

The road at Great Mountain Forest's west gate is a new spur off an older thoroughfare. Jean's Trail is the intersection, and from there the old Chattleton Road once ran down behind where Rustling Winds Stables is now. It still goes south to Meekertown in the other direction, but a hundred and fifty years ago the road passed through open farmland, not forest. Kneeland Munson had the best land, but Elisha Mansfield, Stephen Dorman, and others all worked hardscrabble farms along the road. The land they cleared, along with all the charcoal made by the residents of Meekertown, left little that you would have called a forest by the end of the nineteenth century.



I've covered this history before – that this is a postindustrial landscape, regrown after overuse. I've tried to highlight too, that human thinking created that landscape every bit as much as the collier's axe or the farmer's plow. Deforestation came of our society's resource use, but also the belief that human progress was inherent within that use. I've made the same point in terms of conservation and subsequent regrowth – that before there was a regrown forest there was the idea of a forest, and the belief that progressive woodland management was better use and a greater benefit to society.

This philosophy of stewardship is one important legacy of this forest, and has been applied all along the Chatteleton Road. About a mile from the gate, for example, there's a Norway spruce plantation, started during WWII. The stand is beautiful, and the trees have grown well. They were thinned this past winter, and the logs are in the mill yard where they will be used for a new cabin this summer. The standing trees will grow larger, and some will be used in the future. Wood from an older Norway plantation is being used locally in building canoes, so maybe that will be a later use, but good stewardship does not necessitate knowing.

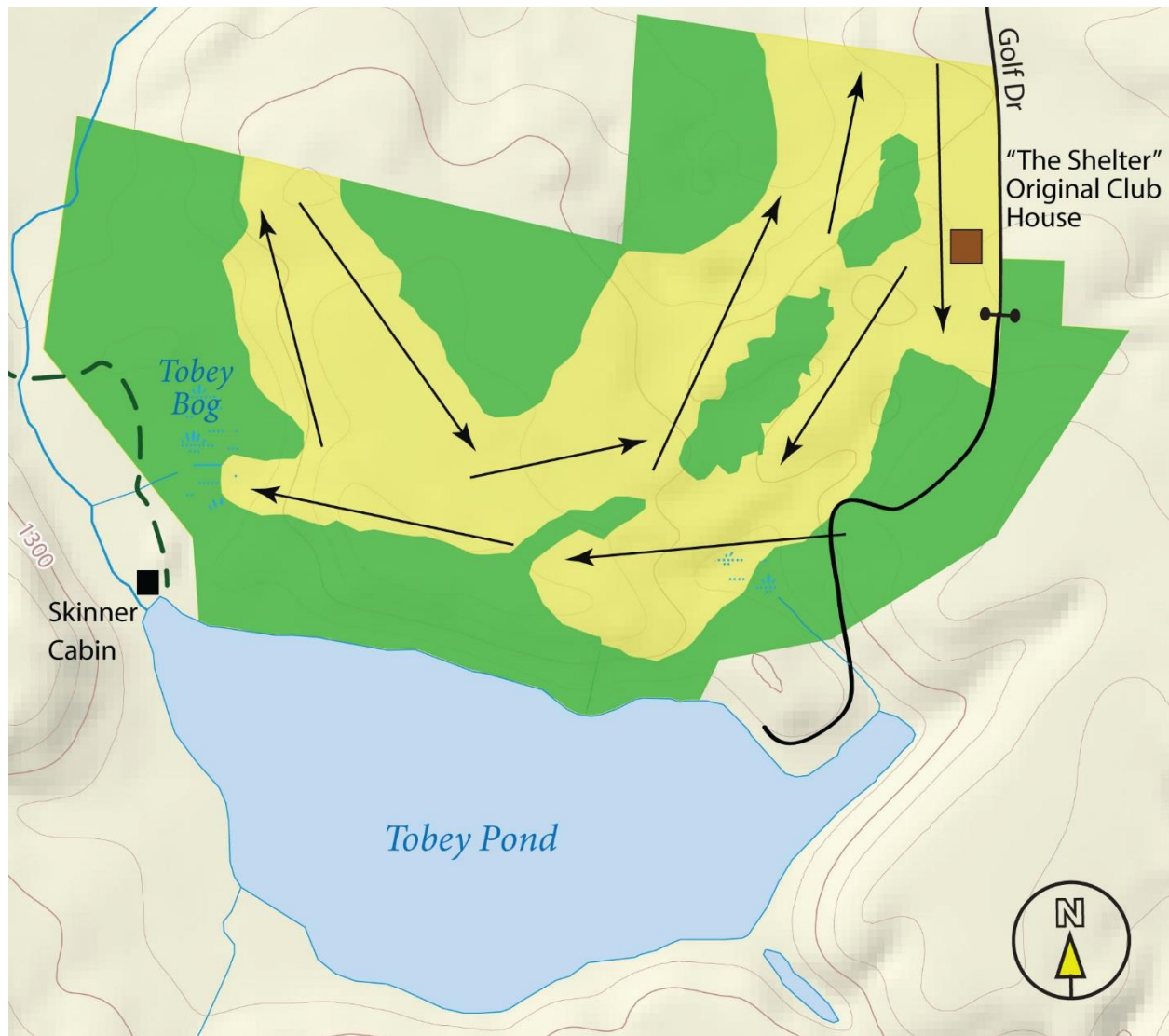
The trees will grow better for being thinned, and a bit further along the road, where Christopher Potter's abandoned cellar sits surrounded by old black locusts, there is another example of this kind of thinking. One of his pastures grew back into sugar maple, and a few years ago those too were thinned. The best trees will now grow larger crowns and someday will be ready to tap. Few of us will be here to see that, but again, thinning was good stewardship – a thought toward the future.

In its oldest sense stewardship means caring for someone else's title or property, to meet their future needs and not necessarily our own. So the fact that we will not use those maturing maples in our working lifetimes is not that important, if you think of the forest as that kind of trust. Future caretakers in turn will plan for things that they will not live to see, and so this forest is really in trust for itself. We are part of the dialog, but the forest will have something to say as well.

At one spot along the road there's a plantation of dying Douglas firs surrounding what was once William Holabird's house. The stand was an adaptability experiment, and so both farm and fir are valuable answers from the forest about what it will or will not be. This whole region is filled with these fragments of conversations between people and the land – between human ideas and the natural environment – and this is another legacy of this forest.

GMF is a record of this long-standing dialog, as well as a philosophy of conservationism. All this is important beyond its boundaries, for the ethos of stewardship is part of the community here in Norfolk. I mean the strong commitment to conservation that exists here, but also the commitment to long-term thinking about community that exists here as well. Communities are grown, after all, not simply enacted, and Norfolk has had many good stewards.

It's axiomatic that good stewardship means making good decisions about the forest. If the same kind of thinking is necessary in growing a thriving community, then maybe we should think about them as interconnected and vital to one another. This I think was the mistake in the nineteenth century belief that you could improve society at the expense of the land. Stewardship thus means caring for the land, but I think also helping to plant and care for institutions and ideas that benefit land and community together. History along the Chatteleton Road would seem to support that idea.



## OLD FIELD PINES ON THE NORFOLK DOWNS

Many people have a perception of the pre-colonial New England forest as dominated by white pine. This is in part due to many early chroniclers using the name pine as a catch-all for conifers – hemlock, fir, spruce. It also has to do with the legendary “Kings” pines, used by the Royal Navy for masts, which sparked controversy in the colonies. Pine was prized from the beginning, as a strong and easily worked wood, and the navy’s demands were another part of colonial frustration. The tree became symbolic then, but it never dominated our forests before European arrival.

Pine became much more a part of the forest here with the abandonment of agricultural land, beginning in the mid-nineteenth century. As western land became available, and transportation improved, people abandoned the rocks and hard winters of the New England uplands, for the deep, rich soils of the Midwest. Old fields began to regrow quickly, and white pine did very well in the conditions left in the wake of farming and pasturage. White pine has a lightweight, wind-dispersed seed that travels far and invade abandoned fields better than hardwoods. Grazing animals also prefer hardwood seedlings to conifers, thereby selecting to the benefit of the less tasty.

You have likely seen old field pines, as they tend to make up large blocks of even-aged trees, and they have a distinctive look because of insect infestation. Growing in open, sunny conditions leaves pines vulnerable to the white pine weevil which love the warmth of the very top of the sapling. The weevil kills the terminal leader – where you would place the star on a Christmas tree – and this forces side branches to become dominant. These too then become vulnerable, and this process continues over years, leaving open-grown trees with lots of branches on multiple trunks. In the late nineteenth and early twentieth centuries, these kinds of stands dominated and became the foundation of the New England box industry for decades.

One of the most interesting areas of old field pine in town is the area that was the original 9-hole golf course, known as the Norfolk Downs, between what is now the curling club and Tobey Pond. Many know that the building locally known as “the Shelter” was the clubhouse for the course, but it’s hard today to imagine the links which covered about forty acres. In a previous article, I wrote about the kettle and kame topography left by Glacial Lake Norfolk, and this is where they used to play golf. It must have made for challenging play.

The land began to regrow in the 1940s, and pines did well in the open conditions and the glacial deposits that make up the area. Before long there was a young forest and there is little trace today of the fairways, tees, and greens that were used for decades. The one telltale sign is that, despite the dramatic topography in the area, the ground is smooth, just as it would be in abandoned pasturage or tillage.

As you make your way to Tobey Beach this summer, look into the forest and try to imagine how it appeared a hundred years ago. Before there was an official town beach, swimmers checked in with the head caddy and then walked to the pond. Where the gate is now, there was likely a good view out over the pond and hills behind. Today it is yet another forest curiosity left in the wake of past land use.



## PLANNING FOR THE FUTURE

Outside of the Great Mountain Forest administrative offices here at Mountain House, this summer's interns are building a small raised-bed garden after work. It's a bit late in the season, but even if they don't get much of a yield this year, the bed will be ready for next spring. They are working as much to create an opportunity for next year's crew as they are to grow vegetables for themselves. With any luck this will be an ongoing thing here on the mountain – something to enjoy and utilize in years to come.

Across the street our interns are working on a longer term project, though one in a similar vein. The acreage over there is old regrown pasture for the most part, and isn't much to look at presently. White pine seeded in, as it did in so many old fields, but most of it was damaged by weevils when it was young. Even more so than the trees on the old Norfolk Downs which I described last month, weevils left these pines with wavy boles and scraggly branches that make them look like something out of Dr. Seuss. The understory also has a significant amount of Japanese Barberry, a problematic invasive. All this presents a challenge for managing this part of the forest.

One thing the area does have is vigorous young sugar maples in the understory – what foresters refer to as advanced regeneration. Sugar maple is shade tolerant, and these trees seeded in under the



pinus, likely from the large old trees that we tap along Canaan Mountain Road. Getting them to grow into productive trees seemed an obvious goal, but this will take thought and planning to be successful. This is the project that this year's interns are starting.

Earlier this spring, Jody Bronson (GMF Forest Manager) gave them the task of creating and carrying out a management plan for three or four acres in this area. A management plan for something this size is essentially a road map for a single project. It delineates what they feel they have to work with, and describes the desired end result. The stewardship plan that Jody writes every ten years for GMF is a management plan too, but one that defines larger goals. It's strategic rather than tactical – a master plan within which other smaller ones like the interns project can be fit.

Earlier this summer the barberry in the area was treated with herbicide. The use of chemicals was necessary, given how established the invasive had become. Without control in a situation like this, the disturbance caused by working in the area would have given the barberry the opportunity to spread even further. Barberry is very opportunistic.

The next step in the process, and the one that is ongoing now, is to establish the boundaries of the managed area and to inventory the species and number of trees. Then it will be a matter of marking those trees to be taken and those to be left. Because the young maple have grown in the shade, they cannot withstand a sudden flood of heat and light, so the thinning will have to be done gradually and carefully. Much of the pine will go, but it will have to be done in stages over the course of several years.

Ideally there would be a use for any wood taken out during the thinning, like the Norway spruce that were thinned this last winter along the Chatteleton Road, that will be used for a new cabin. In the case of these damaged pines, however, there is little use. With a larger managed area they might be chipped for mulch or biomass, but it would not be economical to bring in trucking for something this small. These trees will be left to put nutrients back in the soil, potentially stacked to create brush for animal habitat.

In a private management plan, this might be all that happened, but on this project there will be an educational component as well. The interns are working on several ideas, including demonstrations of various tapping methods in this young sugarbush – taps and bucket, and tube line. There may be interpretive signs to explain in more detail what I'm sketching here. These decisions will be theirs, and they are still working through ideas.

This year's group will start the process, but this will be an ongoing project as years go by. It will take in more acreage and different management techniques over that period too, just as there may be more raised beds out behind the offices in years to come too.



## STORIES IN A MAPLE BOARD

I'm thinking about the beauty of wood this morning – about the revelation that comes when a seasoned board comes out of the planer and shows itself truly for the first time. This is the moment when wood gives advice. When it hints at what shape it would like to take, as cabinet or table, or some other useful and beautiful thing. In woodworking you often impose the needs of the project on the materials, but the most satisfying moments come when you listen; when you work *with* the wood, and show thankfulness for what the tree has given to the work at hand. This is thankfulness for the woodlands that supply our constant human need as well. And when you are really lucky connects you back to your community.

I'm building a table with a friend this week, for a benefit auction later in the summer. We're using maple boards that were cut a half mile from the shop where we are working, a sugar maple that was tapped for years by my friend and earlier sugar-makers. Then the town cut it for safety reasons, and the log made its way to his mill. When he cut it open, the old tap holes were clearly visible in the butt log, and it became obvious that these boards had a story to tell. This table has become our way of giving the tree the chance to do that, and to keep something alive in memory which has passed out of the world.

The table will be a record of decades of harvesting, and will show some of the conditions under which that was done. Trees are generally tapped a few feet off the ground, so most of the holes are clustered toward the bottom of the boards. There are a couple of holes higher up, however, marking

those years when the snow must have been particularly deep here in Norfolk. Deep snows are less usual than they once were, but the boards will keep some of that in memory.

The table is also the record of how the tree reacted to all those years of human use. Each tap hole has a long dark streak that runs up and down the grain for seven or eight inches, and this is the remnant of the tree's natural defenses at work. The streaks are the aftereffect of ambrosia fungus getting in through the tap hole, causing the tree to alter its chemical makeup to fight the fungus. Years of this left its marks on the wood, an annual cycle of healing for each harvest that put syrup on other tables.

We wound maple trees when we tap them to make syrup. It's worth remembering that. They must heal afterward, and like so much wounding and healing in life, it doesn't show much from the outside. These boards are a record of that process, but they are also a record of the fact that the tapping was done well, because the streaks are isolated and regular. Trees are compartmental organisms, and can wall off areas, altering some cell structure without affecting sap flow or overall health. If the tapping hadn't been done well, the fungus would have won the battle and the tree would not have lived to the old age it did.

Care in its use meant that this tree lived long enough for other funguses to find their way in through natural wounds in fact. These have left areas of semi-rotted wood in our boards, something that woodworkers call spalting. Spalted wood is sound enough to be used, but has fungal patterns and staining reminiscent of some aged cheeses. It too is a record of interplay of tree and the world outside – of intertwined life cycles in the natural world, other than that of human use.

All these scars are beautiful to me, and the tap holes most of all. I love figured wood because it speaks of character and individuality. The tap holes in these boards, however, also speak to me of community and history. We know whose sugarbush the tree came from, and so we know the cast of characters who might have drilled these particular holes. The table has already elicited stories about the past here in Norfolk, and many people who are no longer around. Maybe this will continue when this table finds a home after the auction, a record of the community that relied on the tree, as well as what happened to this one individual.





## AUTUMN BEWITCHMENT

I took a walk south of Yale Camp yesterday, enjoying both the warm weather and the beautiful fall leaves. Despite dire predictions that the drought would hurt the colors – made as much by me as anyone – the season has been spectacular thus far. And as I walked the old Chatteleton Rd., I caught sight of another sure sign of the passing of the season. Amongst all the other color, there were the first signs of the yellow blossoms of the witch hazel – those bewitched denizens of the forest understory that put out their flowers in late fall, instead of the spring.

Just as trillium and mountain laurel herald the beginning of the season, so witch hazel marks its end, though it's unclear why it waits so long to begin reproducing each year. There are certainly disadvantages to this behavior, not the least of which is the dearth of pollinators as the weather gets colder. No insect takes the risk of specializing in witch hazel, and only about one percent of its flowers ever set fruit. The various flies, beetles, and bees who do visit are winding down their season, and are not nearly as efficient as earlier in the year. The low fruiting rate is also because fertilization of the ovule – something that most plants do right after pollination – doesn't happen in witch hazel until the following spring.

Given all this odd behavior, people in the past can be forgiven for thinking that witch hazel was under some sort of enchantment. And maybe this is what provoked them to investigate the shrub's medicinal qualities, though it's more likely that they learned about using the plant from Native peoples. It's possible too that the connection with American Indian medicine is what prompted Europeans to think in terms of witchcraft, but whatever the case, use it they did. Then and now its

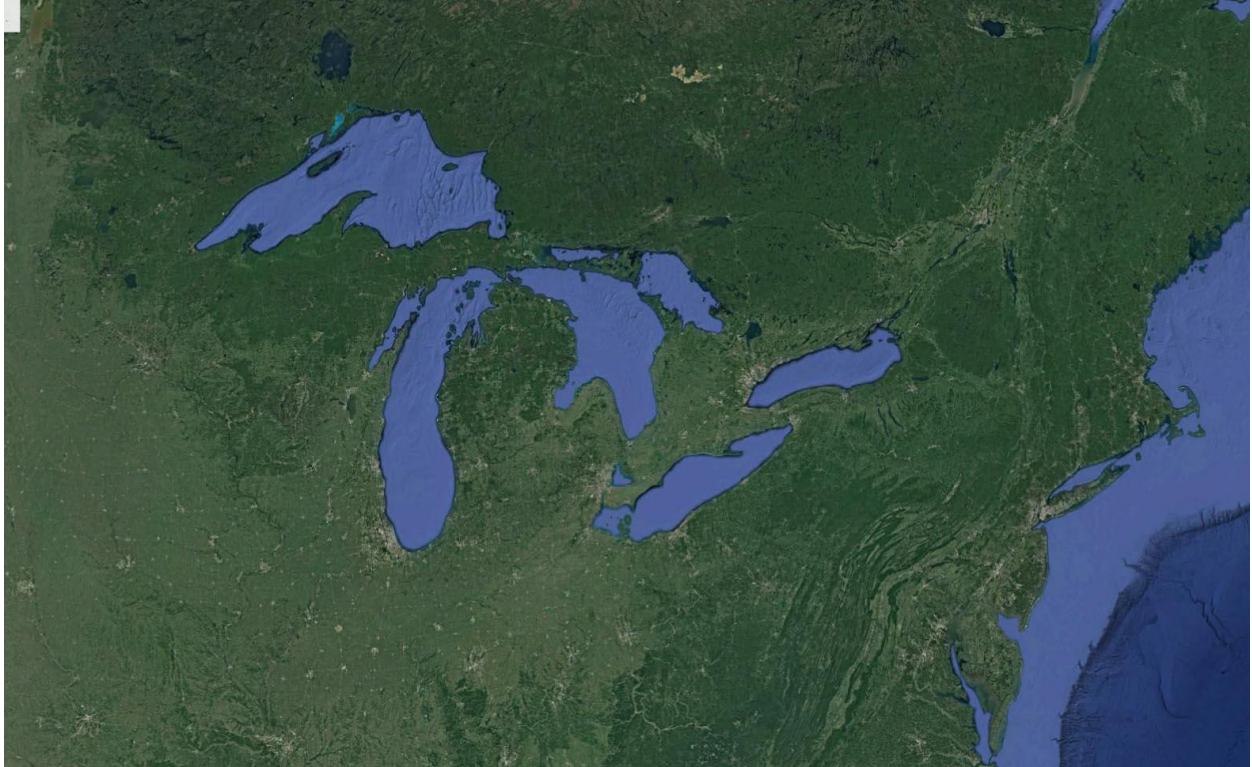


astrigent qualities make it an effective remedy for all sorts of skin condition and insect bites, and despite all its idiosyncrasies, witch hazel remains a significant forest product in Connecticut.

The familiar clear liquid you get at the pharmacy is distilled from the bark and wood, and the process is basically unchanged since the Dickenson Company began operations in Essex, Connecticut, in 1866. Stems are cut in the winter and then chipped before being shipped to the distillery for processing. When the chips have given up their essence, they are turned into mulch, so little goes to waste in processing. In addition to the liquid form, witch hazel is used in other skin products, like deodorant and soap, and Connecticut is still the biggest processor, thanks to the ready access of raw materials and the long history of production here.

It was about fifteen years ago that these witch hazel bushes south of Yale Camp were harvested, and if you look closely you will see the stumps beneath the new growth that has come up since. GMF contracted Norfolk local Gene Buyak, a witch hazel specialist, to conduct the harvest. He cut and piled the brush into one-ton stacks and then used a chipper borrowed from the Dickenson Company to process about 200 tons of raw material. This was GMF's first adventure in harvesting witch hazel, but the plants have now regrown to a point where another harvest is possible.

Witch hazel sprouts vigorously from cut stumps, and so makes up for its odd reproductive habits. It particularly likes the edge of fields, or in the case of these bushes the sides of an old road. One unforeseen side effect of the last harvest was that the machinery tilled up acorns which have sprouted into nice young oak trees. So if there is to be another witch hazel harvest, these will have to be protected. Both witch hazel and oak are valuable forest products that we will manage for the future, even as we enjoy the colors and the odd bewitching yellow flowers of fall.



## GEOGRAPHY OVER THE GUARDRAIL

I am a connoisseur of secondary roads, because they give the up-close view of the human and natural landscape that I have highlighted so often when writing about things in and around Norfolk. Interstates by contrast are not really *of* the places they cross, and for this reason I do my best to avoid them. They leave me feeling separated in space and time, and missing most of what there is to see.

Sometimes there's no choice however, and such was the case with driving to Minnesota this August. Speed meant more time canoeing the Boundary Waters, so I made peace with I-88, I-86, and I-90, and I have to say I gained some grudging appreciation for the macro view those roads offered. Even at 75 mph, the landscape tells a story.

Driving west from Norfolk toward Albany means leaving New England, and there are great historic and cultural differences between these places, though they are not apparent over the guardrail. Crossing the Housatonic and Hudson, however, also means crossing a small section of the Great Valley of the Appalachians, and the visual changes in geography because of that are dramatic.

The Great Valley comprises features as far south as the Shenandoah and Tennessee Valleys, and as far north as the Champlain Valley, sitting in morning shade each day, until the sun crests the Green and Smoky Mountains – the Berkshires too. It's the remnant of tectonic activity, and to a large extent separates the hard marbles, slates, and granites which give structure to New England, from the ground up sedimentary rock that makes up so much of western New York and Pennsylvania.

Our hills are the un-eroded remains of mountains thrown up when Africa ran over North America, beginning about 450 million years ago, when the Taconic Orogeny created something like the Himalayas here. The Acadian Orogeny, fifty million years later, repeated the show and another

hundred million years later, the Alleghenian Orogeny pushed another massif to the sky. All this action created the heat needed to cook the sedimentary rock left from ancient seabeds into metamorphic rock. This left us with our familiar conical hilltops and crenellated ridgelines, when erosion and glacial activity moved most of the overburden into the oceans to the east.

Climbing out of the Hudson Valley going west is a different story. There, one is aware of not climbing the short, steep hills of the Berkshires anymore, but the long, rolling waves of the Appalachians. From the top of one of these ridges you can see range after western range of what's left of the outwash plains of those ancient mountains. It's one of the vagaries of glaciation that ice did not reach south of Buffalo, so where in New England we have bumpy ridges of hard metamorphic rock, this region is the reverse. Ridgelines here are flat and made of eroded rubble, where contour comes from deep valleys cut into softer, fragmented materials – a landscape of hollows and not hills.

The waves of geologic outwash subside moving west, like the ocean calming after a storm, and by Chautauqua you can feel Midwestern calm approaching. The transition happens somewhere around Erie Pennsylvania. Interestingly, this puts you back into a postglacial landscape, though one without the history of tectonic up-thrust and erosion. This is a geologic landscape as quiet and earnest as the Midwest itself, where layered sedimentary rock still lies unchanged under deep soils deposited when the ice carved out the Great Lakes.

The country along the shores of Lake Erie and out into the flat farmland of northwest Ohio doesn't offer the passenger-seat geographer much to look at, but starting in Indiana the glacier left a terminal moraine, a pile of debris that marks its furthest extent. This is of interest, because throughout the upper Midwest the Wisconsin Ice Sheet left familiar kinds of terrain, a landscape not identical but reminiscent of home.

The rest of our journey to northern Minnesota followed this glacial borderland. Like New England, this is a region filled with eskers, as well as kettles and kames, along with the moraines. On the edge of the prairie, kettles are often filled with forest rather than water, for the ice melted there far longer ago and many ponds have evaporated and filled with trees. As you approach the Canadian border, however, there are many places where things look more familiar. If you replaced the dominant jack pines with hemlock, there are ponds that would remind you of Tobey, and rocky terrain quite similar to Norfolk.