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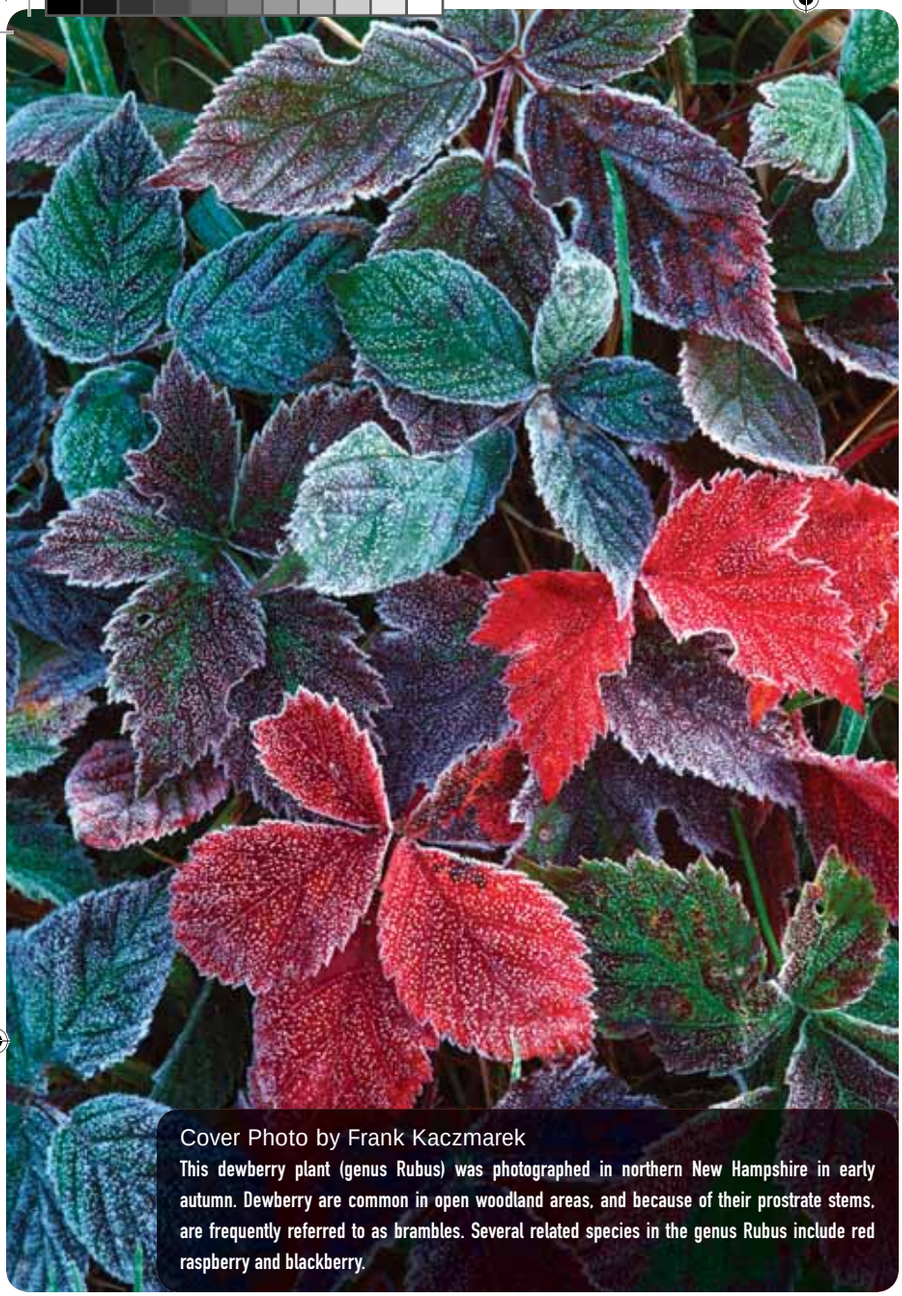


Cover Photo by Frank Kaczmarek

This dewberry plant (genus Rubus) was photographed in northern New Hampshire in early autumn. Dewberry are common in open woodland areas, and because of their prostrate stems, are frequently referred to as brambles. Several related species in the genus Rubus include red raspberry and blackberry.

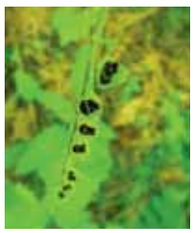
on the web WWW.NORTHERNWOODLANDS.ORG

THE OUTSIDE STORY

Each week, we publish a new nature story on topics ranging from how animals see in the dark to the production of New England's "other" syrup: birch syrup.

EDITOR'S BLOG

Like most things in life, the use-less-paper issue is neither black nor white but solidly gray. On the one hand, bless people for wanting to conserve resources. On the other hand, the go-paperless crusaders don't draw a clear enough distinction between the exploitive forest practices going on in some parts of the world and the responsible, important tree farming that's going on around here.



WHAT IN THE WOODS IS THAT?

We show you a photo; if you guess what it is, you'll be eligible to win a prize. This recent photo showed a miterwort plant (Mitella diphylla) gone to seed. Visit our website to learn more about this plant.

Sign up on the website to get our bi-weekly newsletter delivered free to your inbox.

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VOLUME 19 | NUMBER 3
FALL 2012

CENTER FOR NORTHERN WOODLANDS EDUCATION, INC.

Northern Woodlands Magazine (ISSN 1525-7932) is published quarterly by the Center for Northern Woodlands Education, Inc.,
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Subscription rates are $21.50 for one year and $39 for two years. Canadian and foreign subscriptions by surface mail are $26.50 US for one year. POSTMASTER: Send address corrections to Northern Woodlands Magazine, P.O. Box 471, Corinth, VT 05039-0471 or to mail@northernwoodlands.org. Periodical postage paid at Corinth, Vermont, and at additional mailing offices.

Published on the first day of March, June, September, and December.

For subscription information call (800) 290-5232

Northern Woodlands is printed on paper with 10 percent post-consumer recycled content.

Northern Woodlands magazine

The Center for Northern Woodlands Education, Inc., is a 501(c)(3) public benefit educational organization. Programs include Northern Woodlands magazine, Northern Woodlands Goes to School, The Outside Story, The Place You Call Home series, and www.northernwoodlands.org.

from the Center

When an undertaking is just too big for one person, folks tend to form groups. We're all familiar with this in a blue collar sense – the concept of a barn raising, say. But the idea that many hands make light work is at the heart of non-profit organizations as well. When people join together to rally around an idea, a point of view, or a mission, their collective strength can help change the status quo.

There are many groups that are devoted to the cause of forest stewardship in the Northeast, each coming from a slightly different angle. The New Hampshire Timberland Owners Association is one of the oldest. It was founded in 1911 to detect forest fires, and over the next 100 years expanded its mission to include conserving working forests for future generations through education, legislative advocacy, outreach, and cooperation. In 1944, the New England Forestry Foundation was formed to raise awareness of over-harvesting on privately owned forestland in the region. Dr. Svend Heiberg's work in silviculture led to community forums on the subject – a seed that germinated into the New York Forestland Owners Association in 1963. The Small Woodland Owners Association of Maine was incorporated in 1975, and meetings were held right in the members' forests so that they could learn from each other first-hand. Around the same time, the Eastern Connecticut Forest Landowners Association was formed. Their 300 forestland owners manage about 20,000 acres. Vermont Woodlands Association currently has 1,064 members who manage more than 350,700 acres of forestland.

Northern Woodlands is an ideological partner with all of these groups. Many of them offer the magazine to their members as an educational tool.

We were sad to learn that one of our partners, Tug Hill Resources Investment for Tomorrow (THRIFT), is disbanding after 31 years of advocacy. This landowner group, located on the western side of the Adirondacks, was founded to teach landowners about the value of their woodlands – this to counteract the threat from fast-buck developers swaying inexperienced cash-poor/land-rich residents.

THRIFT has been giving *Northern Woodlands* to its members for many years. They saw it as one way to accomplish their educational goals. When the group decided to close its doors – after making many laudable contributions – the balance of their bank account was entrusted to us to use for our work. No strings, no restrictions, just keep getting the word out, they said.

We gave them our word that we'd do just that.

The threats to the Northern Forest – from development, poor forest practices, the decline of the forest products industry, parcelization, invasive organisms, and unprecedented weather events – can seem overwhelming. Add to this the fact that private landowners, the key stewards of our forests, are aging and transferring their land to a new generation who may not share their stewardship ideals, and one can be forgiven for feeling a little uncertain.

This is why partnership is more crucial than ever. At face value, we're a non-profit with a staff of five shouting its message into the wind. But with the collective strength of our readers and partners, we're thousands strong. Small organizations, linked together through common purpose, have the power to achieve something large and lasting.

Amy Perberdy

Amy Perberdy, Operations Manager

The mission of the Center for Northern Woodlands Education is to advance a culture of forest stewardship in the Northeast and to increase understanding of and appreciation for the natural wonders, economic productivity, and ecological integrity of the region's forests.

36

24

30

34

in this **ISSUE**

features

24 Whole-House Heating With Wood Pellets
CHUCK WOOSTER

30 Where's the Peak? How Weather and Climate Affected Last Fall's Foliage
JOHN BURK

36 On the Lookout: A History of Fire Towers in the Northeast
KRISTEN FOUNTAIN

44 Why Regulated Trapping Still has a Place in the 21st Century
MIKE FREEMAN

departments

2 From the Center

4 Calendar

5 Editor's Note

10 Letters to the Editors

13 Woods Whys: A Sawyer's Lament
MICHAEL SNYDER

15 Tracking Tips: Breakfast in Bed
SUSAN C. MORSE

16 Knots and Bolts

23 1,000 Words

34 Field Work: At Work Celebrating Raptors with Mark Baker
TALBOT ECKWEILER

42 The Overstory
VIRGINIA BARLOW

50 Birds in Focus: Fat, Flight, and Fitness in a Blackpoll Warbler
BRYAN PFEIFFER

54 Discoveries
TODD MC LEISH

57 Tricks of the Trade
CARL DEMROW

63 Upcountry
ROBERT KIMBER

64 WoodLit

67 Mill Prices

71 Outdoor Palette
ADELAIDE TYROL

72 A Place in Mind
JULIA SHIPLEY

A Look at the Season's Main Events

By Virginia Barlow

	September	October	November
FIRST WEEK	The flesh of the giant puffball is delicious when it is snowy white. Off-color ones aren't so good / Pileated woodpeckers and many songbirds eat the fruits of Virginia creeper, a high-climbing vine / Joe Pye weed and boneset have finished flowering. Some asters are very showy now, especially tall white aster / Trees with leaves suck a huge amount of water from the soil. If it's not too rainy, conditions for logging may be excellent from now until leaf fall	The date of the first frost varies widely, but in our region it is now on average about six days later than it was in 1960 / As freeze-up takes place in the far north, many ducks move south through our area / The fox sparrows passing through take time to feed on soil organisms such as ground beetles and millipedes, which they find by kicking at the litter with both feet / Spring peepers are peeping from the woods, not from ponds as they do in the spring	An inconsequential fence has been enough to keep deer out of the garden – until now / Off the New Hampshire coast, minke, fin, humpback, and right whales are swimming toward the warm waters of the Caribbean / Tamaracks begin to drop their golden needles / The southward migration of black ducks peaks at this time / Most of the bird world has quieted down, though sometimes purple finch and evening grosbeak numbers rise and these flocking species can be quite noisy
SECOND WEEK	Many birds make short flight notes during their nocturnal migrations. You can hear them on a quiet night / Red oak acorns are a staple for squirrels, turkeys, deer, bear, and jays; even fishers eat acorns / Hairy woodpeckers are eating mountain ash berries / Most gray catbirds have left by mid-September / Purple blue New England asters are blooming / This year's turkey vultures have dark heads; the red, naked head comes with maturity / Moose mating season begins	Northern red-backed salamanders are mating. Their 4-17 eggs will be laid in a cluster in rotting logs or stumps next June or July / Some deciduous trees don't contribute to autumn color. Apple, sycamore, and white oak leaves change from green to brown / Star-nosed moles are digging deeper tunnels in preparation for winter. They'll stay active beneath the frost line / Most of the yellow leaves of winterberry holly have fallen, revealing the bright red berries	Deer are mating. The gestation period for whitetails is 200 to 210 days; the first fawns will appear at the end of May / The entire population of greater snow geese, about 250,000 birds, migrates south between the Hudson and the Connecticut Rivers. Look for them on large rivers / Crabapple trees are sometimes loaded with waxwings. Both Bohemian and cedar waxwing adults can subsist entirely on fruit, thanks to a short intestine and a large liver
THIRD WEEK	Hold off on cleaning out the birdhouses. Flying squirrels may have rehabbed them for use over the winter / Red admiral butterflies are heading south. They'll be back in May / Black cherries are ripe and ready to be eaten by many birds and small mammals / Peak of broad-winged hawk migration. Hundreds may be seen at a time in flocks called kettles / Monarch butterflies are flying south, but they flap so lazily that you wonder how they will ever get to Mexico	Oct. 21-22 – The Orionids meteor shower produces a max of about 20 meteors per hour. The moon will set by midnight, leaving a dark backdrop / Chokecherries and pin cherries are eaten by many birds and by bears, raccoons, foxes, chipmunks, squirrels, and mice / The earliest pair bonds are formed among wood ducks, now at or nearing their wintering grounds / The yellow, stringy flowers of witch hazel are out; it's the last woody plant to flower in the northeast	Nov. 17-18: The Leonids meteor shower has an average of 40 meteors per hour at its peak. The moon will set early in the evening, leaving dark skies for what should be an excellent show. Best after midnight / Deer hunters are taking to the woods, with visions of big-racked bucks and full freezers / Along with waterfowl, which are still commonly seen, many hardy stragglers are hanging on: robins, tree sparrows, song sparrows, and king-fishers among them
FOURTH WEEK	Chipmunks will stash away as much food as they can, sometimes much, much more than they possibly could use. They don't have a stop button / Sulphur shelf (Laetiporus sulphureus) fungal fruiting bodies grow on both hardwoods and softwoods, most commonly in late summer and fall. The pores on the underside of this prized edible mushroom are bright sulphur yellow / Fall leaf drop indicates another hormonal change in trees: it signals root growth to take over	Apple trees may not have colorful leaves, but they certainly have colorful fruit; look for foxes, deer, and porcupines fattening up on the bright red and yellow apples / Mushrooms stuffed into tree crotches? That's probably the work of the red squirrel / Now that leaves are down, owls, too, are easier to find. They often roost in groves of pine or hemlock / By now, almost all sugar maple seeds have fallen, most of them during or just after leaf fall	Nov. 27: The conjunction of Venus and Saturn. These two bright planets will be within 1 degree of each other in the morning sky. Look to the east around sunrise / Healthy bear cubs now weigh at least 75 pounds and will soon follow their mothers into winter dens / Speckled alder is the only common native shrub that has both male and female catkins on its winter twigs / Snowshoe hare are feeding on the twigs and buds of hemlock and many hardwood species

These listings are from observations and reports in our home territory at about 1,000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.

By Dave Mance III

The opposite of love is not hate, it's apathy. The opposite of a republican is not a democrat, it's an anarchist. The opposite of a beef farmer is not a vegan, but rather someone who couldn't tell you what a hot dog is made out of.

As you'll note after reading Mike Freeman's lyrical evocation of boyhood days on the trapline in the essay on page 43, the opposite of an environmentalist is not a fur trapper. And yet one could have been forgiven for suspecting as much when The Sierra Club – a 1.4-million-member national environmental organization – recently issued a policy statement affirming that it was against trapping, and sportsmen's groups across the nation rose to the bait and decried the act. It should be noted that The Sierra Club has made notable strides in the recent past in reaching out to the hunting community, and so this missive came as a surprise – and a disappointment – to those of us interested in spanning the divide. Anyone who's been to Yosemite is grateful that John Muir, founder of the Sierra Club, went ahead and met with Teddy Roosevelt on their fateful camping trip in 1903, despite the fact that Muir was on record as rooting for the animals over the hunters and Roosevelt had a pronounced Ernest Hemingway streak.

Northern Woodlands is a magazine inspired by naturalists like Roosevelt and Muir, and so when it comes to the modern rift between environmentalists and sportsmen and women, I often feel like the child of divorced parents, trying to bridge the divide. Sometimes I keen for what are, in my mind, former glory days, when nobody at The Audubon Society thought it was weird that George Bird Grinnell was an avid hunter and editor of a hook and bullet magazine, and nobody at *Forest and Stream* magazine thought it was weird that their editor, George Bird Grinnell, was the founder of the first Audubon Society.

In my more analytical moments, I can't help but try to figure out where the trust fell apart. Through history's rosy glasses, we see sportsmen and naturalists working together for limits on game seasons, to end market hunting, to protect watersheds, to create and fund state fish and wildlife agencies, for clean air, and to preserve open space, among other things.

So what happened?

For one, the environmental movement changed. While there has always been tension between conservationists and preservationists, the landmark environmental legislation of the early 1970s – the Clean Air Act, the Clean Water Act, and the Endangered Species Act – spawned a whole new crop of environmental advocacy groups who shifted the focus of the movement from the town hall to the courtroom. These national environmental groups have undoubtedly raised the standard of living for all Americans, but the centralized model has also unwittingly turned the environment into a partisan issue, while alienating many rural Americans (who, not surprisingly, didn't and don't like the idea of activists, lawyers, and lobbyists from away dictating the stewardship of rural lands).

The bigger culprit in the rift, though – call it the affair that ended the marriage – was the alignment of the environmental movement in the 1970s and 1980s with the more aggressive wing of the animal rights movement (PeTA, et al.), which put sportsmen directly at odds with some greens. Certainly fur is no different from leather or down or gelatin or glue or red #40 or any of the other non-meat uses humans have for animals, and it would be hard to argue that sustainably harvested fur from the woods is less environmentally sound than plastic fur produced in a coal-fired factory. But this objectivity has been lost in some quarters, as fur became murder and, by default, trappers became murderers. The fact that some trappers responded to this by becoming more insular – by writing off the whole environmental movement as out to get them – hasn't helped anything.

Today, sportsmen and women – particularly trappers – and environmentalists find themselves at a curious point in history. By joining forces in the early parts of the twentieth century, they were able to change the world. And yet today, the groups often find themselves in opposition, and both are in decline. Polls indicate that today the majority of Americans are opposed to trapping. Polls also indicate that when Americans are asked if they consider themselves to be environmentalists, the majority will say, flat out, "no." In 1993, 78 percent of respondents answered "yes" to the same question.

The opposite of an environmentalist is not a fur trapper; it's someone so tuned out from the natural world that they fail to notice the roadkill on the road to the mall. Most of my friends, who include a large number of sportsmen and greens, want nothing more than a simple, low-impact life on a healthy planet. So why not a future where trappers' associations partner with conservation commissions to fight the spread of invasive plants in wetlands, or monitor mercury deposition, or advocate together for open space and working forests and farms? Our national discourse may still be colored by the dorm-room battles of the 1960s and '70s; we may all be, figuratively speaking, the children of divorce. But this doesn't mean we have to make the same mistakes our parents did. NW

Thanks to Northern Woodlands' Board of Advisors

A hearty thanks to all of the people listed below who serve as valuable resources to the organization.

Mikael Batten, East Orange, VT
Darby Bradley, Calais, VT
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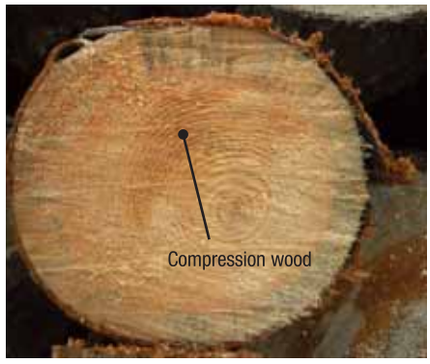
Compression Confession

We misidentified the compression wood in the picture on page 44 of the Summer issue. This was an editing error. A corrected image is at right.



Ready, Set, Glow

From **NorthernWoodlands.org**

To the Editors:

Thanks for the piece on bioluminescent fungi ["A Light in the Forest," Summer 2012]. Every fall, there is a beautiful fruiting of jack-o-lantern mushrooms (Omphalotus illudens) on my neighbor's lawn, probably growing on the dead roots of a tree that used to be there. Do they really glow in the dark, I wondered? So when they first appeared last September, I picked one, brought it home, and put it on the shelf in my bathroom. That way, I figured, when I woke up in the middle of the night, my eyes would be sufficiently adjusted to the dark that I might see the glow.

But it didn't glow.

Day 2: picked one more, brought it home, put it on the shelf in the bathroom next to the first one, but it didn't glow either. Day 3: picked one more. No glow. Day 4: picked one more. Still no glow. Day 5: picked one more. This one did glow beautifully! Day 6: picked one more. Again, a beautiful glow. Days 7 and 8: Added one more mushroom each day, and now lots of glow. Day 5 mushroom and day 6 mushroom both continued to glow. The first four never glowed. Day 8: The lawn-care people came and mowed the lawn, thus bringing my study to an untimely end. But the four mushrooms in my bathroom continued to glow for a couple more days, until they finally dried up. Whether to glow or not to glow must be a matter of maturity. (Would this observation apply to people, too?)

Marcia Jacob, Quincy, MA

War and Peace

From **NorthernWoodlands.org**

To the Editors:

I thoroughly enjoyed Rebecca Rule's article "A Brief History of Brown Paper Company," in the Summer 2012 issue. There is a little-known chapter that could be added to this article that covers this fascinating history of paper production in northern New England. During World War II, a prisoner-of-war camp was constructed in Stark, New Hampshire, to house German prisoners. During the entire operation of this camp, all prisoners worked for the Brown Paper Company – a considerable wealth of free labor. What is fascinating to learn is the relationships that developed over the course of time the camp was in operation. It's chronicled in a book written by Allen V. Koop (history professor at Dartmouth) entitled Stark Decency. I strongly urge readers to get a copy of this wonderful story. Dr. Koop, after researching the POW camp and penning the history, arranged for a reunion between surviving prisoners and the families in Stark, on the 50th anniversary of the end of hostilities. The town of Stark celebrated a get-together in the mid-1990s, and it showcases the strong ties two countries can develop after having been at war with each other.

Dick Strifert, Essex Junction, VT

Kudos and Criticism

From **NorthernWoodlands.org**

To the Editors:

Excellent work (Editor's Note, Summer 2012). One of the exercises I use in my "thinking" classes is to have students read headlines from newspapers and other publications. The question to answer is: "Is this fact or opinion?" While journalism ethics are an important consideration, so are the critical thinking skills of readers! We need to develop better "BS Detectors."

Walter Boomsma, Maine

To the Editors:

Thank you for the excellent issue, as always. One comment: rather than a full page lamenting hyperbole in journalism (Editor's Note, Summer 2012), I would rather have read a cogent article on what data do exist regarding the start and duration of sugaring season in the Northeast, sugar content and such, and what conclusions can be drawn from that data. I'll be surprised if no credible data exist. Mr. Mance seems to say that no meaningful conclusions can be drawn from data that exhibit a wide degree of variability, which in general is not true.

Timothy Budell, Westford, VT

Dave Mance responds: Your point about variable data is well taken, Timothy. (See an interesting story on page 16 along these lines.) But the problem as I see it is that "sugaring season" is a human construct. Sap runs anytime it freezes and thaws (except when it doesn't). The type of equipment you use, your available labor pool, your trees, and about a hundred other variables all have a big say in "season" length. Based on bud-break records, it may be safe to say that the window in which people can make syrup comes, on average, earlier than it did 70 years ago. But bud-break seems quantifiable to me; when a person chooses to poke a hole in a tree does not.

From **NorthernWoodlands.org**

To the Editors:

Thanks for the unequivocal debunking of the sugaring season myth. I think that your point generally applies to much of the weather that we experience. We are made aware of how the daily weather supposedly varies from normal. Really, normal rarely occurs because what is normal is for weather to vary considerably from one day and one year to the next. Simply put, if one day had a temp of zero, and the next 100, then the normal (average) would be 50. Whereas 50 never really occurred, except as a brief moment as the temp ascended or declined.

Jon Harris, Newcastle, ME

To the Editors:

For some time now I have been an enthusiastic subscriber to Northern Woodlands. Ecologically, my part of northern Wisconsin shares more with the Northeast than it does with most of the Midwest, and as a woodland owner interested in sustainable forestry, I appreciate your publication's focus on ecologically responsible rural labor.

I read your Summer 2012 "Editor's Note," however, with dismay. In that piece, you accuse largely unidentified journalists of lying when reporting on the present and future effects of climate change on maple sugaring. You condemn those journalists for

"blurring the lines between weather and climate" – an error that presumably consists of generalizing too broadly from limited data. I wonder whether, as you were doing so, you ever considered that your own personal experiences might not be an adequate measure of the entire maple sugaring industry?

Like your family, mine has made maple syrup for several generations, and this year I made one-twelfth of an average season's harvest. As for quality, it was the worst I have ever produced. I have attempted to gauge how my experience compares with those of other producers; the preliminary yield report published in the latest issue of Maple Syrup Digest (June 2012) estimates 10-20 percent of a normal crop for Wisconsin producers on buckets, with below-normal harvests across the entire U.S. and much of Canada. I would be comfortable chalking this season up to the normal vagaries of weather if not for three factors. First, the intensity of the abnormal warmth this spring was stunning; we hit 80°F in my part of northern Wisconsin in mid-March, and some places in the Midwest recorded overnight lows that easily broke the previous all-time records for daytime highs, a statistical feat that is hard to square with over 100 years of temperature data. Second, this spring was only the latest and most extreme example of an obvious (and measured) trend toward unusually warm winters and early springs – springs followed all too often in northern Wisconsin by drought. Third, these changes are in keeping with predictions made years ago by climatologists, who noted that climate change in the region would be particularly evident in warmer overnight winter lows.

You say that you do believe that people are causing the planet to warm and that "as the planet continues to warm there will be negative ecological consequences." This – your one gesture at acknowledging the seriousness of climate change – is cartoonishly inadequate. Either you were sloppy with your choice of tenses or you are stunningly unaware of the current state of ecological science.

Devin Corbin, Menomonie, WI

The Rules of Logs

To the Editors:

We love your magazine. It is excellent. When reading your "Mill Prices" segment on page 67 of your Summer 2012 issue, I noticed that no log rule or log scale is disclosed. In our area, some mills use International 1/4-inch Rule, some use the Scribner Rule, and yet some use the Doyle Scale. The differences among these log rules are important. A reader can interpret the prices accurately if the reader knows what scale was being used to report the pricing. I suspect your multistate region contains similar log scale/rule variability among mills. It would be helpful if you would always footnote which log scale or log rule is being used to report the log prices shown on the "Mill Prices" segment.

Thad Taylor, Coudersport, PA

Editors' Note: The sawlogs are scaled with the International ¼-inch Rule.

Splinter-free Favorite

To the Editors:

Add pole-saw poles to Virginia Barlow's list of uses for basswood ("The Overstory," Summer 2012). For an arborist like myself, there is no substitute. Unlike other woods used for this purpose, you will never get a splinter from a basswood pole. And as long as it is dry, basswood is incredibly light – important when you spend all day climbing wide-spreading oaks and maples.

Kurt Woltersdorf, Sanford, ME

Exotic Consequences

To the Editors:

It was surprising to see the deleterious aftereffects of the hemlock woolly adelgid minimized in "Finding a Silver Lining" (Another View, Summer 2012).

In the almost 50 years that I've been a forester and forest land manager, all I've been able to manage are forests impacted by exotic species (from non-native earthworms to garlic mustard, from chestnut blight to Dutch elm disease, from the beech scale/nectria complex to gypsy moth). The changes in species composition caused by exotic species have resulted in forests that can barely be called natural. The author's perceived "silver lining" – dead material on the forest floor, canopy gaps, early successional habitat – are features that are also created by windstorms, mortality due to native insects and pathogens, and timber management. Our forests do not need yet another disturbance creator. In reading the essay, it was easy to anticipate a sequel extolling the virtues of the chestnut blight that all but eliminated American chestnut from eastern forests. After all, the blight made a lot of low-cost wood available to industry, added dead material to the forest floor, and released higher-dollar-value red oaks to grow more rapidly.

While we may have to learn to live with exotic species and hope our forests develop resistance to them, we also need to fully understand the ecological consequences of the exotics that are impacting our forests and not try to rationalize our way to seeing a silver lining.

C.E. Schwarz, Williamsport, PA

Moisture and Firewood

To the Editors:

Thank you for the informative article on wood and moisture in the last edition of Northern Woodlands. As a novice woodworker and certified arborist, I constantly engage with wood in a variety of settings. I have questions for you concerning firewood: First, is it correct to assume that most water leaves through the ends of the wood? And if this is the case, does it matter how small I split pieces of firewood? Second, I have seen several people who leave firewood out in the rain, uncovered. Just how much water will firewood absorb in this type of setting, and how detrimental is it? Third, I keep hearing about BTUs and wood, and how hardwoods have (in general) higher BTUs than softwoods. Could you define a BTU in layman's terms, and tell me why this is important?

John Swepston, Bristol, VT

Irwin Post responds: In order for water to leave wood, it has to first get to the surface. The speed at which it can move to the surface depends on two factors: how difficult it is for water to move within the wood and the moisture gradient (how much the moisture content varies across the wood). For most species, water can move more easily with the grain than across the grain, so there is less resistance for water to move towards the ends of pieces of firewood than across the grain to the sides. However, the water has much farther to travel from the center to the end, which somewhat counteracts this.

Two other factors are important in how fast

firewood dries: the bark and the surface area available for evaporation. Part of the bark's job on a tree is to help keep the water in. The bark of some species, such as white birch, is almost as waterproof as a plastic bag – very little drying will occur through white birch's bark. Rough surfaces, be they at the ends or on the sides of firewood, increase the surface area, which increases evaporation. Splitting firewood smaller increases the surface area and increases the moisture gradient from the center to the sides, both of which hasten drying.

If you want dry firewood, it is poor practice to leave it uncovered in the rain. The amount of water it absorbs (or, if green, how much it dries) is highly variable, depending on many factors including species, air flow, pile size, humidity, and how often (and how much) it rains. There will also likely be considerable variation within the pile, with the pieces near the top typically being drier than those near the bottom.

For best drying, firewood should be stacked, with only the top covered. Plastic that covers the sides of the pile, as well as the top, keeps firewood from drying or, if it is already dry, will trap any moisture in the air and re-wet the firewood. It is amazing how often plastic sheeting or tarps develop holes that can channel a significant amount of water into the firewood. A shed with good air circulation is ideal; if not available, covering stacked wood with sound metal roofing or heavy rubber roofing membrane, appropriately weighted so that it doesn't blow off, works well.

BTU, which is short for British Thermal Unit, is a quantity of energy. It is the amount of energy needed to raise the temperature of one pound of water by one degree Fahrenheit. It's the amount of heat in your fuel. When comparing heating fuels, it is useful to know the energy that will be released by burning a given quantity.

Heating oil, propane, and firewood are all sold by volume – gallons in the case of heating oil and propane, cords in the case of wood. While there is very little difference between the heat available from, say, 100 gallons of heating oil from delivery to delivery, there can be significant differences between cords of wood. With dry wood, there is relatively little difference in BTU available between species on a per pound basis (a bit more per pound for resinous woods than nonresinous species), but different species have very different weights. A cord of seasoned shagbark hickory weighs about 4,000 pounds and contains around 25.3 million BTUs/cord. A cord of similarly seasoned eastern white pine weighs about 2,100 pounds and contains around 13.2 million BTUs/cord. All things being equal, one would therefore prefer to buy denser species: i.e., heavier cords,

Whatever species of wood you're burning, it's important to factor in moisture content, because the water in the wood will have to be heated as the wood burns. It takes lots of energy for water to be heated to the boiling point, vaporized, and then for the temperature of the steam to be raised to the stack temperature. If the firewood is frozen, there is the additional energy needed to melt the ice. You will get far more BTUs per cord with dry wood than with green wood. Some species, such as red maple, cherry, and white birch (when split) dry very quickly, whereas others, such as the oaks, dry more slowly. If you do not have plenty of time to get your firewood dry, you might be better off burning the faster-drying species.

By Michael Snyder

A Sawyer's Lament

We milled a bunch of beautiful-looking white pine logs the other day and found that many boards had red rot in them. Can you tell me more about red rot?

Red rot is the local name for a common wood decay disease. It is a trunk rot. Variously known as red ring rot, red heart, heart rot, ring scale, and pocket rot, this disease is caused by a fungus (*Phellinus pini*) with a wide geographic distribution. It exists throughout the northern temperate zone, it infects more than a hundred species of conifers worldwide, and it causes more wood decay in living pine trees than any other fungus.

While there are certainly many kinds of decay that can attack softwoods (and some can even cause reddish coloring), red rot is by far the most common in our region. As too many of us have learned the hard way, infected trees become structurally unsound and suffer significant loss of useable wood. Interestingly, it only infects living wood; it does not decay wood products such as poles, posts, and structural timbers.

Typically, red rot begins its invasion of a tree when its spores attach to a dead branch stub or a wound. It takes a very long time for decay to follow. Evidently, this is especially true when decay develops in the heartwood of trees whose leader shoots were killed many years before by the white pine weevil. The fungus may be present in recently dead (or pruned) branch stubs or weevil-killed leaders, but actual wood decay does not begin until the wood has grown over the branch scar or dead leader, usually several years later.

In pine, early stage red rot appears as a pinkish or red stain, often forming concentric rings in cross section. As decay progresses, thread-like fibers of the fungus invade wood cells and small, white, lens-shaped pockets of rot develop. In advanced stages, the wood becomes soft and lighter-colored as the fungus selectively consumes lignin, the chief structural constituent of wood cells. Over time, columns of decay develop within trunks, often extending 30 feet or more, rendering multiple log sections useless for lumber and predisposing the trunk to breakage. Decay normally occurs in the trunk, but butt rot is also common, and the rot sometimes even extends into major roots.

Damage from red rot is much greater in older pine trees, but not necessarily due to increased susceptibility. Rather, the greater prevalence in older trees is thought to result simply from longer exposure and more time for the decay to develop. Slow-growing trees also tend to exhibit more decay. This is because there is less new wood produced each year, and it takes longer for wounds to be covered, thus increasing the tree's exposure to infection. Then again, fast-growing pines are not immune.

The reddish stain on the two boards at left is red rot.

Indeed, many large, fast-growing pines have large crowns resulting from past weevil damage, which is known to increase the likelihood of red rot infection.

It is not hard to find a forester, logger, or landowner who has been gravely disappointed by rotten wood they found in logs cut from beautiful-looking pine trees. That is the hard truth about red rot. Despite the massive internal damage it causes – degrading large sawtimber trees to pulp or cull – the presence of red rot inside a tree is often very hard, or even impossible, to detect from the outside.

Still, we try. We look for swollen knots where branches were shed or pruned years before. We look for resin flow from the knots. And we look for signs of the fungus itself: brown or blackened spore-producing protrusions at branch bases, stubs, and knots, or the brownish perennial conks of the causal fungus, which usually develop at branch stubs and vary from thin and bracket-shaped to thick and hoof-like. All of these indicators suggest there is rot within.

In addition, most foresters try to develop a sense of local conditions under which red rot is most likely to occur, so that they can plan and manage accordingly and minimize disappointment. Conventional thinking holds that it is less common on good pine-growing ground and more common on poor sites.

But the reality is that red rot occurs across many sites, stocking conditions, and management strategies, and it's probably folly to think otherwise. That's because, hard as it is to accept, red rot is not merely a frustration to wood growers, sellers, and users. It is caused by a native organism with a rightful place in healthy forests, and as such it plays important – if unheralded and nonmonetized – roles in normal forest function. Don't tell a cavity-nesting bird or mammal that red rot is bad, because while it is a major irritant to us, their lives depend on rotten trees – the bigger the better.

Michael Snyder, a forester, is Commissioner of the Vermont Department of Forests, Parks and Recreation.

Story and Photos by Susan C. Morse

Breakfast in Bed

Clockwise from left: A doe at rest; look for compressed leaves and grasses in this handsome buck's bed; frozen standup tracks can be found and cleaned of loose snow with one's fingers.

Fresh tracks frozen in the November snowpack reveal where, earlier this morning, a doe and two fawns browsed on raspberry canes, red maple stump suckers, and selected mushrooms. Following their meandering trail, I also observed where the deer dug through the snow in order to find some ferns, pawed away the leafy tops with their hooves, and ate the carbohydrate-rich rhizomes.

When their brief feeding bout was over, the doe led her offspring up-slope several hundred yards to a hemlock knoll thick with thermal and concealment cover. Three oval-shaped bed sites pockmarked the snow where the deer lay for several hours while they rested and digested their food. The adaptive advantage of foraging and resting in this way is brilliant. At opportune times, day and night, a deer can feed and then retire to a secluded bed in order to minimize exposure to energy-draining weather conditions and lessen its vulnerability to predators.

The digestion of the morning's food may take as much as 30 hours and largely occurs while the deer are lying down, resting, chewing their regurgitated cud, then resting some more. A deer's four-chambered stomach works upon the plant's otherwise indigestible cellulose and lignin. Billions of microfauna break down and ferment the contents of the rumen, making nutrients available from the fibrous plant material. During winter, while curled within an insulating snow bed, a deer's digestive activities ameliorate the deepest cold; inside its body core a microbial furnace warms the animal from within.

Finding and studying deer beds is great fun, providing, of course, that we don't disturb the occupants. On dry ground, look for compressed leaves, vegetation, grasses, or soil. Circle the bed site to backlight the spot you are examining. The angled sun will enhance the visibility of the bed because the flattened surface reflects the light differently than the surrounding area. Look closely: sometimes telltale deer hairs can be found within the bed. In snow, a bed or cluster of beds will offer legible stories for interpretation and appreciation. First, notice that roughly one-third of the bed's sidewall will be smooth and concave. This corresponds to where the deer's rump and lower back were pressed. Feel this smooth area and knock on it with your fist. If the bed was vacated hours or even days before, and temperatures were below freezing, the sidewall will become frozen solid. The warm body of the cervid releases moisture from the snow, which subsequently becomes as hard as ice.

Now that you can discern where the rump and back were, look for the imprint of forelegs that were bent at the knees and folded under the body. Knee and leg impressions help us visualize the position of the deer while bedded. Sometimes hind leg impressions will show as well. If the deer was a rutting buck, we may find dark stains on the snow from the tarsal glands, located on the insides of the hind legs at the hocks. Finally, we teach our Keeping Track students to feel the base of the bed for the "standup tracks." If fresh snow has covered the bed-site details, use your fingers to probe though to the bed's hard base until you find the frozen tracks made when the deer stood up to exit the bed.

Multiple beds show where a number of deer lay down and rested near one another, but that's not all. If you inspect each bed, and determine the direction each occupant faced, you'll find that the deer faced in different directions, maximizing their collective coverage of forest surroundings with their eyes, ears, and legendary noses.

Susan C. Morse is founder and program director of Keeping Track in Huntington, Vermont.

[**BOTANY**]

Return of the Chestnut

In his New York Times best-seller A Walk in the Woods, author Bill Bryson mourns the loss of the "massively graceful" American chestnut: "There has never been any tree like it. Rising a hundred feet from the forest floor, its soaring boughs spread out in a canopy of incomparable lushness." He goes on to describe the 1904 discovery of the chestnut blight at the Bronx Zoo in New York, which spread throughout the tree's range, wiping the chestnut out within 50 years.

A Walk in the Woods was published in 1998, and little did Bryson know that scientists were already hard at work to create a blight-resistant chestnut. And it looks as if their work might be paying off. Earlier this year, 10 genetically modified American chestnuts were planted at the New York Botanical Garden (which is across the street from the zoo) in the hope that a blight-resistant, pure American chestnut will make a comeback where the tree's demise was first documented. "This is where the blight started," said Dr. William Powell, "and we want it to be the place where it stops."

Powell and Dr. Charles Maynard of the State University of New York's College of Environmental Science and Forestry have been involved with American chestnut research since the early 1980s and are the first researchers to perform field trials with transgenic chestnut trees. Their research involves growing chestnut embryos in tissue cultures, using nuts from pure American chestnut trees in New York State (trees that, although not blight-resistant, have survived by escaping the path of the blight). These trees differ from the Chinese chestnut hybrid trees that have been back-crossed with American chestnuts for years in attempts to breed a disease-resistant tree. The approach that Powell and Maynard have taken is to find a gene or combination of genes that will protect trees from the blight. The gene in the trees planted at the New York Botanical Garden is derived from wheat and contains an enzyme called oxalate oxidase, which detoxifies the lethal acid that the blight produces.

STATE UNIVERSITY OF NEW YORK'S COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY

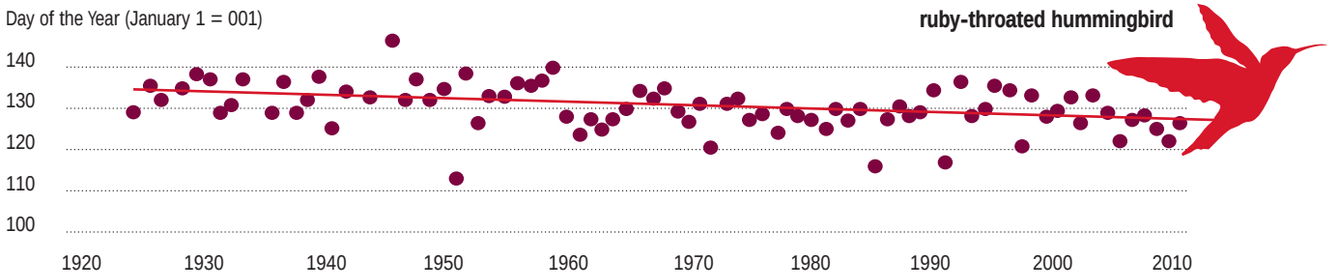
Professor William Powell with a transgenic American chestnut tree.

Maynard said the 10 trees planted at the botanical garden are "the most promising" of the over 600 transgenic trees growing in test sites around New York state since 2006. The researchers have already developed other trees to replace the original ten, should they fail. At age three, trees are inoculated with the blight, and their resistance is observed. Maynard said the team is trying out "lots of genes from different sources," so that when they have successful trees ready to distribute, they "won't be a simple clone." In other words, the chosen trees will be genetically diverse, which will increase their resistance to disease. Nuts for the project are collected from different sources for the same reason.

Looking to the future, the trees that are finally selected as the most promising for full-scale distribution will be required to go through a USDA deregulation process, due to their transgenic status. Once that happens, private landowners in the chestnut's home range will be invited to plant trees on their properties.

For more information, visit The American Chestnut Foundation's New York Chapter at www.acf.org/Chapters_ny.php.

Liz Marsden



A 90-year linear regression analysis of the ruby-throated hummingbird's spring arrival at Mohonk Mountain Preserve.

[**CLIMATE**]

The Forecast Calls for Change

At the Mohonk Mountain Preserve in New York's Shawangunk Mountains, naturalists have been collecting data on weather, spring migrants, plant life, and seasonal milestones for almost 90 years. What started as simple record keeping has become important data for those studying global climate change.

The record-keeping can be traced back to Daniel Smiley, whose relatives owned and operated the famous Mohonk Mountain House resort. Daniel started taking almost daily records of plant blooms, tree frog populations, bird populations, and other natural phenomena in 1925 and continued until his death in 1989. In all, he left about 100,000 observations, all indexed on handwritten 3-x-5-inch note cards.

Today, Shanan Smiley, a conservation biologist and collections manager at the Daniel Smiley Research center (and the wife of one of Daniel's grandsons) and colleagues carry on Daniel's work, though now they use field computers. Twice a week, they sample water from the property, record what plants are blooming and which insects, amphibians, and reptiles are out. "Wherever we are, we're taking notes on what we see," said Smiley.

A look back on the Preserve's records provides an eye-opening overview of changes in the region's ecological happenings. By plotting the data on a graph, Smiley and her cohorts have created "lines of best fit" to indicate trends in the data. (Statisticians call this a linear regression analysis.) The chart above shows Smiley's data on ruby-throated hummingbird arrival times, and gives some sense of the strengths and weaknesses of this kind of data analysis. Year-to-year variations are large; the first hummer in 1945 wasn't seen until May 25, and just five years later, one showed up on April 22. But when the data from 90 years are analyzed, the line of best fit indicates that the hummingbird's arrival is now seven days earlier than in 1925.

Smiley says that it's clear that the trend is towards warming temperatures, earlier bloom times, and earlier animal arrival dates. Consider the data for when the Mohonk Lake freezes and thaws. The dates, of course, vary from year to year, but the trend line shows that the lake's average freeze date is two-and-a-half weeks later than it was 80 years ago and its average melt date a full week earlier.

There are some significant differences in bird spring arrival times, too. While any birder anxiously awaiting her favorite warbler can tell you a bird's first appearance in spring may vary widely from year to year, the trend is toward earlier arrivals. At Mohonk Mountain, northern flicker arrival dates are averaging three weeks earlier than they did in the 1920s, those of the red-eyed vireo about a week earlier, and those of the eastern towhee a week and a half earlier.

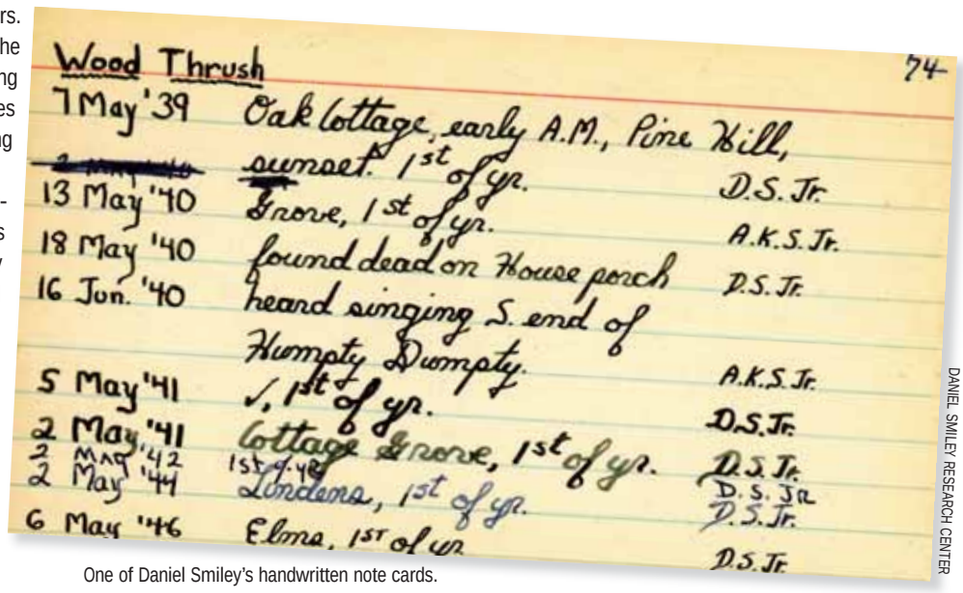
Overall, amphibians are coming out of hibernation earlier. On average, the northern gray tree frog is three weeks earlier than in 1931, the wood frog is two weeks earlier than in 1932, and the northern spring peeper is nine days earlier than in 1931.

So, can we attribute the shifts in animal schedules to human CO_2 emissions and global climate change?

"I'm really careful not to say the causes and effects," Smiley said. "What we've been careful to do so far is to just present the facts, the data."

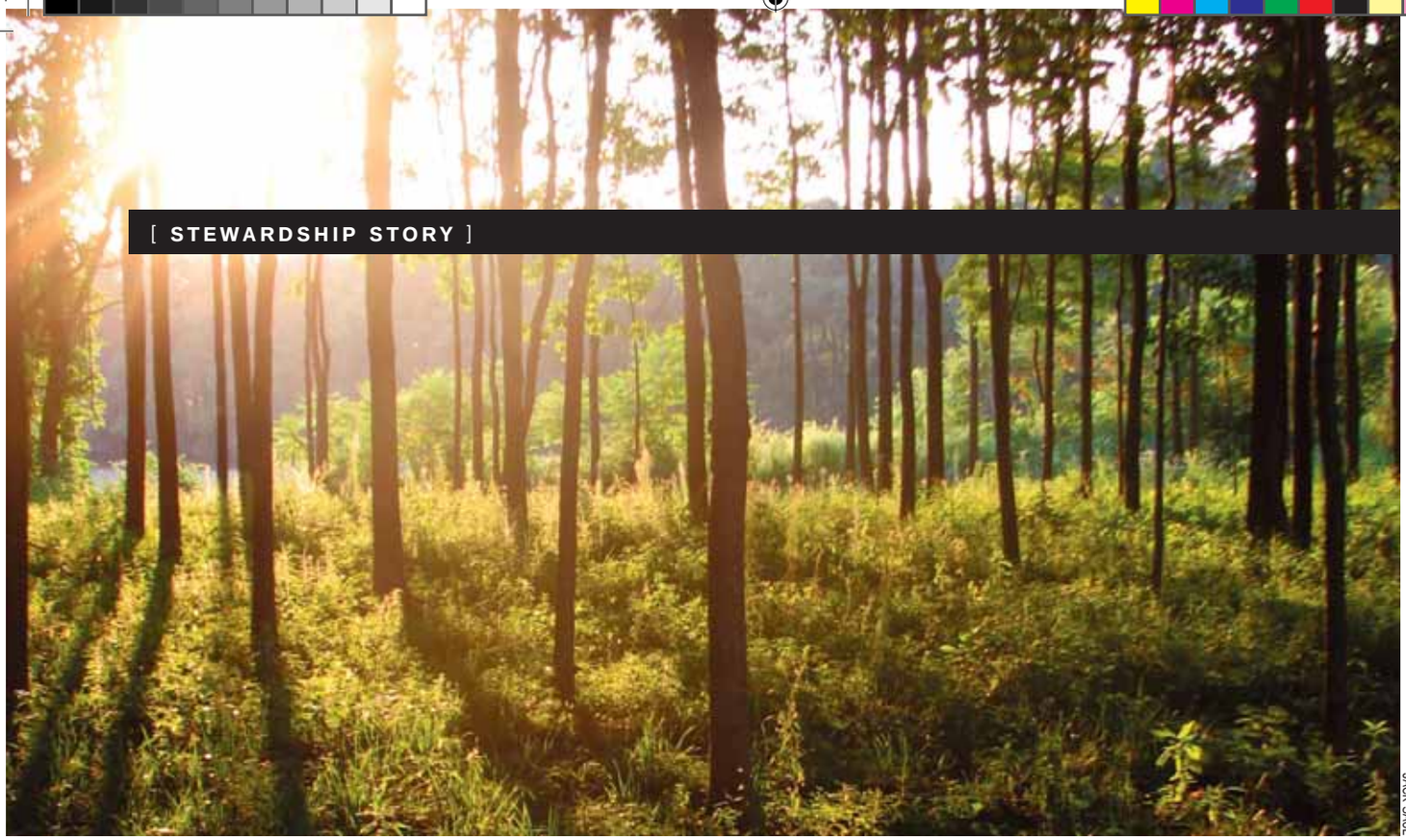
When asked if 90 years was a long enough timespan for the data collected to show definitively that the planet is warming, Smiley said, "90 years is good enough to at least show the trend."

Meghan Oliver



DANIEL SMILEY RESEARCH CENTER

One of Daniel Smiley's handwritten note cards.



JACK SAUL

Sunset on the Saul family tree farm.

At Home on the (Tree) Farm

Some might call it a plantation, and some a tree farm, but my family refers to it simply as "the farm." To the outside observer, our marginal patch of land may appear aesthetically unspectacular. Some might even dismiss its grid-like layout as a sterilized imitation of natural forest. But I am always quick to point out that where once there was nothing, now there are trees, glorious trees of all different kinds.

The project began on a sandy, infertile 22-acre pasture in Amherst, Massachusetts, once part of a 700-acre dairy conglomerate, and has since expanded to a total of 220 acres scattered in an archipelago of properties around town. On the newer acquisitions, planting and tending practices involve an industrial, systematic production methodology, including glyphosate application and brush-hogging. Recently, our innovative farm manager developed a plan to grow ginseng under closed canopies, as well as camelina and rapeseed for biodiesel in between rows of seedlings.

The original property, immediately behind the house I grew up in, remains most intimate, most known to me. The majestic trees here are the same age as I am, growing as I grow. I always feel at home among them. With an idling chainsaw in hand, I have walked past each and every tree now standing, given it an appreciative once over from roots to rustling canopy, and blessed it with permission to live. After 20-plus years in our soil, these trees have just begun to tower, and many have reached huggable diameters.

The parallel rows of oak, maple, white ash, black walnut, and black cherry run north-northwest to south-southeast, 12 feet apart. This careful spacing promotes healthy competition, allowing trees just enough room to absorb sunlight but not so much that they can grow decadently and extend their branches horizontally. To avoid being shaded out, each tree must grow straight up. Combined with yearly pruning and periodic thinning, the planting plan produces uniformly straight trunks and wood with minimal defects.

The trees require less attention with age, and for the most part the labor is deliberate and unhurried. In the early 1990s, taking up such work seemed manageable for my parents, Amherst graduates from New Jersey and Buffalo who had recently settled back in their college town. When the tract next to their home became available, my mother humored my father's dream of land ownership, and they bought the parcel, built a new house, and started sticking saplings in the ground: first spruce and fir for Christmas trees, then the hardwoods that today stand waiting to become veneer logs (or firewood, with less luck). The farm progressively became a source of agrarian groundedness that countered the stresses and abstractions of my parents' careers in finance and education.

Like many others who farm in our liberal suburban town, where education is "the industry," my parents are financially comfortable people who have opted to engage in agricultural practices without much previous experience. We are what some might call gentlemen farmers, and the Saul farm was not wholly designed to make a living. It acts as a long-term asset and as supplemental income. It's also an excuse to follow a particular way of life.

This positive balance in our lifestyle reflects a tension inherent in the Massachusetts landscape: an uneasy coexistence of suburbia with rural and forested land. During the past few decades, our state – the third most densely populated in the country – has allowed roads and residences to encroach upon its already fragmented woodlands. Fortunately, our land's designation under the Commonwealth's Agricultural Preservation Restriction program helps hold this last stage of forest succession at bay by recognizing the difference between the land's fair market value and agricultural value. The graveyard-like subdivision directly across from our home suggests the fate that our wooded lot could have met without our commitment to tree farming.

Jack Saul

Chainsaws: a Look Back

Anyone who has spent any time working in the North Woods knows the sounds and smells of a gas-powered chainsaw. That sound is music to the ears of Louis Pelletier Jr., whose chainsaw collection could staff three full symphony orchestras.

"At the last count I had around 350," said Pelletier, 70. We spoke recently at his makeshift showroom at Allagash Wood Products in Allagash, Maine, where he and his son, Louis Pelletier III, produce furniture from locally milled wood.

Chainsaws first appeared in the North Woods in the 1950s, and while you might expect that they'd have been viewed as a godsend by men accustomed to using cumbersome bucksaws and axes to fell timber, it took a while for the saws to make their jobs any easier.

"Those early saws were not all that dependable," Pelletier said. "I can remember being in the woods and seeing a chainsaw on a pile of logs and the guy working with a bucksaw."

The Sally Saw, for instance, produced by Cummings Machine Works in the 1940s, used a gas-powered motor to operate a circular saw at the end of a driveshaft and weighed about 75 pounds. Other old saws had chain bars and blades that would rotate while the motor remained fixed upright. The heaviest saws were operated on pivots mounted on legs, which allowed the operator to cut straight down much like a modern chop-saw. The upright part was key, as the old saws had float carburetors in them, like the ones in lawnmowers today.

"If the engine got tipped on its side, the carb would flood with gas and the engine would quit," said Pelletier.

Gear-driven, cantankerous, noisy, and producers of massive amounts of fumes, those original chainsaws presented tremendous learning curves for woods workers.

"Those old guys had to relearn how to cut wood and to let the motor do the work," Pelletier said. "It couldn't have been easy for them (and) there were times you could not see the guys through the smoke."

One of the reasons for all that smoke, Pelletier said, was the rich oil-to-gas ratio in the early saws.

"They were using one pint of oil to two gallons of gas," he said. "And they were using 30-weight; there was no two-cycle oil back then."

While the bulk of today's chainsaws come from the big three chainsaw manufacturers (Stihl, Husqvarna, Jonsered), back in the early days just about everyone was putting one out. Pelletier's collection includes saws by Homelite, Wright, Allis Chalmers, Massey Ferguson, John Deere, Montgomery Ward, Sears, Remington, and even Chrysler.

Regardless of the label on the outside of the saw, Pelletier said, the guts of the machines were often from the same manufacturer. "A lot of those companies bought Power Product motors and just attached handlebars and chain bars to them," Pelletier said.

His collection boasts two old military saws that ran on air pressure and were capable of cutting underwater, a diesel-powered saw, two left-handed saws marketed by Porter Cable, and an example of the only chainsaw built in Maine, which was produced by D.D. Terrill in Bangor. But there do remain some unfilled spaces in his collection.

"In the 1950s there was a saw called the Turbomatic that ran on a float with a torque converter and no clutch," Pelletier said. "It had heated handlebars and was called the Delorean of chainsaws (and) there are probably only two left in the world."

Then there's the 1975 KMS4 made by Dolmar Sachs with a Wankel rotary engine that operated with no pistons. "I'd really like to find one of those, too," he said.

Julia Bayly

JULIA BAYLY

From top: Louis Pelletier Jr. holds a 1940s-era Sally Saw; before the advent of the diaphragm carburator, motors had to remain in an upright position; D.D. Terrill Saws were the only chainsaws made in Maine.

BEN LORD

Caution: Forest May Contain Nuts

A Primer on Foraging Wild Nuts in the Northeast [1]

The anthropologist Richard B. Lee once asked a San hunter why his people had not abandoned foraging to settle down and plant crops like their neighbors. I have always loved the response: "Why should we plant when there are so many mongongo nuts in the world?"

As a modern-day forager, I see nuts as the holy grail of wild plant foods. Man cannot live on greens alone, or stalks and shoots for that matter. As nutritious and tasty as these foods may be, the foundation of a foraging menu must be dense in energy, rich in calories, and satisfying to the kind of hunger one develops during a day on foot looking for things to eat. Wild nuts do just that. And just as some invisible alchemy in garden tomatoes makes store-bought tomatoes taste like Styrofoam, there is no comparison between the flavor of wild nuts and the over-salted nut-products that are produced in some distant factory. Foraging for nuts does not disappoint, but, like gardening or hunting, it takes time and practice to master.

Though early birds get the worm, early worms often get the nut. Plants produce nuts to give their seeds an energy boost upon germination. This confers a considerable advantage to seedlings that germinate in a shady forest, but it also attracts hungry animals.

To outwit hungry mouths, many nut trees have evolved the ability to act like an oil cartel: they fix the market. Across a region, nut trees create cyclical boom and bust years. During bust years, populations of nut-eating animals are kept in check. During boom years, so many nuts fall that nut-eaters cannot possibly consume them all. Focus your harvest on species that have produced abundantly, and save the excess for lean years. My family is always tripping over boxes of nuts in our boot room and basement, but the upside is that we get to enjoy black walnuts even in years when the trees produce no nuts at all.

When I started foraging, I was surprised to find that it was such hard work. Many authors, in their zeal to extol the benefits of wild foods, highlight only the finest points: we're told that wild food is free, available everywhere, tasty, and among the most nutritious foods that you can put in your mouth. While all of this is true, wild foods are spread out over a much wider area than your garden and, despite my search for the exception to this rule, don't come preprocessed.

The work involved is different for different nuts, but it always means shelling. Often the right tools can help. I've never bought elaborate nutcrackers, but a sledgehammer, a nut pick, and a vice are useful for opening black walnuts and butternuts. My favorite tool is a pair of wire cutters that snap precise pieces from difficult shells. Beech and hickory nuts are impractical to shell individually and so were traditionally processed for oil and stock.

Nuts have a complex chemistry, and like any food, some of those chemicals are great for you, while some of them are not. Hickory nuts, butternuts, and hazel nuts are all palatable right off the ground and require no more processing than the removal of their shells. Beechnuts are a tasty autumn nibble, but they contain the mildly toxic compound fagin. No need to worry about it. It would take an awful lot of beechnuts to make you sick, but it's probably one reason beechnuts were traditionally pressed into oil, which does not contain the offending substance. Acorns, the Northeast's most abundant nut, contain large amounts of tannins. And although the acorns of white oaks contain a slightly lower tannin content, it is a myth that they are edible right off the ground or require less processing. All acorns must be shelled and either boiled or leached. Anyone who has tasted cakes or breads made of acorn flour, however, will tell you that time invested in leaching is worthwhile.

In early October, when nights begin to chill, it is time to head to the hardwood forests, stoop to the ground, and search for the same delicacies that our ancestors sought. As you gather acorns or hickory nuts into your basket, you are repeating motions that have sustained thousands of generations of humans on every inhabited continent. Perhaps, amidst the bounty of a generous mast year, you may find yourself wondering why those ancestors ever turned to planting, with so many fine nuts in the world.

Ben Lord

Interested in learning more? Following are some books I recommend on wild nuts and foraging.

Ancestral Plants by Arthur Haines (Anaskimin, 2010)

The Forager's Harvest by Samuel Thayer (Forager's Harvest Press, 2006)

Nature's Garden by Samuel Thayer (Forager's Harvest Press, 2010)

NUT	**Beech** American beech (Fagus grandifolia)
SEASON	Late September.
SIGNS OF RIPENESS/ QUALITY	Fallen from the tree.
HARVESTING	Many nuts are sterile and empty. Fertile nuts look noticeably more plump.
BEFORE CRACKING	Little preparation necessary. Nuts usually fall easily from their prickly husk.
CRACKING	Wire cutters, knife, or kitchen shears.
COOKING & EATING	Raw in small quantities. In large quantities, nuts should be roasted or pressed for oil.

			
Oak (Acorns) Many species (Quercus spp.) All acorn species in our region contain tannins, but all are edible.	**Hickory** 8 species – not all are edible. Best are: Shagbark hickory (Carya ovata) Mockernut hickory (Carya tomentosa)	**Walnut** Black walnut (Juglans nigra) Butternut (Juglans cinerea)	**Hazel** American hazel (Corylus americana) Beaked hazel (Corylus cornuta)
Usually start in mid-September. Nuts that fall earlier are usually bad.	Late September – early October. Early nuts are usually bad.	Late September – early October.	Ripen in late summer. Keep an eye on them: the squirrels snatch them up pretty quickly.
Fallen from the tree and loose from the cup.	Fallen from the tree.	Fallen from the tree.	The husk is still green, but the top of the nut inside is light brown and the bottom is a creamy white.
Watch for weevils. Some collectors (see Thayer) can identify good and bad acorns on sight. However, a float test will reveal many bad (floating) acorns.	Gathering later in the season may increase the proportion of nuts with fully developed kernels.	Easily gathered in quantity when available.	Watch for worms and sterile (i.e., empty) nuts. Some people are irritated by the hairs on the husk; wear gloves if you intend to harvest a lot.
Preparing acorns is a complicated process, far more than can be adequately covered here. Take some time to educate yourself about the details of acorn preparation.	Dry to split husks, then remove by hand.	Rot husks off in a shallow container over several months. Break off what remains of the husk. Rinse and dry. (Caution: Inky dye in the husk stains clothes and skin.)	Dry until husks shrivel, or bury and rot husks for about one month. Remove husks by hand or work in a sack until husks separate.
Regular nutcracker, hammer, or rock.	Regular nutcracker, hammer, or rock. Some foragers claim that striking the correct place on the shell leaves the kernel intact.	Sledgehammer, vice, or rock. Some individuals run over nuts with a car. Using wire cutters and nut picks helps to remove stubborn kernels.	Regular nutcracker, hammer, or rock.
All acorns must be leached of tannins either by boiling coarsely chopped nuts in multiple changes of water or by soaking and decanting finely ground nuts in cold water. Leaching is complete when nuts are no longer bitter. Dry and grind into a flour that, when mixed with wheat flour, makes remarkable baked goods.	Straight out of the shell or roasted. The cultivated pecan is a hickory and has a similar flavor. Hickory milk is a soup stock made by crushing shells and kernels together, soaking for several days, and decanting the liquid.	Delicious raw (butternut is reminiscent of banana). Can be soaked to deactivate phytic acid, an antinutrient.	Straight out of the shell or prepared like their cultivated cousins.

SUSAN C. MORSE, BEN LORD, PAUL WRAY, BEN LORD, PAUL WRAY

1. To the botanist, and to champions of precise language everywhere, peanuts aren't nuts – nor are pine nuts, cashews, walnuts, or Brazil nuts. To qualify as true nuts, the fruits of a plant must be dry, surrounded by a hard and woody wall, indehiscent (a smug botanical word that loosely translates as difficult to open), and contain a single seed. True nuts include acorns, hazel nuts, and chestnuts. In popular use, however, the word nut has come to mean anything tasty that comes in a hard shell from a plant. With apologies to the writers of botanical dictionaries, the latter definition will be employed here.

Photographer Chris Mazzarella loves to capture the movement of nature in his photography, and the dispersal of cattail parachute seeds offered him the perfect opportunity to do this. "I took this photo while paddling on the Connecticut River last fall. I still remember trying to keep my kayak stationary on the moving water while waiting for a gust of wind to make this scene come to life."

Whole-House Heating with Wood Pellets

Renewable Energy with the Convenience of Fossil Fuel

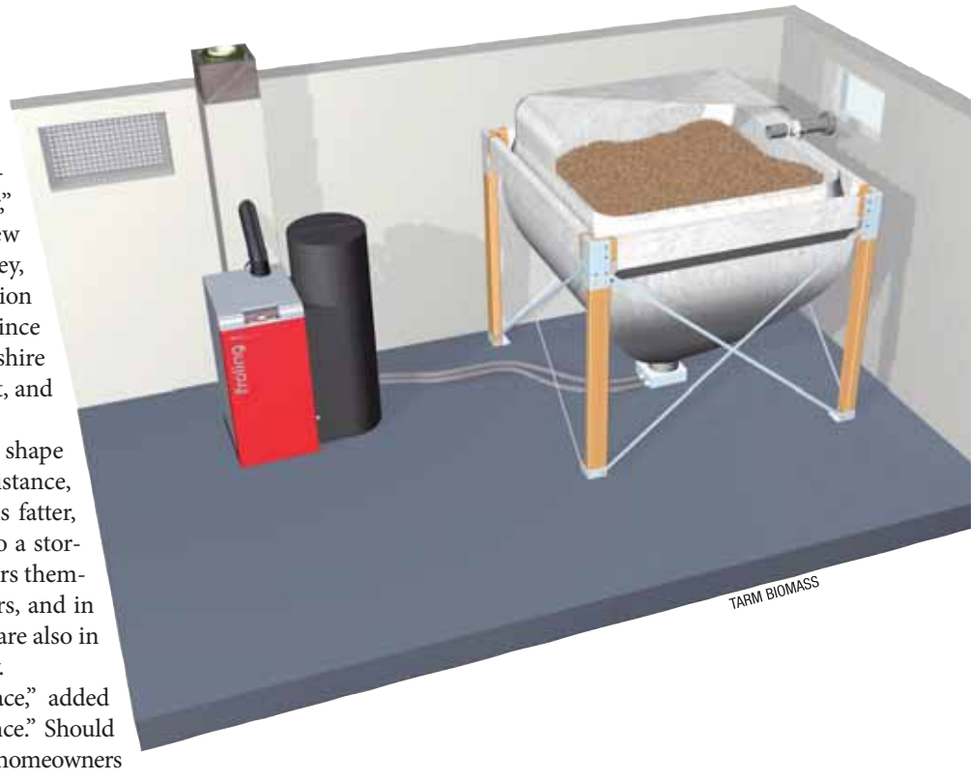
By Chuck Wooster

It's a scene you've undoubtedly witnessed many times: a fuel truck lumbers up to a house, the driver attaches a hose to the house's fuel tank, several minutes go by while the fuel is transferred, then the driver tucks the bill inside the storm door and heads off to the next stop. No muss, no fuss.

Now picture that same scene again, only this time with a twist: the fuel being delivered is wood pellets. Increasingly, homeowners across the Northeast are doing just that – taking delivery of a locally produced, renewable source of energy, delivered right to their homes with the ease and convenience of oil and propane.

Pellet stoves have been common in the Northeast for decades, providing companion heat to woodstoves or even heating entire houses from furnaces in the basement. But the popularity of pellets has been limited by three things: the pellets have typically been sold in 40-pound bags that require hefting and handling, either by you or by a neighborhood teen coerced with cash; pellet stoves have needed to be refilled on a regular basis, making them impractical as a primary heat source when you're away for the weekend or on vacation; and the capital cost of pellet systems for central heating have been much higher than the comparable systems running on heating oil or natural gas.

At least two of these problems have now been successfully addressed. Which brings up the question: has the age of convenient, renewable heat finally arrived?



Bulk delivery comes of age

"There isn't a blank spot on the map of the entire Northeast where you can't get bulk delivery of pellets from at least one manufacturer," said Charlie Niebling, general manager of New England Wood Pellet, headquartered in Jaffrey, New Hampshire. "Pretty much the entire region is now served by at least two manufacturers, since besides our company [with mills in New Hampshire and New York] there are mills in Maine, Vermont, and Pennsylvania."

Pellet delivery trucks are similar in size and shape to oil and propane delivery trucks, and from a distance, it's hard to tell the difference. Mainly the hose is fatter, because the pellets are blown from the truck into a storage hopper. In some cases, the pellet manufacturers themselves make the deliveries directly to homeowners, and in others, independent fuel dealers (many of whom are also in the oil and propane business) handle the delivery.

"We now have redundancy in the marketplace," added Niebling, "which is critical to consumer confidence." Should supplies from one mill or one dealer be interrupted, homeowners can always call someone else, which has a stabilizing effect on both supply and prices.

And what about those prices? Pellets are now averaging $225 per ton delivered, a price that varies somewhat depending on your distance from the nearest mill. Assuming you use six tons of pellets to heat an average-sized house in an appliance that is 85 percent efficient, you'd spend $1,350 for the year. For comparison, that would be equivalent to about $2,600 worth of oil (750 gallons at $3.50/gallon) or $2,750 of propane (1,100 gallons at $2.50/gallon.) Pellets, it turns out, are half-price heat, trailing only cordwood as the least expensive way to heat your house.

Anatomy of a wood pellet

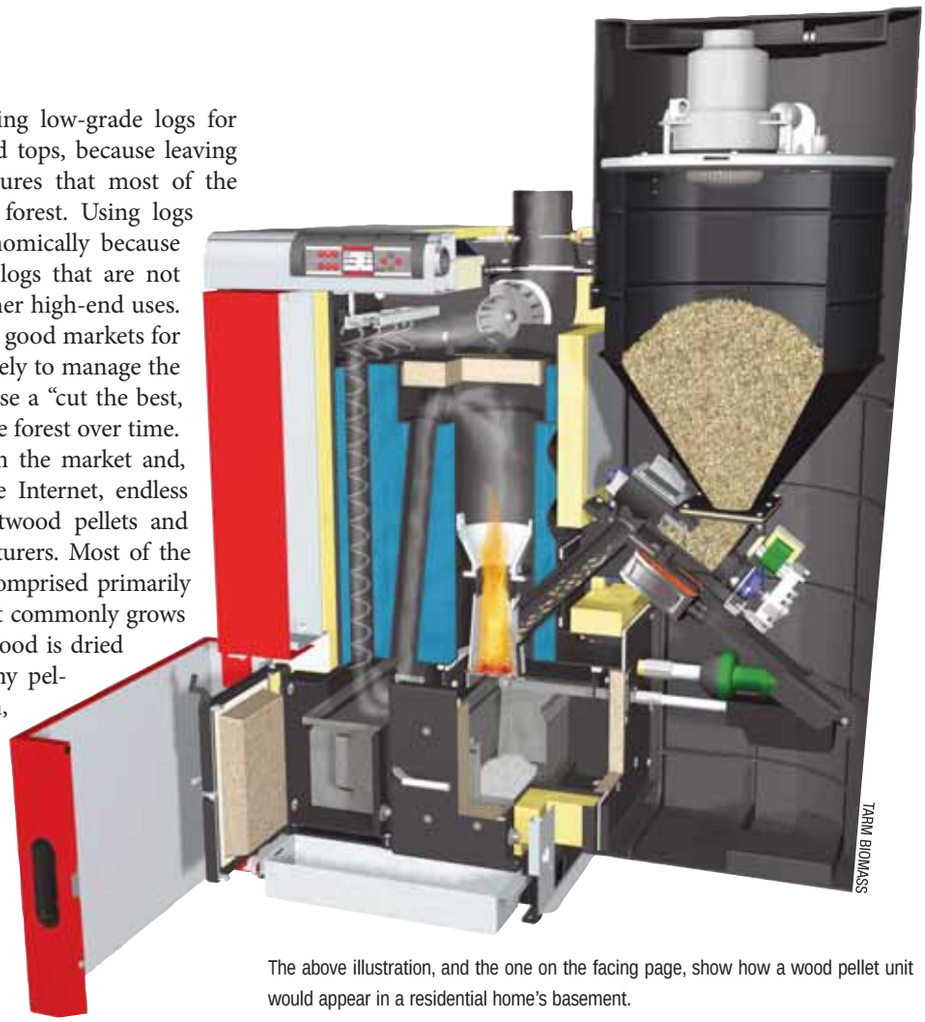
Wood pellets, whether sold in bags or delivered by truck, are made by grinding wood into sawdust and then compressing that sawdust into uniformly sized pellets. No glue or other ingredients are used – the lignin in the wood becomes glue-like under pressure and holds the pellet together. A wood pellet, in other words, is just a chunk of firewood in different form, drier and more dense. A ton of wood pellets contains roughly the energy equivalent of a cord of firewood, depending on the species and moisture content of the firewood, but takes up only about half as much space.

Most pellets are made either from clean sawmill waste or from whole, debarked logs that are chipped especially for pellet making. Though many people think that pellets are made from waste wood, which is to say, tree tops and limbs left over on a logging job, this is generally not the case. Pellet manufacturers want to produce a fuel that leaves very little ash behind, and since bark and twigs contain many compounds besides cellulose and lignin, they are less desirable for making high-quality pellets because they produce more ashes.

Photos from left: Testing for ash content, packaged pellets, and chips ready to be made into pellets at the New England Wood Pellet Plant.

From an ecological perspective, using low-grade logs for pellets is better than using limbs and tops, because leaving limbs and tops in the woods ensures that most of the nutrients in a tree remain in the forest. Using logs instead of limbs is also better economically because it provides a market for low-grade logs that are not otherwise suitable for furniture or other high-end uses. If landowners and land managers have good markets for the less-valuable logs, they are more likely to manage the forest in a balanced way and not just use a "cut the best, leave the rest" approach that depletes the forest over time.

There are many brands of pellets on the market and, if you take a few moments peruse the Internet, endless discussion about hardwood versus softwood pellets and East Coast versus West Coast manufacturers. Most of the pellets produced in the Northeast are comprised primarily of hardwood, since that is the forest that commonly grows here. Whether hard or soft, all of the wood is dried and compressed, meaning that most any pellet is suitable for most any application, provided the source material is clean and that the manufacturer is reputable. Softwood contains more resin than hardwood, so pure softwood pellets will burn hotter and faster and produce more ash than pure hardwood pellets. Most manufacturers use a blend of the two to capture some of the benefits of both.



The above illustration, and the one on the facing page, show how a wood pellet unit would appear in a residential home's basement.

Is there enough wood to go around?

In 2010, New England and New York burned about eight million green tons of wood for biomass of all types, including wood pellets, firewood, and wood chips. That same year, our forests generated about 55 million green tons of new growth. In a report titled "Heating the Northeast with Renewable Biomass: A Vision for 2025," the Biomass Thermal Energy Council (BTEC), a pro-biomass lobbying group, found that of the 55 million tons of annual growth, 17 million tons were in no-cut reserves or were otherwise unsuitable or unavailable for harvesting, 15 million were cut for pulp and paper, 8 million were cut for sawlogs, 8 million were cut for biomass, and 7 million were available for harvesting but weren't cut.

While different people have different ideas about how our forests should be managed, it's clear that there is a fair bit of additional wood that could be harvested, without cutting more than is growing each year, and without logging in wilderness areas or other lands that are currently off limits. If you added the 7 million tons of uncut new growth to the 8 million tons that are currently cut for biomass, you'd nearly double the amount of wood available for wood pellets, firewood, and chips without depleting the forest.

Looking ahead, if the pulp and paper industries continue to decline as their manufacturing moves offshore, and if you move half of their 17 million tons of green wood to the biomass column, you will have tripled the supply of wood available for heating, again staying well below the annual growth. The amount of the region's heat that comes from wood would rise from 4 to 12 percent. While these estimates depend on many factors, such as paper-making economics and the attitudes of private landowners (who own the majority of the wood in the Northeast) toward timber harvesting on their lands, it is safe to say that pellet use could greatly increase without any major change in our current harvesting levels.

A typical pellet system

Scott Nichols owns Tarm Biomass in Lyme, New Hampshire, which has been selling and installing wood- and pellet-burning central heating systems since the early 1980s. "You don't need a woodshed for pellets," he says, "but you do need a silo or a bin in the basement" to take advantage of bulk delivery. The silo looks like a typical silver-colored grain silo and is most often used in commercial applications. For homeowners seeking a less industrial look, cloth bags that hold 5 tons or more and sit in a wooden cradle can be installed in most basements, with just a hose leading outside for filling. "The truck pulls up, and the delivery itself is pretty boring," said Nichols.

In addition to the fuel bin or silo, you need the boiler and an auger or vacuum system for moving the pellets from the hopper into the boiler. Nichols recommends installing a hot-water storage tank so that the boiler heats the tank and the tank heats the house. "Thermal storage reduces cycling of the boiler [turning on and off] and improves the exhaust emissions," he added, though quickly noting that pellet systems exceed all EPA standards, even without the storage tank. "It's more a question of burning the pellets as cleanly and efficiently as technology allows."

As with fossil-fuel boilers, pellet systems need to be checked and cleaned once per year. On top of that, the homeowner needs to empty the ash drawer every two to four months, depending on heat load and the type of pellets burned. Compared with a woodstove or even a gasifying boiler, the ash buildup is minimal.

All in, with the boiler, the hopper, the auger, and the storage tank, the total system cost can reach $20,000, with installation on top of that. Eliminating the storage tank might save $3,000-$5,000, but even so, the capital costs of installing a pellet-burning system are formidable. Figure on $15,000 to $25,000 for everything.

A typical system for burning propane or heating oil might cost around $5,000, plus a thousand or more for installation. And now you know why, even though pellets cost only half as much as fossil fuel, the technology has yet to take off. The break-even point for a typical homeowner is at least 10 years.

Capital punishment

"We're getting to this critical mass where people know about pellets, and they want pellets, but when they see the cost [of installation], they're not so sure," said Nichols.

Charlie Niebling of New England Wood Pellet agrees: "The capital cost is the tough nut. The companies that want to make pellets happen are really thinking creatively about how to make it happen, because if you can address the higher capital costs, there's a very compelling return on investment. The fuel price is so much lower."

New Hampshire launched a boiler rebate program in 2010 for the lesser of either $6,000 or 30 percent of the installed price and quickly received more applicants than they had funding available for. The program was extended into early 2012 and may be extended again. The issue for the state is simple economics: New Hampshire businesses and homeowners ship more than a billion dollars out of the state each year buying heating oil. If even a fraction of that could be redirected to locally produced wood pellets, the economic impact would be enormous. "Pellets play a double role – not only through equipment sales but also on the fuel-savings side, which will, in the long run, be more important to the New Hampshire economy," Nichols said.

Vermont currently offers a $1,000 rebate, and both New York and Massachusetts are working on programs of their own. The Federal government offers a $300 tax credit.

The bigger breakthrough may be that a number of Northeast states are in the process of adopting PACE programs, which stands for Property Assessed Clean Energy. A homeowner takes out a loan for a pellet system (or other clean-energy improvement) and repays the loan along with their annual property tax payments. The PACE loan runs with the house, not the owner, so the payback is enjoyed even if the house is sold along the way, a major benefit in a country where a typical family moves every five years. Meantime, the pellet system is net cash positive from year one because the fuel savings are greater than the loan repayment.

Who are the customers?

The prime mover right now is economics," said Nichols. "The more oil you burn, the faster you repay your equipment costs. Most of our customers are commercial building owners, or owners of large homes, or people who are able to make the investment."

The lack of basic awareness among consumers is also an issue, Niebling said. "People simply don't know that the bulk delivery option exists. And the companies trying to develop this market are small and undercapitalized and not flush in marketing dollars." Both men agree that the typical pellet customer these days is motivated by more than the cost of fuel, be it concern about climate change or a desire to keep their money within the local economy. Throw in a handful of aging woodchucks grown tired of feeding the woodstove, and you have a cross-section of the customer base.

But there is an example of a place where that cross-section includes a much larger slice of the population. Finland has a population similar to that of the Northern Forest region, a long tradition of forest-products utilization, 90 percent of the land in forest cover, and no domestic source of fossil fuel. The Scandinavian country is in much the same boat we are in when it comes to energy.

Ten years ago, 400 households were heated by wood pellets in Finland. Today that number is 25,000 and growing rapidly. Pellet systems are still dwarfed by the number of homes heated by solid-wood boilers or wood-fired district heating systems that supply whole villages, but bulk-supplied pellet systems have become the go-to choice for replacing oil-fired furnaces and boilers in Finnish homes, many of which were installed in the aftermath of World War II and are now wearing out.

Finland does not subsidize pellet systems but does tax carbon emissions, and the nation is party to the renewable energy goals set by the European Union. But while their economic environment may be different, their logistical environment is similar and demonstrates that wood pellets have the capacity to work on a large scale.

It takes a village

Beyond the economics, there is a barrier to the widespread use of pellets here in the Northeast, and it is significant: social acceptance. Few people want to be the first ones on their block to try something new, and fewer want to run the risk of making a significant investment in a heating system that turns out to have been a mistake.

"The first five homeowners who came into our program came reluctantly, even though there were very generous subsidies that basically covered the full cost of the boilers," says Mike Wilson, senior program manager at the Northern Forest Center, a non-profit based in Concord, New Hampshire, that promotes long-term stewardship of the Northern Forest through sustainable economic development. "There was very high wariness – people felt that this was a brand new technology. They wondered if they could get pellets, and they wondered whether there was someone who could fix it if it went down."

Wilson's group, in collaboration with Maine Energy Systems (a supplier of both boilers and pellets) and the Berlin Better Buildings energy efficiency program, launched the Model Neighborhood Project in Berlin, New Hampshire. The goal of the project is to foster a community where pellet heat is the norm and not the exception.

Seventeen bulk-supplied pellet systems have been installed in Berlin homes as of August, with 13 more in the works and an overall goal of 40. Several public buildings and community facilities are being retrofitted as well. "Right now we have a waiting list," Wilson says. "People in town know someone who has a pellet system, and they want one, too. It's been really interesting: the project has completely changed the receptivity to these systems. At least at a local level, we've seen that the development of even a small reference population can have a huge effect on getting people over the psychological barrier."

People who want to see how the systems are performing can view live data on the Northern Forest Center's website (www.northernforest.org), which tracks both individual homes and how much Berlin is saving as a community.

Once the Berlin project is up and running, Wilson's goal is to create a Model Neighborhood Project in each of the four Northern Forest states. The theory is that the biggest reason so few people heat their homes with pellets is that so few people heat their homes with pellets. Achieving a critical mass of pellet users is the key, both logistically and psychologically.

"The switch to a high-efficiency pellet system provides benefits on many levels," said Wilson. "It saves homeowners money. It helps support demand for low-grade wood and good landowner management. It reduces greenhouse gas emissions. And, fundamentally, it keeps 100 percent of our heating dollars circulating in the local economies of the Northern Forest states. And that's when we start to see the full benefits of pellet heat accruing."

Chuck Wooster is a farmer and writer in White River Junction, Vermont, and a frequent contributor to Northern Woodlands.

Photos from top: a delivery truck ready to load up at Maine Energy Systems in Bethel; a New England Wood Pellet bulk truck making delivery to New Hampshire Audubon in Concord; a residential home delivery of wood pellets.

NORTHERN FOREST CENTER

NEW ENGLAND WOOD PELLET

TARM BIOMASS

Where's the Peak?

How Weather and Climate Affected Last Fall's Foliage

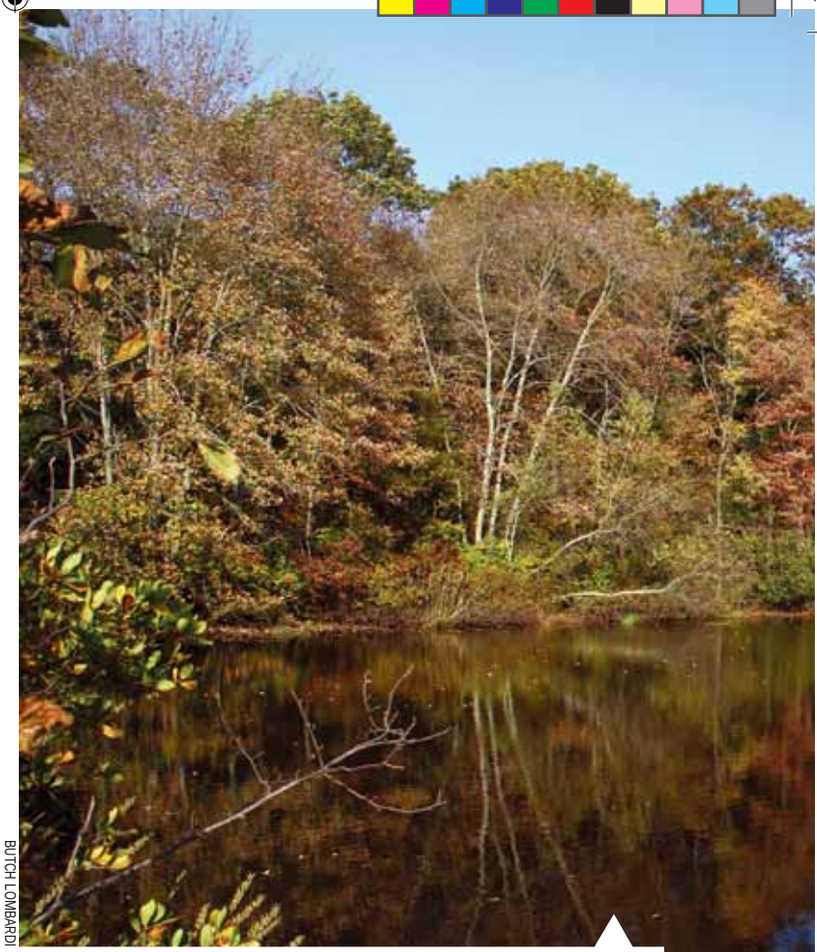
By John Burk

"Excuse me. Is this . . . the peak?" This query, from a perplexed tourist whose family had traveled from Italy to enjoy New England's world-renowned foliage last fall, rather appropriately summed up the unusually drab autumn of 2011. Indeed, during my travels around New England, the lack of color was a regular topic of conversation. The ramifications of the poor season extended beyond aesthetics. Foliage tourism is a billion-dollar component of New England's economy and October is an especially crucial month for the region's travel-related businesses, many of which have suffered from the recession and Hurricane Irene.

While it was of little consolation to leaf peepers, the 2011 foliage season served as a useful reminder that leaf color is intricately related to weather and climate on both long- and short-term scales. Annual variations are the norm, especially given New England's notoriously fickle climate – this is why forecasting "the peak" is tricky. The strange foliage of 2011 reflected a series of unusual weather events throughout the growing season, beginning with a spring that saw record precipitation and flooding in the Northeast.

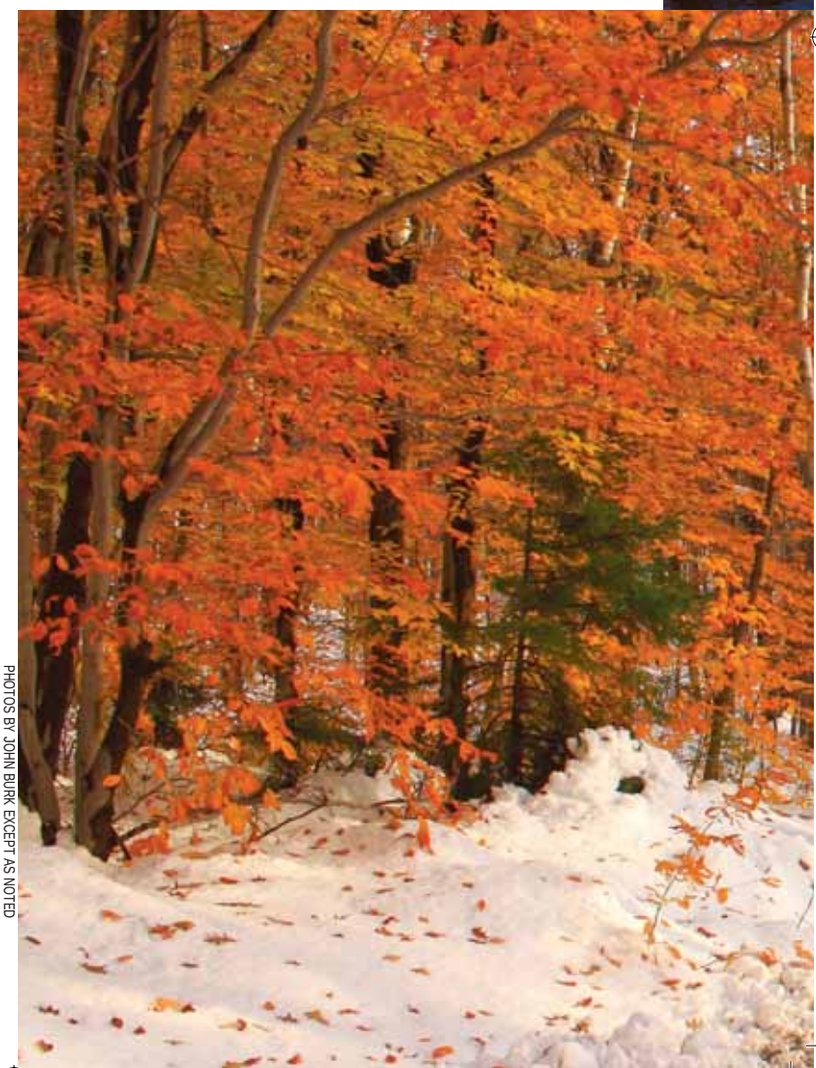
Maples are arguably the region's most iconic foliage species, and in 2011, the normally vibrant red and orange hues were conspicuously absent in many areas of the Northeast. Many maples were affected by anthracnose, a fungal disease that causes leaves to discolor and fall prematurely (symptoms include brown spots and markings on veins). It is present every year, but thrives during cold, wet springs such as last year's. Ash, sycamore, oak, elm, birch, beech, and hickory all have their own form of anthracnose. Fortunately, though affected trees often look rather sickly and many people feared their ornamentals had died, anthracnose rarely kills trees.

In addition to anthracnose, many sugar maples were stressed by a high seed year. During these times, trees devote more energy and resources to ripening seeds at the expense of producing colorful red and orange pigments, especially in the seed-covered upper branches.



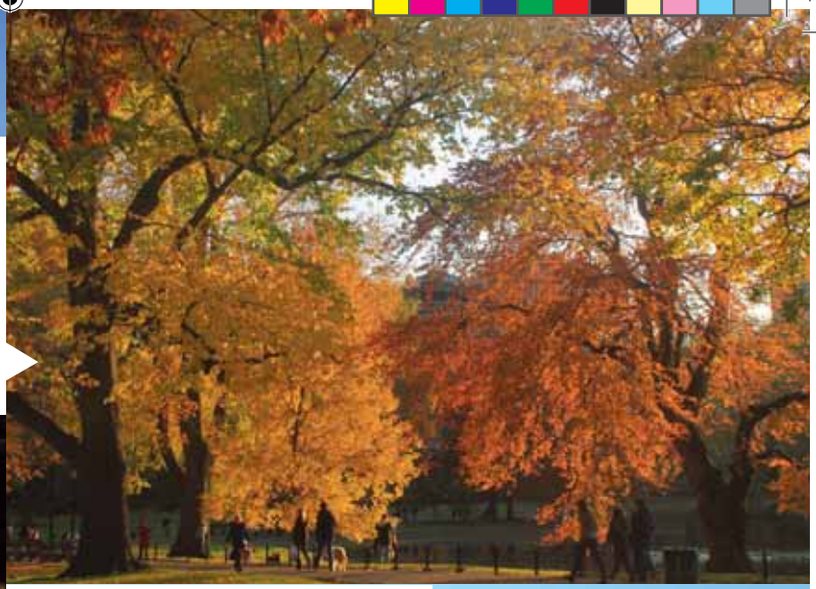
BUTCH LOMBARDI

The winds of Tropical Storm Irene deposited ocean salt on trees and shrubs many miles inland in southern New England, causing cell and tissue damage to leaves.

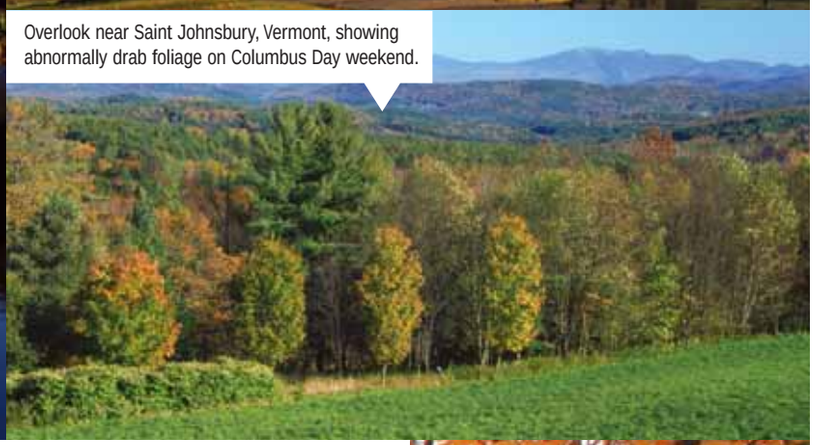


PHOTOS BY JOHN BURK EXCEPT AS NOTED

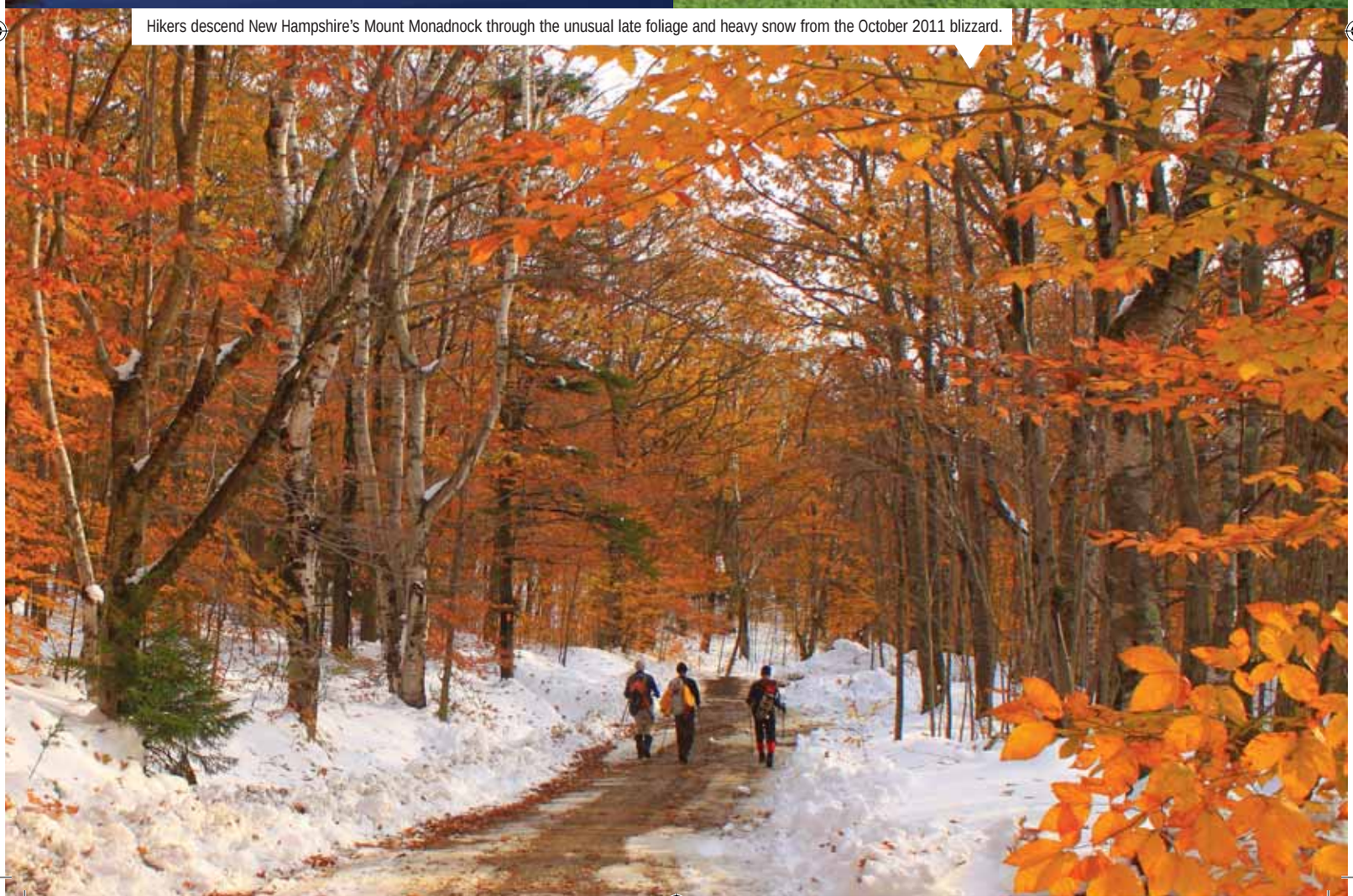
This peak-season foliage in Boston Common's Public Garden occurred in mid-November. Due to the mild season, foliage was visible in Boston as late as the week before Christmas.



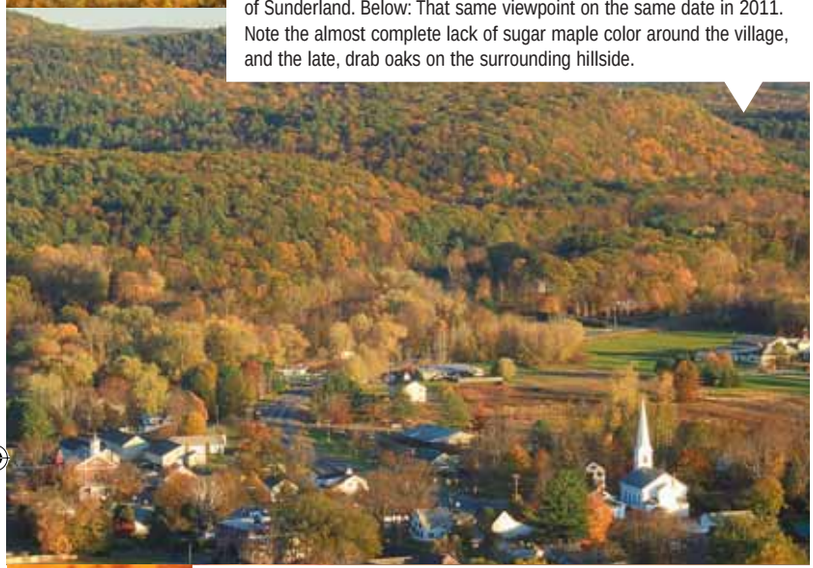
Overlook near Saint Johnsbury, Vermont, showing abnormally drab foliage on Columbus Day weekend.



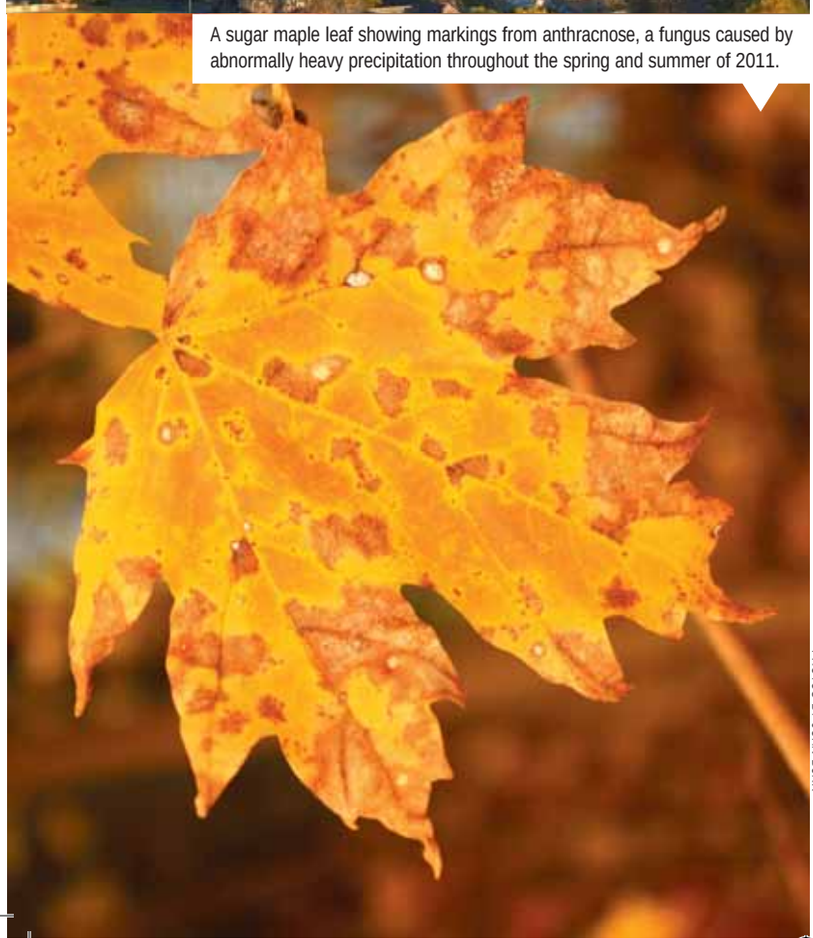
Hikers descend New Hampshire's Mount Monadnock through the unusual late foliage and heavy snow from the October 2011 blizzard.



Above: Photo taken October 26, 2010, of the view from Massachusetts' Mount Sugarloaf looking east across the Connecticut River to the village of Sunderland. Below: That same viewpoint on the same date in 2011. Note the almost complete lack of sugar maple color around the village, and the late, drab oaks on the surrounding hillside.



A sugar maple leaf showing markings from anthracnose, a fungus caused by abnormally heavy precipitation throughout the spring and summer of 2011.



PHOTOS BY JOHN BURK

This process is evident in autumn when individual trees have colorful low branches with early leaf drop higher in the canopy.

As summer drew towards a close, a variety of other fungal diseases made their marks on the hillside. Aerial surveys in Vermont, for instance, documented 25,000 acres of birch defoliation caused by septoria leafspot. In southern New England, the winds of Hurricane Irene deposited ocean salt on trees and shrubs many miles inland, causing cell and tissue damage to leaves. The damage was greatest in Rhode Island and southeastern Massachusetts, on the east side of the storm track, which receives less precipitation in tropical storms than areas to the west; here there was little rainfall to rinse trees and mitigate the effects of the salt. Late-dropping species such as oak and beech lost their leaves as much as two months early.

Where leaves were left undamaged by fungi or insects, they were affected (or perhaps more accurately unaffected) by abnormal weather. Autumn 2011 began with a prolonged period of unseasonably mild weather, including a summery Columbus Day weekend when temperatures soared into the 80s. While the weather was ideal for hiking and traveling, the lack of cold, frosty nights significantly delayed the onset of fall foliage in many areas. After an abrupt interruption from yet another unusual event – the Halloween blizzard that caused widespread forest damage and power outages – the mild weather resumed and continued into the winter months. Groves of oaks and beeches offered colorful displays well into November in areas of southern New England, and in the greater Boston area foliage was visible on some trees as late as the week before Christmas.

While the mild autumn of 2011 was related to a global La Niña event, when cool Pacific Ocean temperatures cause warm, moist conditions in the Northeast, it also was consistent with a long-term climate trend. According to data recorded by the weather station at Harvard Forest in central Massachusetts, the date of the first frost has become progressively later over the past half-century, especially during the past 20 years. Research and observations by Dr. John O'Keefe, who has been monitoring phenology (the relationship between phenomena and climate) at Harvard Forest for the past 23 years, show that several species have been dropping their leaves later during this time.

So far, the weather in the months leading up to the 2012 foliage season has been the opposite of that in 2011, with record-breaking warmth and below-average precipitation, apart from a short rainy period in mid-spring. These conditions bode well for preventing a repeat of the fungal diseases that were widespread in 2011, though a prolonged dry spell can cause stressed leaves to brown and fall prematurely. The National Weather Service Climate Prediction Center's long-term forecasts indicate that above-normal temperatures are likely to continue in the Northeast through the autumn, which would likely continue the trend of late foliage. The general prognosis looks favorable for a vibrant season, though the region's capricious weather will be the final variable.

John Burk is a writer, photographer, and historian from central Massachusetts who has published several guides and books related to the New England outdoors, including New England's Natural Wonders: An Explorer's Guide.

Story and photos by Talbot Eckweiler

At Work Celebrating Raptors with Mark Baker

Moonwink, a barred owl, was hit by a car and suffered ocular damage.

Mark Baker's friends call him Birdman, and it's easy to see why. There's the alertness in his dark eyes, his baseball cap with a bald eagle embroidered on its crown, and the fact that he often has a raptor perched on his arm. Baker is a Master Falconer, and he also runs Eagle Dream, a bird-of-prey rehabilitation organization. In addition, he travels throughout New York presenting programs about raptors to the public.

Baker's birds come in all shapes and sizes, from a softball-sized screech owl that can sit in the palm of his hand to a red-headed turkey vulture with a 7-foot wingspan. Baker is not able to fully rehabilitate all of the injured birds that come into his care. Those successfully rehabbed are returned to the wild, while birds too disabled to be released are kept by Baker to use in his programs.

Several times a month, Baker loads his birds into a special trailer and travels to schools, libraries, park events, and sportsman shows. Once there, he sets his raptors on perches or hollowed out logs and waits for people to stop and ask questions.

At such events, people often need a moment to realize they're looking at live creatures. Once they do, they pull out their cell phones and cameras to snap photos of the stoic birds. Small children tuck in their chins and stare, afraid and entranced all at once. At a recent event, one toddler needed his grandfather's assurance that the birds wouldn't eat him.

There is something arresting about the raptors Baker cares for, whether it's the shocking white of the snowy owl's coat, the subdued slate blue of a male kestrel's feathers, or the comically annoyed expression on a great horned owl's face. While we've all seen red-tailed hawks perched on telephone poles, and heard distant owl calls at night, a close look at these birds is a rare treat.

"One nice thing about doing shows is that people get the chance to see things up close that they'd never get a chance to see so close out in the wild," Baker says. "That makes a good impression because then people know there is someone out there helping them."

Handling raptors properly is no small feat, and is not to be undertaken lightly. A great horned owl can squeeze its taloned foot with 500 pounds of pressure per square inch – something you'd want to be aware of before handling such a bird.

Baker maintains four separate state and federal licenses for rehabbing, falconry, education, and breeding.

"[The licenses] are to protect the birds, to make sure they're with people who can take care of them," he says. The raptors are protected by law even after their death. It's illegal to collect or sell the feathers of any raptor (or that of most any migratory, native bird) without a special permit. When one of Baker's birds dies, he's required to either burn the body, bury it, or donate it to an institution or individual who has the appropriate permits.

There's a practical exception to feather laws that allows falconers and rehabbers to keep a few feathers to replace those that break or fall off a bird prematurely. "Imping" is the procedure of repairing broken or damaged feathers by attaching donated feathers to the bird's broken feather shaft. "Mother Nature has a way with their feathers. It's like a domino effect: when one breaks, it puts the pressure on the other ones, and then they all start breaking. Next thing you know, you've got a bird with no feathers," Baker explained.

Most raptors are apex predators in the bird world, which means the majority of the injuries Baker sees in adult birds are caused by accidents or humans. Hunting raptors is illegal, but Baker has rescued a few raptors with gunshot wounds.

One special case sticks with him. One day he answered a call about a hawk with an injured wing. "When we got the call, it was cold that day, and we walked up the hill to find a bird in the snow," he said. "If it wasn't for the snow, that bird would have died. This shot hit the bird in just a way that it shattered the whole bone," Baker said. "The only thing holding the wing on was a piece of skin. I told my wife, 'I give it 48 hours.' Forty-eight hours passed, and he was eating out of my hand. I said to myself, 'This is a bird that wants to live.'" The hawk now resides with a licensed individual who uses it in educational programs.

Car collisions are a more common source of raptor injury. Moonwink, Baker's barred owl, was hit by a car and lost sight in one eye. The bird displays remarkable calm, though it's disconcerting to look at his mismatched stare: one eye is shimmering black, the other opaque white.

Baker has a great horned owl, Blinky, who bears a similar injury. Baker thinks Blinky fell out of the nest as a hatchling, either because his parent pushed him out or a predator invaded. The injury caused permanent damage to Blinky's right eye. At public events, Blinky rotates his head from side to side in an attempt to compensate for his handicap. Of all Baker's birds,

Blinky is the most alarmed by the crowd, though Baker can settle him with a touch.

"He might try to bite me and everything else at first," Baker said. "Until I get him up to a certain level and let him get a sense of who I am. When he can feel my heartbeat, he calms right down. Then I can put my nose on his beak. That's how much trust I have in these guys." To Baker, that's what the relationship with the birds is all about: building trust, whether with a rescue or falconry bird.

Baker took up falconry, the art of hunting with a trained raptor, ten years ago. In New York, falconers must be licensed; the initial testing process takes six to eight months, the subsequent apprenticeship takes two years. It takes another five years of practice, plus recommendation from three Master Falconers and the New York State Falconry Advisory Board, to become a Master Falconer. As a Master Falconer, Baker can maintain three raptors for hunting purposes. His falconry birds are a red-tailed hawk named Ava, a Harris hawk named Bella, and a goshawk named Mia.

"A lot of people get into it, and then they find out how much work is involved and drop out. But once it's in your blood, it's there," he said.

Baker enjoys falconry simply for the experience of connecting with his raptors. Whatever his birds catch, he keeps as food for them. "Some birds are designed for squirrels, some for pheasants and ducks. It all depends. Each of these birds has its own personality, their own speed," Baker explained, smiling, his eyes far away at the thought.

New York allows licensed falconers to take a raptor from the wild and trap it while it's still young (six months) and train that bird to hunt. After a year, the falconer can release the bird back to the wild or keep it for falconry. "In the wild, about 75 percent of juveniles won't make it to adulthood," Baker said. "It's always been that way, because in the winter they're young and poor hunters. So, this way we get to give them a fighting chance."

While falconry and rehabilitation are integral parts of the work Baker loves, bringing his birds to the public and connecting people with nature is the most rewarding. At a recent event, Baker reflected on the mission of his work. "My passion is right here, seeing people's eyes light up when they see one of my birds."

Mark's strategy is an effective one: when people see the birds so close, they're drawn in and they'll start a conversation. People are awed and curious about such lethal and beautiful creatures. It must have been the same awe that first brought man and raptor together 2,000 years ago.

Talbot Eckweiler is a recent graduate of St. Bonaventure University's School of Journalism and Mass Communication. She has worked for Harvard Forest, Highstead, and Hawk Creek Wildlife Center to ensure the protection of natural resources.

Falconer Mark Baker with his red-tailed hawk, Ava.

On the Lookout: A History of Fire Towers in the Northeast

Kristen Fountain

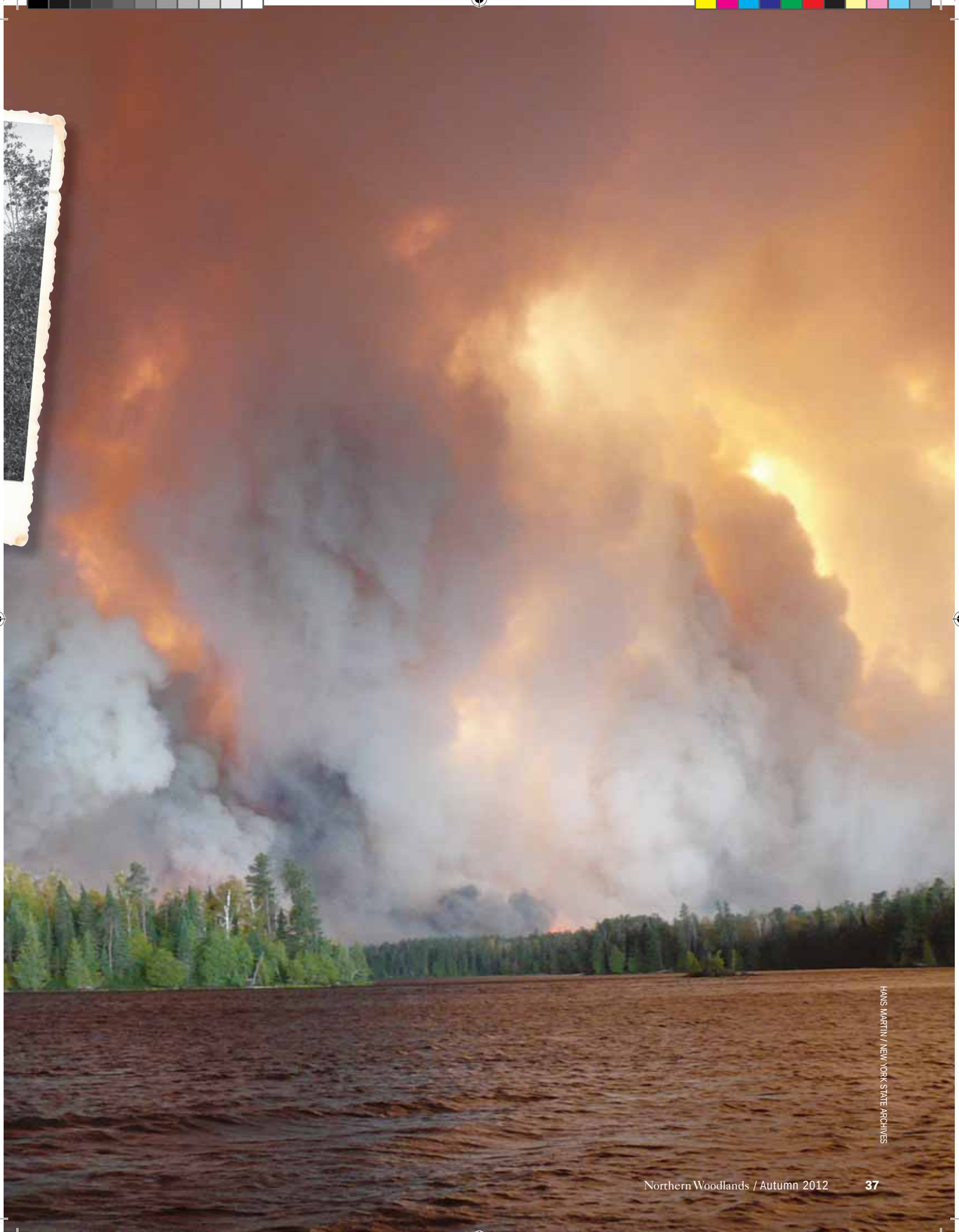
Anyone in Maine who was paying attention knew that by the end of September 1947, a forest fire was likely. There had been almost no rain during the previous 10 weeks of high summer. Newspapers and radios reported streams and lakes dropping to near-record lows. The leaves dried up early and fell in drifts that crackled and crumbled underfoot. Town fire crews and state fire lookouts were put on high alert.

Yet the fires that broke out across three southern counties three weeks later surprised everyone with their violence. Strong winds during the week of October 20 whipped several small fires into conflagrations like nothing the locals had ever seen. Austin Wilkins was supervising fire protection for the Maine Forest Service during the big fires. Fifty years later, he remembered the destruction in the newsletter of the Small Woodland Owners Association of Maine:

"It was an awesome sight to see the solid walls of roaring fire sweeping over mountains and across level areas, consuming everything in their path. At times, when the fires reached timbered growth, the flames shot into the air at heights of 100 to 300 feet. The sun did not penetrate through the thick pall of smoke for over 10 days."

The fires burned through roughly 215,000 acres in York, Hancock, and Oxford counties, including inside Acadia National Park. Since 1932, only three California wildfires have covered a larger swath of land. The flames leveled neighborhoods in Kennebunkport and Brownfield, and destroyed millions of board feet of standing timber, pulpwood, and sawed lumber in yards.

Today, we can't imagine a fire of this magnitude occurring in northern New England. Forest fires seem like something that happen elsewhere – a western or southern phenomenon. But they did happen, as evidenced by the construction of hundreds of fire towers that still stand on mountaintops and ridges across the region.



HANS MARTIN / NEW YORK STATE ARCHIVES

Devastation inspires action

In 1887, a sportsmen's club in New York's Ulster County built what was probably the Northeast's first fire tower to watch over their Catskill Mountain preserve. Two years later, the Massachusetts towns of Duxbury and Plymouth each funded a tower to help firefighters respond quickly to fires. Soon after, a New Hampshire sportsmen's club joined forces with a lumber company to construct a tower on Croydon Peak.

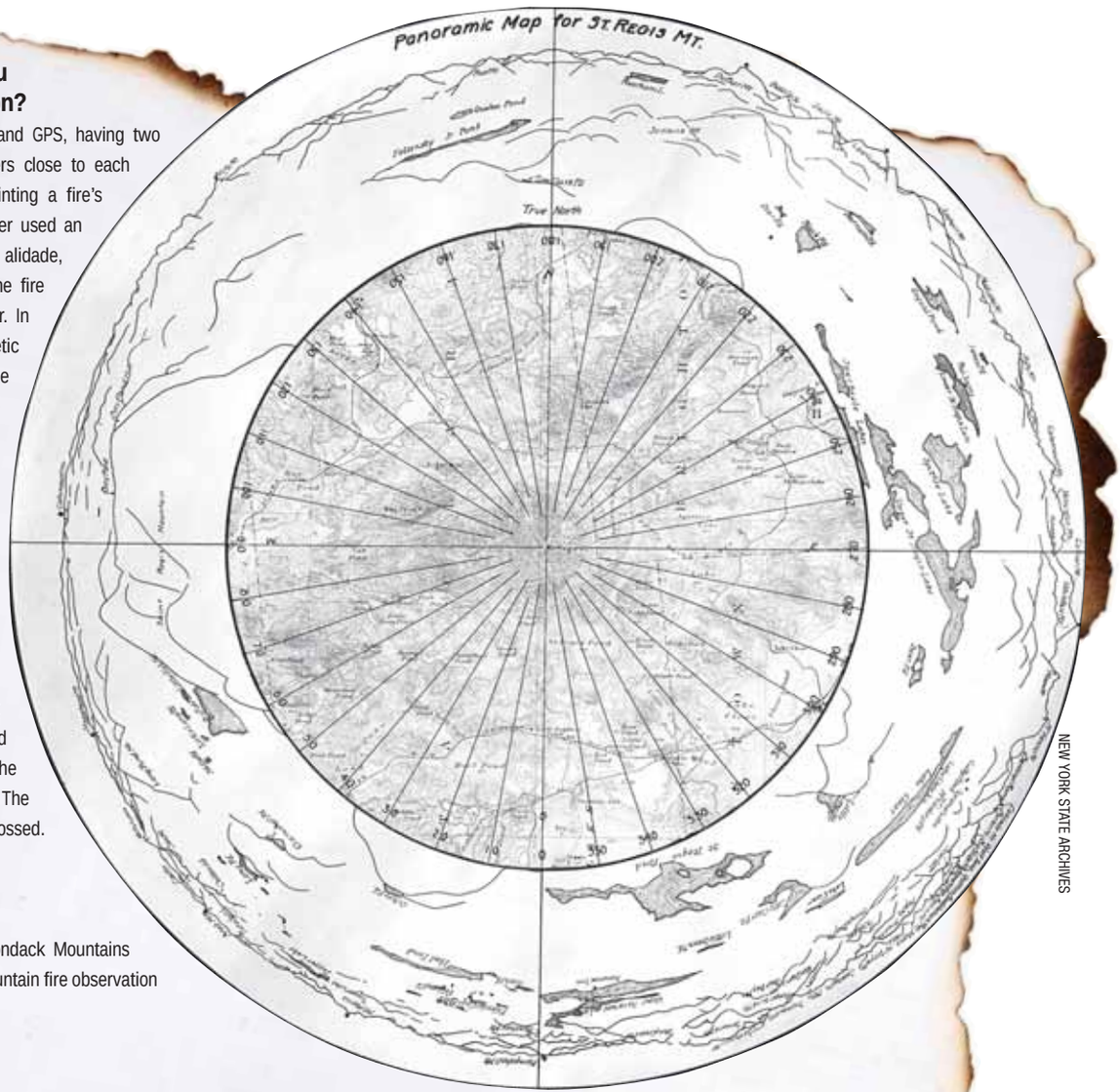
But plans for an extensive connected observation system first took hold in Maine's North Woods in 1905, the brainchild of a group of timberland owners. They were inspired by the fires of June 1903, which "swept over acres of timberland with the speed of a racehorse," according to then Maine Fire Commissioner, Edgar Ring. A spring drought contributed to devastating fires across the Northeast that year, burning 600,000 acres in New York. In Maine, the fires tore across the unorganized territories, blackening 136,000 acres in Aroostook and Piscataquis counties alone.

Those losses led William Shaw, who ran the M.G. Shaw Lumber Company, to hike up Big Squaw Mountain with Elmer Crowley, a recent graduate of the University of Maine trained in the young science of forestry. The peak had the best vantage of the Shaw family's roughly 4,000-acre holding that curved around the southern end of Moosehead Lake. A Canadian Pacific railroad crossed the property and Shaw suspected that sparks from the locomotive had set off the recent blaze. He had assigned several men to patrol the rail line on the ground, but Crowley suggested he would do better to build an observation tower on Big Squaw (now called Big Moose) where one man could watch the whole area. Within three years, Shaw and other landowners built nine towers. Observers were connected by telephone so they could share information quickly.

In 1908, another drought caused large fires across New York and New England. The newly formed state forestry commissions in New York, Vermont, and New Hampshire began to investigate the idea of a tower system. When queried by Vermont state forester Austin Hawes in 1909, William Shaw wrote back an enthusiastic response:

Before GPS, how did you pinpoint a fire's location?

Prior to the use of airplanes and GPS, having two or more fire observation towers close to each other was essential for pinpointing a fire's location. An observer in a tower used an Osborne Fire Finder, a type of alidade, to determine the bearing of the fire from the location of the tower. In this case, the bearing, or magnetic azimuth, is the measure of the clockwise angle between geodetic North and the fire. Though one tower's measurement can locate the direction of the fire, a second tower and azimuth is needed to find out how far the fire is from the first tower. Additional measurements from additional towers increase accuracy. Often a third party, such as a forest ranger, took all the reported measurements and plotted the angles on a cartographic map. The fire was where the lines crossed.



NEW YORK STATE ARCHIVES

A panoramic map of the Adirondack Mountains surrounding the Saint Regis Mountain fire observation tower in Franklin County.

"There is no question with any timberland owner, but what this is, is the very best protection that could be possibly had against forest fires," wrote Shaw. "A few men will do more on a fire when it first starts than a regiment can do after it gets well underway in the forest."

That year, the forestry commission in Maine took over the private towers and, like the state foresters in other states, began building towers as fast as they could find the funds and materials. In Vermont and New Hampshire, timberland owner associations taxed themselves in order to fund the construction of towers and the laying of telephone lines.

First line of defense

For the next 70 years, tower observers provided the first line of defense against forest fires. They often had long-standing, salaried positions and lived in cabins within walking distance of the towers. Writers who worked as observers, such as Jack Kerouac, Gary Snyder, and Edward Abbey, spread the idea of a peaceful mountaintop life.

But sometimes the reality of the job was anything but. When Henry Isenberg started work in Massachusetts 30 years ago, he got this advice from the man he was replacing: "There are two types of days in the fire tower . . . days you are so bored that you want to jump out the window, and days that are so hectic that you want to jump out the window."

Others, as one might expect, ended up feeling very lonely. William Wing Sanderson, a young man whose journal is posted online as part of a history of the New York State Forest Rangers, worked for two months in the summer of 1909 on a mountain in Hamilton County. Near the end of his time, he wrote: "I was very disappointed about not getting any mail so I have been very blue. The weather is nice but it is so still. It does not seem as if I could stand it up here much longer."

But some observers loved the job, which often involved sitting all day in a room that was only slightly bigger than a king-size bed. Andrea Mather grew up at the base of Burke Mountain in Vermont's Northeast Kingdom and manned its fire tower between 1974 and 1984. She remembers being captivated with the tower from an early age. "Since I was six years old, I said I either wanted to be a nurse or Smokey Bear," remembers Mather.

Love it or hate it, the work was steady through the first half of the twentieth century as the network of forest fire observation towers in the Northeast continued to grow. States' efforts were bolstered in 1911 when Congress approved the Weeks Act, named for the Massachusetts congressman John W. Weeks, which provided matching funds for forest fire suppression projects. The federal government became more involved in the construction of towers with the establishment of the White Mountain National Forest (1918) and the Green Mountain National Forest (1932). Later, the federally funded Civilian

From the top: Men cutting down smoldering brush, circa 1920s. William C. Noble, fire observer, in a tower on New York's Black Mountain, circa 1918, and below sitting in the doorway of his cabin.

Why don't we have forest fires like we used to?

Why hasn't the Northeast seen a recent repeat of the devastating forest fires of 1903, 1908, and 1947? One key factor is that today's cargo trains have diesel engines. In the old days, sparks from steam locomotives with wood- and coal-fired engines started a substantial portion of forest fires, though people, with their campfires and burn piles, were and remain a common culprit.

Also, severe drought conditions that allowed fires to burn out of control have become far less common. The late spring is one of the most dangerous periods for forest fires in the Northeast. That is when snows have melted but deciduous trees haven't grown the mature leaves that burn less readily and keep fire from spreading. The Palmer Index measures cumulative long-term drought. Between 1910 and 1965, the index for the Northeast region recorded either a "severe" or "extreme" drought ten times during late spring, but according to the National Climate Data Center, there has not been any drought more severe than "moderate" level since 1966. (The NCDC includes the mid-Atlantic in its definition of the Northeast.)

The fall, after leaves die, is another period of greater fire risk. The average rainfall over the Northeast between September and November has increased by almost 3 inches over the past century. The last time precipitation fell below a cumulative 7 inches during those three months was in 1965. (Between 1963 and 1965, low rainfall pushed states all along the East Coast to either close their woods or forbid hunting, campfires, and even smoking in the fall.)

Forestry and land use practices have also changed dramatically over the decades. Loggers around the turn of the twentieth century thought nothing of clear-cutting large swaths of forest, leaving fields full of stumps and slash that provided perfect dry-weather kindling. When they learned the danger of this type of harvesting, which not only increases the risk of large fires but also hastens slope erosion and reduces overall forest productivity, smaller, selective cuts became the norm.

Finally, decades of successful fire suppression in the Northeast have produced a tree mix in much of the region's forests that is simply less flammable. Because of fewer forest fires, red and white oaks have been edged out by maples, birches, and beeches. (Slow-growing oak seedlings need fire to compete.) And the leaf litter of these replacement species also burns less and degrades more quickly than oak litter does. Thus, combating fires has led to a forest that is less prone to fires, the opposite of what occurs in the western United States.

A relatively flammable southern New England oak forest.

Conservation Corps replaced many of the wooden towers with metal structures.

At the peak of the network, between the mid-1930s and late 1940s, there were around 270 fire towers actively operating during fire season (April through October) between New York and Maine, plus roughly 50 more in Massachusetts and Rhode Island. But by the end of the 1960s, states had, for the most part, stopped building new fire towers. They were pursuing a new and more powerful fire observation tool: airplanes. Older towers and their communication equipment were allowed to fall into disrepair. Then, as budgets tightened in the 1970s, states began shuttering the towers.

The end of an era

Vermont was the first state to close its entire network of towers. "It was very costly," said Hollis Prior, a retired fire control supervisor for the northeast district of Vermont. "And we weren't having that many fires."

Despite that, forestry officials did not want to remove the fire observers. Most people worked the same tower year after year and had taken on roles – tour guide, naturalist, dispatcher – that were well outside their original job description.

"You were there for public relations as much as for the fires," said Mather, the former observer. "There was quite a bit of work just keeping up the trails and answering questions for people."

Also, in the final years, observers provided an essential communication link between forestry employees, who often worked in valleys between mountains that blocked radio signals. That role shrank with improvements in radio technology.

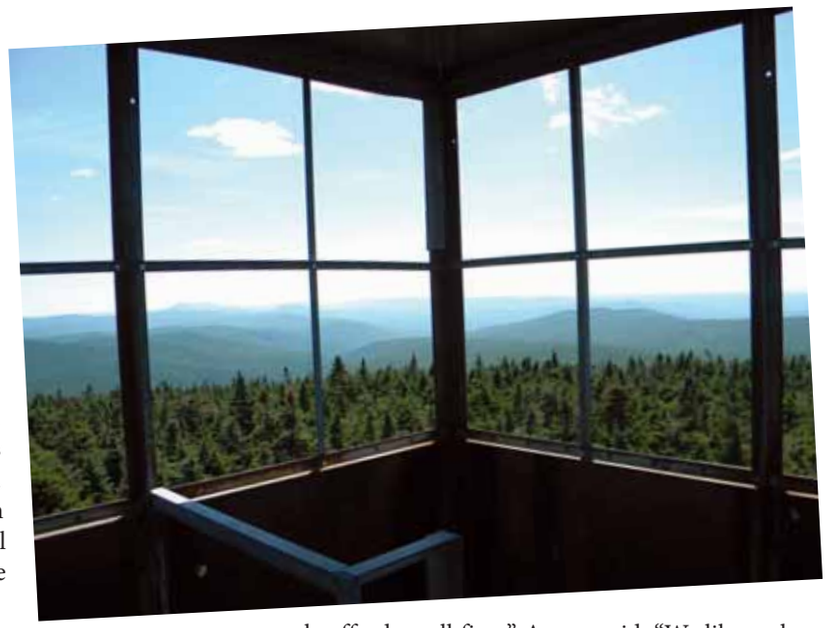
"They definitely earned their keep," said Brent Teillon, who retired after almost 30 years as chief of forest protection for the Department of Forests, Parks and Recreation in 2005. Still, he had trouble defending the expense in the state legislature, and the last operating tower in Vermont was closed after the summer of 1985.

New York and Maine followed suit, closing fire towers one by one. New York stopped employing observers in 1990, while Maine discontinued its system following a budget crisis in 1991. Cutting the towers saved his department $800,000, said Tom Parent, the fire supervisor for the Maine forest service at the time.

"It was either close the towers or lay off people who were on the ground ready to be suppressing fires," Parent said.

Over the following years, more than 100 towers were taken down or allowed to collapse in New York, Vermont, and Maine. "Many of the towers were just cut down in the eighties and nineties," said Marty Podskoch, the author of several books about the history of fire towers in New York's Adirondack and Catskill state parks. "There was nobody out there explaining their importance and (state governments) were worried about liability."

But this is changing. Today, in New York's largest state parks, nonprofit groups have been successful in restoring many fire towers with the help of grants from the state department of



Glastenbury, Vermont firetower, circa 2012.

environmental conservation and funds raised by residents of the area. Twelve of the 34 towers in the Adirondacks have been restored to varying degrees and more are slated for restoration. The Catskill Center opens the cabs of five towers to the public every weekend between early June and mid-October.

"It's the best gig I've ever had, paid or not," said Diane Sirios, who has volunteered for five summers at Overlook Mountain Fire Tower near Woodstock, New York. "People often don't realize how much wild land still exists so close to urban areas until they get the perspective that comes from seeing the expansive view from the fire tower."

In Vermont, the state allocated funds last year to restore the fire tower on Okemo Mountain, a popular hiking destination. And the Green Mountain Club employs former longtime lookout observers Hugh and Jeanne Joudry as summit caretakers at the Stratton Mountain fire tower. In Maine, the Forest Fire Lookout Association has a strong presence in York County, and volunteers still man lookout towers during dry weather.

Fire tower proponents argue that the view from the top of a tower offers more than a scenic vista – that it gives both hikers and schoolchildren a unique perspective on the forest and on the history of forest conservation.

"The educational piece is what grabs my imagination," said David Thomas-Train, a former teacher who heads the Adirondack Fire Tower Association. "The fire towers were really the first organized effort by the state to protect its forests. There is an environmental stewardship message here."

New Hampshire, Massachusetts, and Rhode Island continue to maintain the states' towers for fire observation, but they employ observers only as needed. Massachusetts and Rhode Island are more vulnerable to forest fires than other New England states because of the prevalence of pitch pine, sandy soil, and dry, coastal winds. Fire risk is rated on a scale of 1 to 5, based on a variety of factors, including the number of trees down in the forest and the number of days without rain. The fire lookouts come to work only on days when the fire risk is level 3 or higher.

The situation in New Hampshire is different. There, the Division of Forests and Lands is part of the Department of Resources and Economic Development. Bud Nelson, chief of the fire protection bureau between 1985 and 2004, explained that his department valued the towers as tourist destinations as well as tools for fire suppression.

Forest landowners are a powerful political group in New Hampshire and they support the towers, said Keith Argow, chairman of the Forest Fire Lookout Association. "Small landowners can only afford small fires," Argow said. "We like early detection and we like peoples' eyes on the forest."

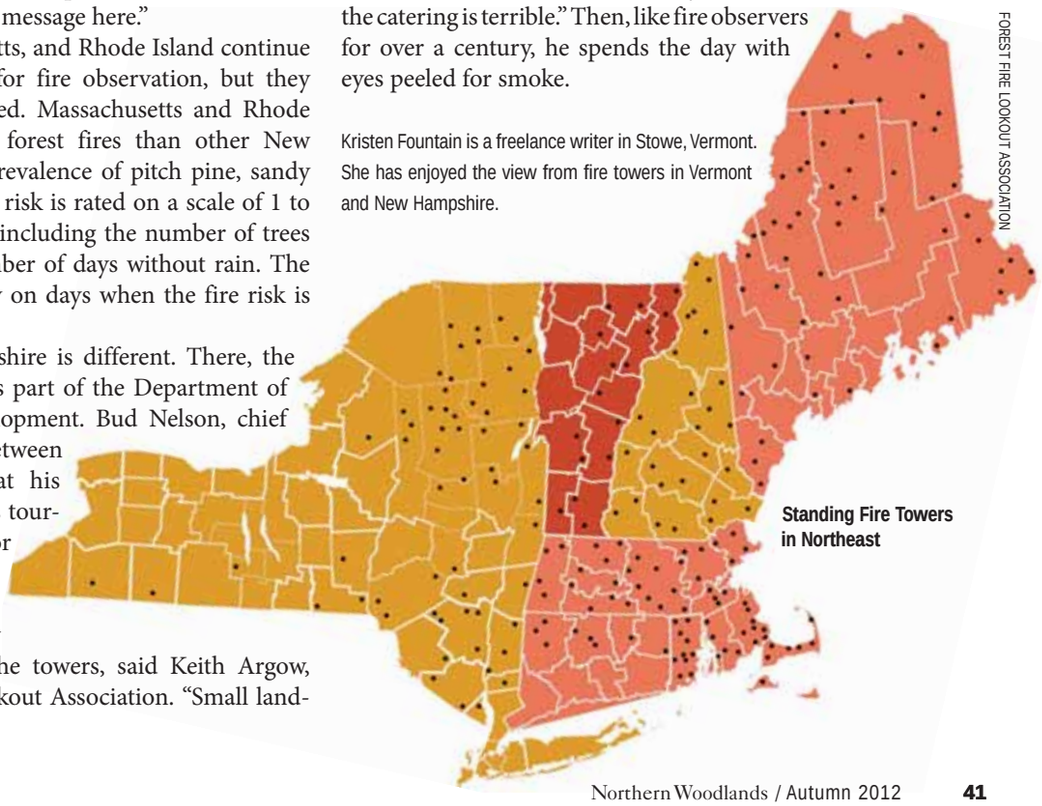
In Maine, John Heseltine, a retired Marine whose father and grandfather fought the great 1947 fire, has volunteered as a fire observer in York County for the past 14 years. He was a small child when he took a bus tour of the torched Goose Rock section of Kennebunkport with his father, but the images stuck with him.

"I'm not suggesting we are going to have another 1947-style fire," said Heseltine. "But you never know."

On dry days when the local fire warden tells him that the fire danger is high, Heseltine climbs the tower, turns on the computer, which displays a map of the area, and reports to the emergency dispatcher on duty that Mt. Hope is manned.

"I bring out the coffee and the Cheetos and stare out the window," Heseltine said. "I've always said the view is terrific, but the catering is terrible." Then, like fire observers for over a century, he spends the day with eyes peeled for smoke.

Kristen Fountain is a freelance writer in Stowe, Vermont. She has enjoyed the view from fire towers in Vermont and New Hampshire.



FOREST FIRE LOOKOUT ASSOCIATION

Standing Fire Towers in Northeast

Story by Virginia Barlow

Illustrations by Adelaide Tyrol

Tamarack, Larix laricina

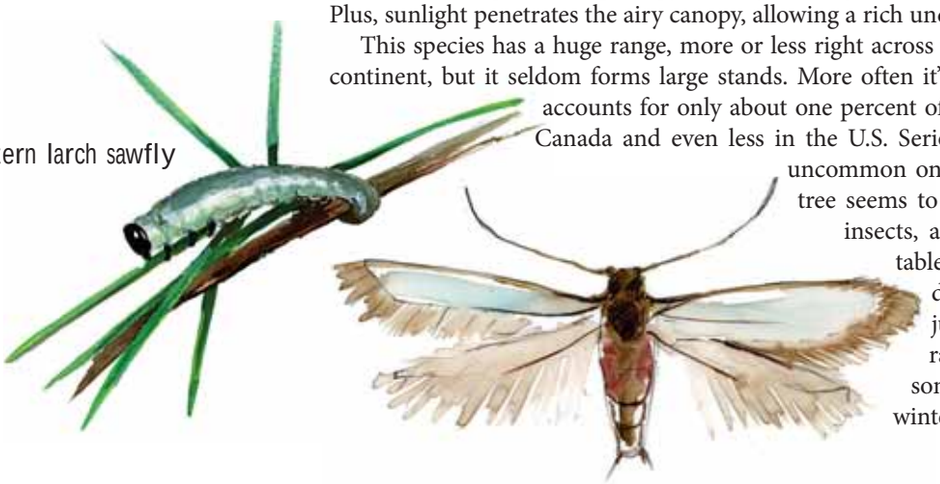
Tamarack is one of 11 larch species worldwide, and larches are the only northern conifers to shed their leaves each autumn. It's late in the fall when tamarack needles turn yellow and drop, well after most hardwoods are bare. Perhaps the trees pause to reconsider this unnatural act. When they finally do change from green to yellow, tamaracks have such a golden glow that they appear to be lit from within.

But what comes next is not so pretty: all winter long, stark, scorched-looking leafless trees, with the signature conifer pyramid outline and severely straight horizontal branches (often holding a few years' worth of ugly old cones) darken the land. No wonder people think the trees are dead.

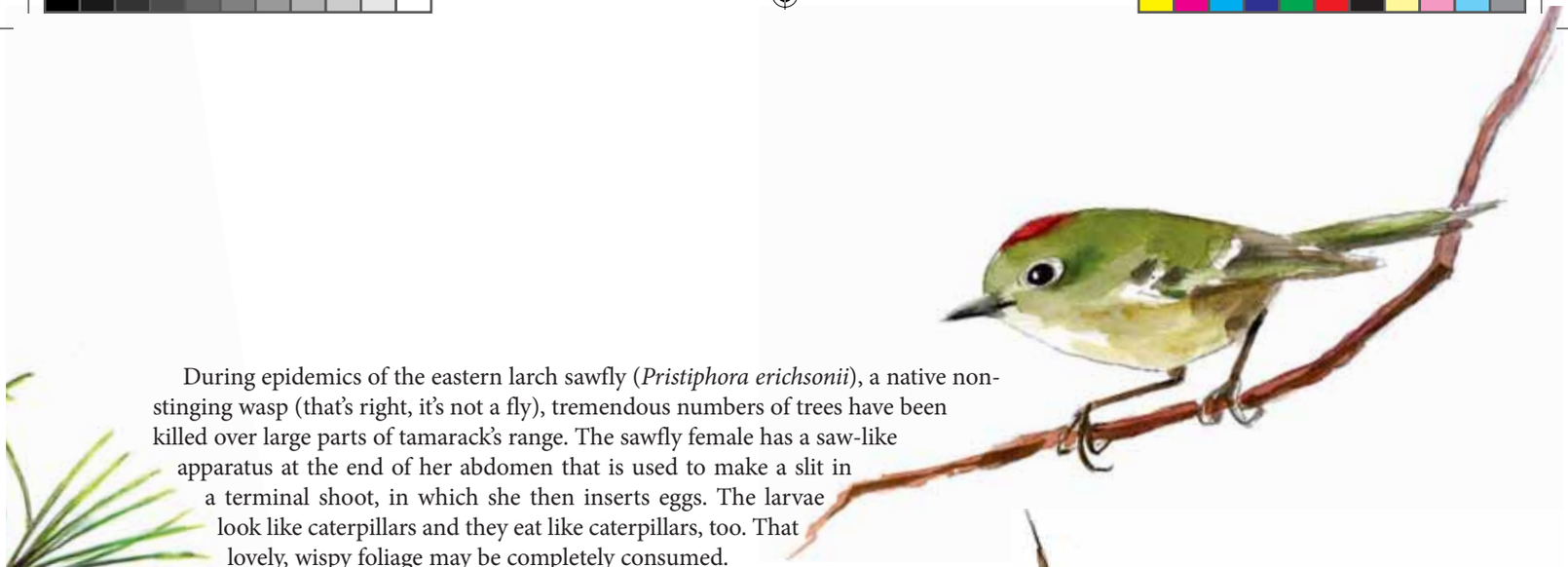
The other conifers – the spruces, pines, and balsam fir, for instance – are thought to benefit from keeping their needles through the winter, both by sneaking in some photosynthesis on warm days and because they get more mileage from their investment in foliage by keeping needles at work for more than one year. Black spruce, tamarack's companion in cold bogs, may keep using a set of its needles for up to eight years. Like trembling aspen, another far northern tree, tamarack bark contains some chlorophyll, so possibly there's a little activity in winter, but overall tamarack would seem to get the worst of both worlds: manufacturing is shut down in the winter, plus in summer its wispy needles are no match for the huge surface area of other deciduous trees' leaves. And yet tamaracks grow as far north as any tree, happily photosynthesizing at midnight in summer above the Arctic Circle. Plus, they manage to grow in the most inhospitable parts of the landscape, often with their roots confined to a slim band of soil on top of wet, impenetrable clay or hardpan.

In spring, the tree goes through another colorful transformation, with flowers and new foliage appearing at about the same time. The small male flowers are bright yellow, but the female cones are even better looking, like small, waxy rose buds of a striking purplish color. The 20 or so seeds in each cone ripen in just one season and will begin to fall in September. Tamarack needles on the newest twigs grow singly, but on older twigs they're in tufts of 20 or so needles that are only about an inch long, soft to the touch, flexible, and the lightest green; now they contrast favorably with the stiff darker needles of all of the other conifers. Walking through a tamarack grove is a pleasure: nothing at all like getting jabbed by the truly needle-like needles of its brethren. Plus, sunlight penetrates the airy canopy, allowing a rich understory to develop.

This species has a huge range, more or less right across the northern parts of the continent, but it seldom forms large stands. More often it's found in groves, and it accounts for only about one percent of the softwood volume in Canada and even less in the U.S. Serious fungus problems are uncommon on tamarack but, sadly, the tree seems to be vulnerable to several insects, and changes in the water table may tip it into a state of decline. It's hard to know just what starts a tamarack's downward spiral, but sometimes the dead-looking winter trees are indeed dead.



eastern larch sawfly



During epidemics of the eastern larch sawfly (*Pristiphora erichsonii*), a native non-stinging wasp (that's right, it's not a fly), tremendous numbers of trees have been killed over large parts of tamarack's range. The sawfly female has a saw-like apparatus at the end of her abdomen that is used to make a slit in a terminal shoot, in which she then inserts eggs. The larvae look like caterpillars and they eat like caterpillars, too. That lovely, wispy foliage may be completely consumed.

Another larch-needle-eating insect, more common in the northeastern U.S., is the larch casebearer (*Coleophora laricella*), first introduced into this country in the 1880s. These moths and their larvae are so tiny that it's hard to believe they could kill a big, thriving tree, but they can at least come close. The moth's wingspan is only about three-tenths of an inch and the caterpillar maxes out at less than a quarter of an inch. In early summer, each female moth lays 50 to 70 eggs, singly, on larch foliage, and when the larva hatches it mines out the center of a needle and then moves in. If you look at a larch needle, you'll see how very tiny a caterpillar must be to pull this off. Protected by its little case, it goes on to eat many more needles, patching in bits of other needles to enlarge its cigar-shaped house as it grows.

Eastern larch beetle (*Dendroctonus simplex*) larvae colonize and consume the phloem of tamarack stems and large branches. Again, these are small creatures, but when they occur in huge numbers, trees are girdled and killed. In the past, this bark beetle, like most bark beetles, has been considered a secondary pest that can thrive only on stressed trees (those that have been defoliated, for instance), which the beetles come in to finish off. Woodpeckers pecking the trunk to get at the larvae are an early sign of bark beetles. Nowadays, these beetles sometimes kill tamaracks that appear to have been doing just fine. Why this happens is not at all clear. Since tamaracks often are found on wet soils, changes in the water table – in either direction – might have stressed the trees.

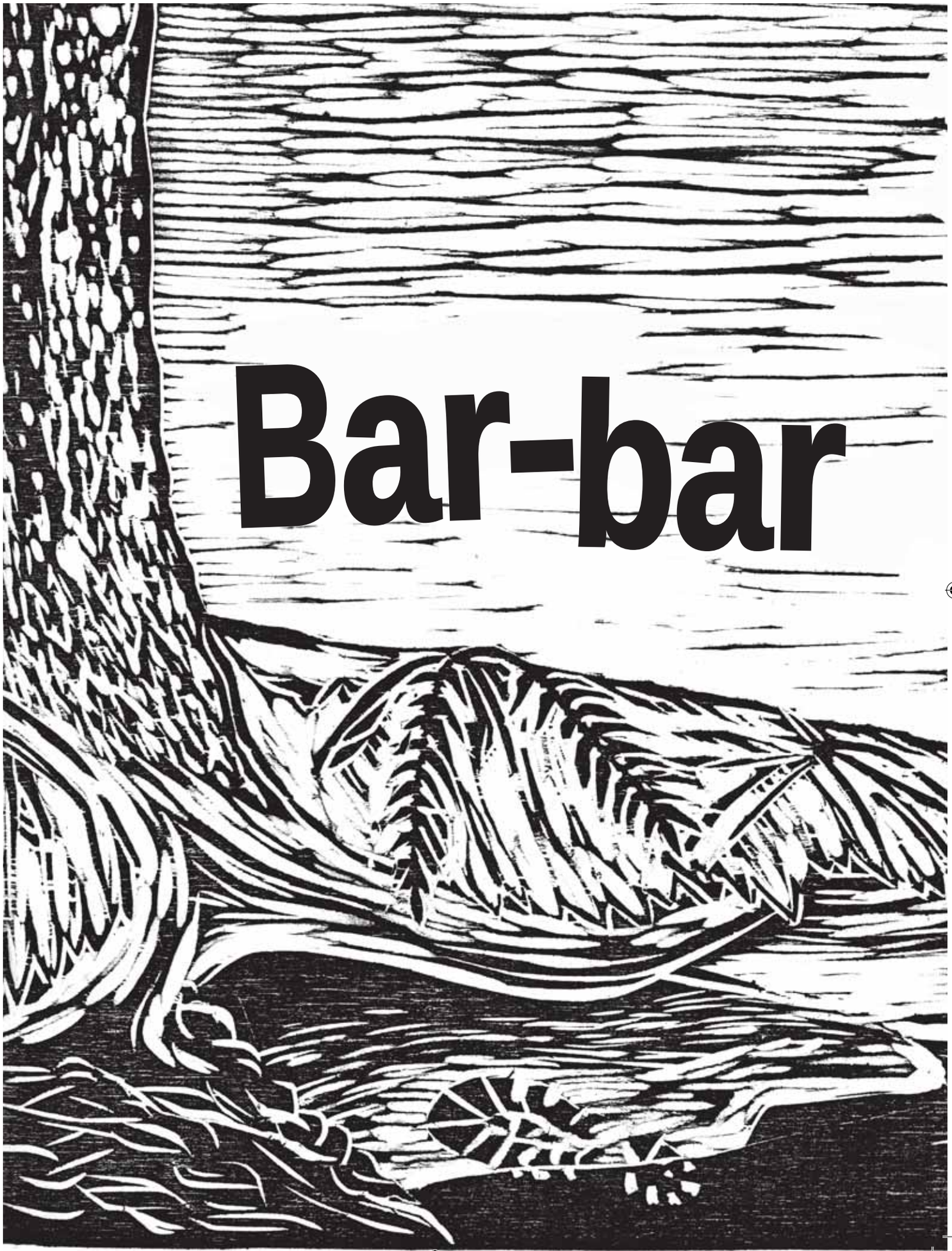
When tamaracks begin to fail, which they seem to do all too often, it's called "larch decline," a term that means no one knows what the problem is or how to fix it.

Mice, voles, shrews, and red squirrels all eat tamarack seeds, and snowshoe hares girdle many saplings and small poles by eating the bark. White-tailed deer and moose do some browsing as well. Porcupines seek out the inner bark and are sometimes considered to be bad pests because of that. In the fall, ruffed grouse and spruce grouse eat needles and buds. Crossbills, purple finches, and both kinglet species eat the seeds, and many other birds – the ruby-crowned kinglet, white-throated sparrow, song sparrow, veery, common yellowthroat, and Nashville warbler – spend the summer among tamaracks.

The wood presents us with yet another anomaly: a softwood tamarack is quite hard. The name tamarack is a corruption of the Abenaki name hackmatack, which means "wood for making snowshoes." It is rot resistant and fairly strong, and has been used for railway ties, fence posts, barn sills, props in mines, piers, wooden culverts, bridges, telephone poles, sled runners, crates, and pails. The most interesting use is for ships' knees, the pieces of wood that are bent at nearly right angles and used to connect the deck to the hull of wooden ships. Because tamarack grows on very shallow soil, its roots take a sharp bend outward, and this part – an ell of half root and half trunk – is perfect for tying ships together.

Tamarack is relatively short-lived by tree standards, with a typical life span of 150 years, and, because it doesn't do well in shade, many other tree species are poised to replace it. It's kind of amazing that this odd-ball leaf-shedding conifer survives, but it does, and as a result, we get a stunning encore of yellow light every autumn.

ruby-crowned kinglet



Why regulated trapping still has a place in the 21st century

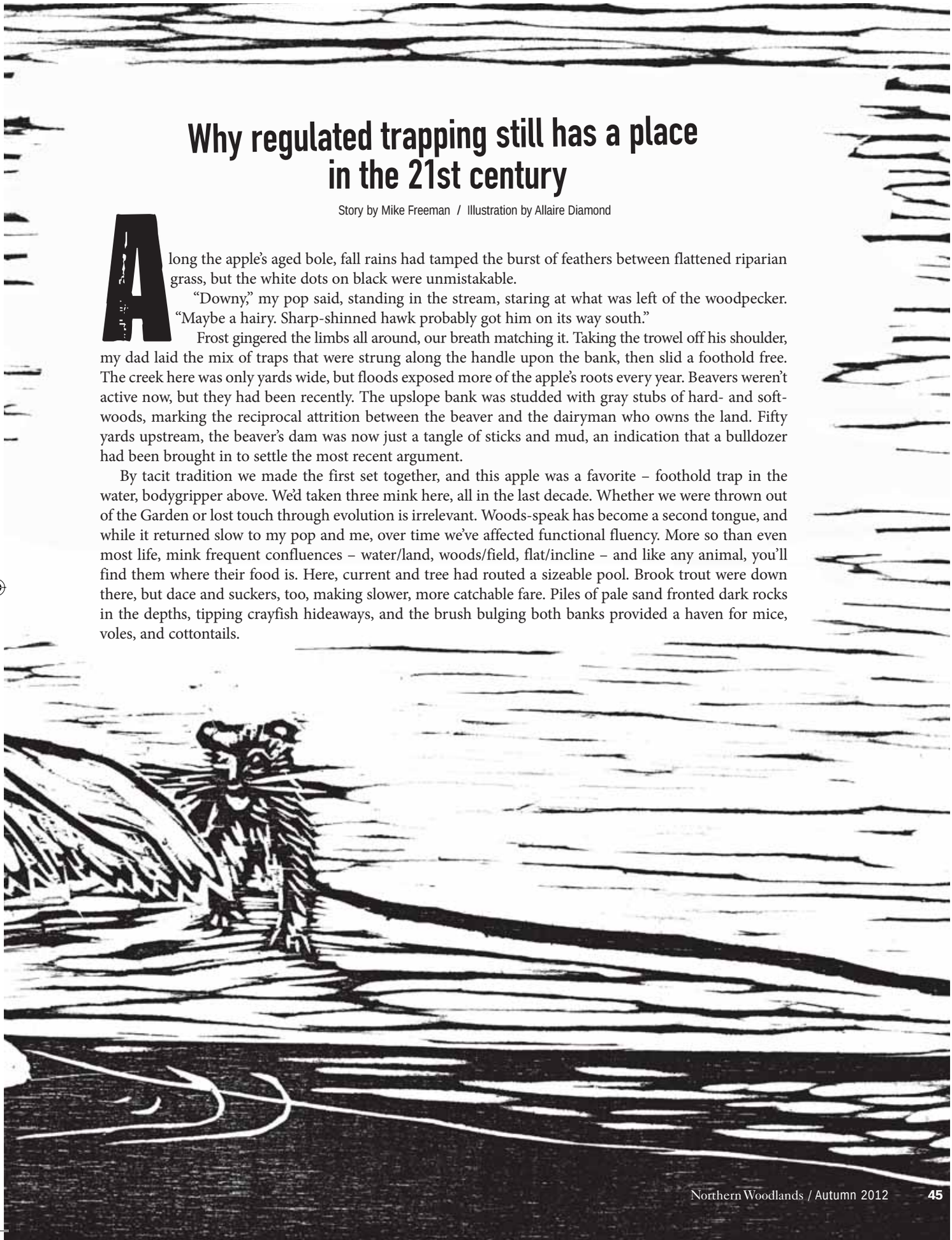
Story by Mike Freeman / Illustration by Allaire Diamond

Along the apple's aged bole, fall rains had tamped the burst of feathers between flattened riparian grass, but the white dots on black were unmistakable.

"Downy," my pop said, standing in the stream, staring at what was left of the woodpecker. "Maybe a hairy. Sharp-shinned hawk probably got him on its way south."

Frost gingered the limbs all around, our breath matching it. Taking the trowel off his shoulder, my dad laid the mix of traps that were strung along the handle upon the bank, then slid a foothold free. The creek here was only yards wide, but floods exposed more of the apple's roots every year. Beavers weren't active now, but they had been recently. The upslope bank was studded with gray stubs of hard- and soft-woods, marking the reciprocal attrition between the beaver and the dairyman who owns the land. Fifty yards upstream, the beaver's dam was now just a tangle of sticks and mud, an indication that a bulldozer had been brought in to settle the most recent argument.

By tacit tradition we made the first set together, and this apple was a favorite – foothold trap in the water, bodygripper above. We'd taken three mink here, all in the last decade. Whether we were thrown out of the Garden or lost touch through evolution is irrelevant. Woods-speak has become a second tongue, and while it returned slow to my pop and me, over time we've affected functional fluency. More so than even most life, mink frequent confluences – water/land, woods/field, flat/incline – and like any animal, you'll find them where their food is. Here, current and tree had routed a sizeable pool. Brook trout were down there, but dace and suckers, too, making slower, more catchable fare. Piles of pale sand fronted dark rocks in the depths, tipping crayfish hideaways, and the brush bulging both banks provided a haven for mice, voles, and cottontails.



My father took the foothold and I picked up a bodygripper, setting where schist slag forces bank travelers between rock and wood. My dad slipped his trap beneath water, fingers turning pink, wedging it between an overhung root and vertical clay. Milkweed flavored each bank, registered by itinerant monarchs that dust plant life like orange snow when laying eggs. My dad bent a stalk low to ensure a mink wouldn't hop the trap. A pod split, littering the current with duck-down seeds, joining eddies in their lazy revolutions.

MODERN-DAY TRAPPING

Prior to having my own kids, my father and I trapped Connecticut for 30 years, a habit I took to Alaska the decade I lived there. Family ties had something to do with it. Exercise, anticipation, and devotion to the outdoors, too. But the prime mover was deeper, inaccessible. I'm not alone in this loss for words. Scarcely a trapper can articulate with precision what sends them out every year.

"It's part of their fabric," Chris Bernier, a Vermont game biologist, said when I asked him. "It's who they are." In light of this silence, others have stepped in to define the roughly 13,000 trappers in New England and New York who will take to the field this fall. From the perspective of the fur industry, these men and women are wild fur farmers – a small piece of a $13 billion global fur trade. To biologists, they're tools used to implement wildlife management goals. To animal rights advocates, they're a relic of America's barbaric past.

The anti-trapping positions are especially well known, passionate, and on the rise. Bob Noonan, a long-time trapper out of Canaan, Maine, was blunt. "Oh God. There are a lot people who put us below the filthiest criminals," and while that's likely hyperbole, he's not far off.

Trapping's past has served it poorly in the modern day. "You have to remember, from colonial times through about 1900 it was 'finders keepers' out there," said Charlie Brown, Bernier's Rhode Island counterpart. "No seasons, no laws, no ethics to speak of. Up until the 1960s, in fact, states had bounties on everything from foxes to raptors, and throughout much of American history, trapping played a large role in many species' declines. This doesn't happen anymore, but it certainly did."

Modern-day trappers are working to reverse this rightfully scorned dowry, that of infrequently checked traps set any time of year, baited to catch anything that wandered by. So are biologists and state fish and game departments. Today, only abundant species can be legally trapped, and trapping is far more regulated than hunting or fishing. Biologists track not only total harvest but trapping effort, which over time gauges whether animal populations are increasing, decreasing, or stable. Otter, bobcat, and fisher carcasses are turned in for sexing, dietary data, and aging purposes, all useful in determining the species' overall health. Fur dealers, moreover, are required to report their annual purchases, hindering out-of-season and over-limit harvesting. With fur an international commodity, broader global measures have been taken to thwart black marketers. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), for example, requires tagging specific species, usually predators whose numbers are scant even in high times.

Modern traps have also been redesigned to reduce suffering. The goal is to kill cleanly or hold humanely. "Animal welfare is a chief concern now," said John DePue of Maine's Fish and Game Department. "It's hard to explain, but the bulk of trappers I know love the live animal as much as the dead one." Over 150 trappers in 32 states have teamed up with biologists and veterinarians to develop Best Management Practice (BMP) guidelines that recommend which trap to use for which species. To date, over 1,000 full body necropsies have been performed to assess trapping injuries, and trapping equipment and techniques have been honed as a result. The study is ongoing. "BMPs can't be understated in the effects they've had minimizing suffering," Bernier stated, with DePue adding that apart from outliers, "most trappers follow them."

However, many people, even when aware of such reforms, remain unmoved. In the same way that hunting accidents, while exceedingly rare, do happen, buttressing the *vox populi* that hunters are reckless ne'er-do-wells, pets and nontarget species are still caught in traps, sometimes with deadly consequences. That such misfortunes are usually caused by inexperienced teenage boys just starting out is immaterial – the fact is that BMPs are voluntary and not every trapper is a model of ethics. These exceptions fortify the public's poor opinion of trapping, and in some parts of the country – especially where ballot referendums give urban voters numerical strength – trapping has been banned or severely restricted.

Antitrapping sentiment is particularly strong in southern New England. Since a 1996 referendum, Massachusetts only allows box and cage traps, eliminating the far more effective, cheaper, and, one could argue, more humane foothold and body-gripping devices. Rhode Islanders can only use body-gripping traps, and in Connecticut, a proposed ban that would have eliminated all trapping was narrowly defeated in the 2009 state legislature.

THE CASE FOR MANAGEMENT

Trapping in New England, then, offers a fine study of rural/urban/suburban fault lines. In keeping with a trend lasting millennia, the world is losing its rural population. Rather than working in nature, with all the interactions that entails, the vast majority of Americans today recreate in it intermittently, affecting how the country views the natural world. Those who work in nature approach it with a practical balance, as anyone weeding a garden can attest. Urban life, however, punctuated by the occasional hike, tends to subvert the pragmatism and morph the awe we all feel towards nature into ever-rarifying ether, venerating the natural world to the extent that it can scarcely be touched.

This makes things hard on wildlife managers, who need to reconcile an ecosystem's biological carrying capacity – the number of wild animals an ecosystem can support – with the amorphous idea of "cultural carrying capacity" – the number of wild animals people will tolerate. That anti-trapping sentiment

has become increasingly commonplace has certainly added to this challenge.

"Whether people understand it or not," John DePue observed, "animals now exist in a heavily human-influenced world, and their habitat – or lack of it – reflects that. While nature would certainly take care of matters without our regulation, it would be messier and not without unintended consequences."

With trapper numbers down, for instance, ground nesting birds can experience increased attrition through the rise of egg-poaching furbearers. A classic example of this unfolded in California in the late 1980s, when conservationists fought (and won) a protracted court battle with animal rights groups for the right to trap non-native red foxes, which were wiping out endangered bird species. One ecologist described the problem this way in an Audubon Magazine story on the subject: "If not checked soon, [red foxes] will account for more extinctions of bird species in the state than any other single factor in history." Closer to home, DePue's fieldwork in Maine has shown that fishers regularly kill the federally endangered lynx. "Without fishers being trapped, the increased numbers would certainly affect the lynx population," said DePue.

In the absence of trapping, distemper, mange, and rabies, too, could potentially make more frequent and wrathful appearances in furbearer populations. "With trapping," Bernier remarked, "vector species like raccoons, skunks, and foxes are managed at or below carrying capacity, lessening those diseases' abilities to spread."

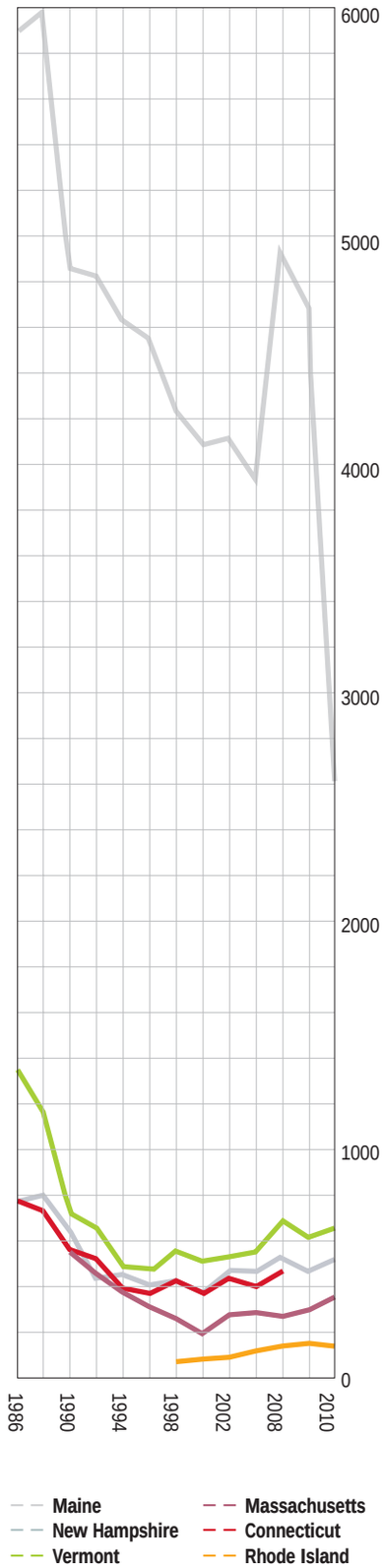
While the positive biological effects trapping has on an ecosystem can be hard to quantify, trapping's role in mitigating human/wildlife conflicts is not. Paul Rego, with Connecticut's Department of Environmental Protection, said that 60 percent of the beavers trapped in the state are associated with property damage.

"While nature would certainly take care of matters without our regulation, it would be messier and not without unintended consequences."

Maine trapper Maddy Whitmore with muskrat.

BILL MACKOWSKI

TRAPPING LICENSES ISSUED IN NEW ENGLAND SINCE 1986



With decreased trapping, New England beaver populations have spiked in recent years, with subsequent rises in crop and road damage. "There are certainly ways around [using recreational trapping as a management tool]," Rego reiterated, "as you see in Massachusetts now, but trapping is the most efficient tool we have. It lets the resource be utilized for both fur and meat, it gets people outside, and animals that have to be killed anyway aren't wasted by DOT (Department of Transportation) or property owners." (Rego's assertion of the meat being used is no throwaway. Beaver meat has one of the highest protein concentrations and is delicious, as are muskrat, raccoon, and opossum.)

As Rego points out, Massachusetts is an example of what dwindling trapper populations – or a ban – can cause. To be certain, the Commonwealth didn't forbid trapping. Rather, in 1996, it limited it to box and cage traps, like Have-a-Hart traps, which will passably catch fishers, muskrats, raccoons, and beavers. They don't, however, catch them reliably. They're also heavy, expensive, and awkward, and as a result many trappers have given up.

Five years after the ban, the beaver population in Massachusetts had increased from 24,000 to 70,000. Trapping success rates went in the opposite direction. "We dropped from about a thousand [harvested] beaver annually to a hundred," Laura Conlee, a Massachusetts state biologist said. "There's been a dramatic increase in that population since the referendum, with a rise in flood complaints attending it."

As rodents, beavers proliferate rapidly. They start reproducing at age three, and assuming three kits per year, one pair can potentially produce almost 300 offspring in a decade. This explosion forced the state to capitulate to pragmatism despite the ban.

"In 2000," Conlee went on, "an emergency permitting process was established. It's at the town level, through the board of health [presumably to control giardia, or 'beaver fever']. If there's flood damage to roads or private property, a trapper can be called who is then able to use a conibear [a bodygrip-style trap that kills an animal by breaking its neck]." This level of administrative oversight, and the fact that it's the board of health that's now managing beaver populations and not people with degrees in wildlife management, is novel. It's a new paradigm, akin to suburban areas where the autumn ritual of recreational deer hunting has been displaced by professional, year-round snipers working at night with silenced barrels. A resource, then, has been turned into a pest, and recreational trappers/hunters have been replaced by professional exterminators.

One of those converts is Ruth Callahan, wife of Mike Callahan, who runs Beaver Solutions, LLC, out of Southampton, Massachusetts – an outfit largely made possible by the 1996 ban, but one more in line with pest control than trapping. Mike Callahan responds to complaints with water control devices to curtail beaver damage. (Editor's Note: To learn more about nonlethal beaver control devices, see our story on "beaver baffles" in the Autumn 2006 issue.) In cases where these devices aren't practical or effective, Ruth steps in with conibears. The 2000 provision, Mike said, has made his business more effective, especially for Ruth. "Before 2000, it might take three or four weeks to get the proper permit. Now it's a day or two."

The abundance problem hasn't abated, though Callahan said that based on anecdotal evidence, he believes the beaver population has leveled since 2000. Conlee notes that the postban rise has changed the population dynamics.

"Beavers are in marginal habitat now: larger river systems, intermittent creeks, places they'll be pushed closer to humans and maybe a lesser food supply," said Conlee. "Without trapping harvest records, we can only track recent trends, not long-term population."

With reduced trapping effort, Brown has seen similar incursions in Rhode Island.

"Some years," he said, "trappers only take 30 animals. At most a hundred. These numbers don't do much management-wise, and while there's still room for expansion in certain systems, in others there's saturation." Beavers in those systems have made inroads into thin habitats, including the Woosnasquatucket watershed in Providence. Complaints have skyrocketed, and Brown laments that even without a ban, sagging trapping effort has deprived Rhode Island of "the most effective means to control species that cause economic damage."

The number of trappers in the Northeast has dropped by nearly half in just two generations. Closer scrutiny, however, shows the numbers beginning to stabilize and in some cases tick up, providing cautious hope among game managers.

After a 10-year decline, for instance, the number of licensed trappers in Maine has steadied at 2,000. "Moreover," DePue noted, "while anecdotal, there's been strong interest in our recent trapper's courses, which is pretty exciting." Part of this is a reflection of higher fur prices, fueled by burgeoning markets in Russia and China. Part, though, is trappers recognizing that no one will replace them. "We're even seeing new recruitment," Bernier stated, sharing DePue's optimism. "We had one girl make her father go to all the courses and buy a bunch of traps, which is good news."

Vermont furbearer biologist Chris Bernier collecting age and sex data from muskrat pelts at the 2011 Vermont Trappers Auction.

The American trapper is something of a Caliban figure now... but Caliban is, after all, the native of the place, the one who knows where everything is.

THE CULTURAL THREAD

That trapping limits human-animal conflict is terrific, that it contains certain diseases even more so, and that it gets people outside and appreciating nature is perhaps best of all. Still, it's difficult to live outside your own opinion, and being human is nothing if not contradictory. While I'll always support trapping and hope to go back to it, from the beginning I've understood the emotional pull of anti-trappers. I'm under no illusion that a practical look at the pursuit will assuage anyone repulsed by it, and it may be impossible to explain how someone can simultaneously love and respect an animal, then kill it.

The fact remains, though, that among the greatest memories I have are those on a trapline – studying nature, imbibing it, participating in it as the animals themselves. As nearly any trapper will attest, such immersion can't be replicated, and should trapping disappear through ballot or disinterest, it's the loss of this language – very nearly a wordless one – that I'd most lament.

"I see a different world out there," Malcolm Speicher, president of the Massachusetts Trappers Association, said. "One the Average Joe doesn't. Don't ask me to explain, though."

Spencer Tripp, a Massachusetts native who also traps in Rhode Island, spoke to this observation when scouting or trapping.

"I've trapped since I was five, and am now 71. What I've seen, what I've learned through trapping, can't be duplicated. You're always looking for species-specific sign, even in spring and summer. In doing so, you observe plants that are no longer common, such as lady slipper and ground pine, and learn of their location. Furthermore, you note general numbers and locations of turtles, snakes, birds, everything – all knowledge that might not have been gained had you not been searching the woods as a trapper."

In *Heart and Blood*, Richard Nelson cites a study that puts trappers second only to birdwatchers in general nature knowledge. Trappers, too, have an abstract ken that science is just acquiring. Biologists, for example, are coming to understand that animals possess intelligence rather than instinct, something nearly any trapper could have stated two centuries ago. The field, however, has been abhorred from the start. Ben Franklin called trappers the most "vile and abandoned wretches in our nation."

Yet if the cultured have inveterately scorned them, trappers have recently been honored by two outside the tribe, unlikely admirers gifted with words.

Like other fine novelists, it's tough to say where Annie Proulx stands on any issue. Yet in *Postcards*, which details the dissolution of a Vermont family (and by extension, its rapidly antiquating lifestyle) she expresses profound understanding of her protagonist's deep woods knowledge, as explained by another character:

"Loyal learnt all his trap-wise ways from old Iris . . . half-wild hisself. Loyal was real clever in layin' his sets. He was a damn genius with guide sticks, knew how to lay a stalk of hay or bend a goldenrod stem so the fox would step over it every time, right into the trap. Snow sets? He'd put 'em near a tuft of grass stickin' up out of the new ice along the river edge, see, the foxes go and play on the new ice, or he'd make a trail set in the snow you couldn't tell anybody been walkin' there. You got to know your fox and you got to know your terrain."

Susan Brind Morrow puts this assimilation in modern context. A linguist, Morrow's memoir of New York's Finger Lakes region, *Wolves and Honey*, is among the most eloquent inquiries into how humans currently mesh with nature. The "wolves" of the title traces the eastern coyote's arrival, and the popular unwelcome attached to it. She parallels this unease with trappers, who had "opened up the continent to settlement" not by extirpating natives but by learning from them, mingling, allowing the refinement that followed. To Morrow, the same disdain of wilderness mingling that appalled Franklin still pervades America today:

"The trapper and the trapped now meet as castoffs in the civilized world. The story of the devolution of the wolf into the scruffy eastern coyote is not unlike that of the American trapper, the primordial hunter of the wild, who allied himself with the Indians, and so learned to survive without the hampering luxuries of settled urban life. The American trapper is something of a Caliban figure now – a chthonic, scruffy character, out-moded and despised. But Caliban is, afterall, the native of the place, the one who knows where everything is."

If today's trappers are degrees removed from their forebears, they're also, like Franklin, more refined. "They've turned the corner into the 21st century," Speicher said, something biologists verify, as for the most part trappers have submitted to regulation. If not as immersed as their harbingers, they speak a similar tongue, something like Spencer Tripp's – modern English maybe, as opposed to that of Shakespeare, Caliban's creator.

It may be that trapping will die, and it may be this will turn another corner, around which humans track toward a higher consciousness. That's not for me to say. I only know that critical communication will be lost. While in Alaska, I admired a couple of ageing fishing guides, Bob and Frank. Bob trapped extensively in the Tongass National Forest, whose stewards hem woods-people further each year with regulation.

"I mean, Jesus," he told me riverside. "Pretty soon it'll be so the only people they let in the woods are tourists unable to walk off a path, with some Forest Service guide telling them the scientific names of flowers. Everyone will look at Frank and me like we're some kind of barbarians."

I smiled, then cocked an eyebrow, letting him know he was a barbarian. We laughed, but his poignancy has punch. As Brind Morrow would know, "barbarian" is Greek. Cultured Athenians thought all tribes outside the metropolis too close to nature, and that their dialects sounded the same: "bar-bar-bar-bar." Perhaps, perhaps not, but the shedding of such rhythms has its price.

Mike Freeman lives in Rhode Island. He authored Drifting: Two Weeks on the Hudson (SUNY Press), which was reviewed in the Spring 2012 issue of Northern Woodlands.

By Bryan Pfeiffer

Fat, Flight, and Fitness in a Blackpoll Warbler

Two wings and a prayer will carry a blackpoll warbler on a remarkable journey to South America this autumn. Well, two wings, a prayer, and the energy packed into a scoop of Ben & Jerry's ice cream.

Since June, this wisp of a bird, with a high, thin pulsing song, has been raising young in boreal woods from Alaska, across Canada, and into high forests of the Northeast. With their offspring on the wing and independent, many songbirds now begin migration to the tropics. But the blackpoll's route is where few would dare flutter: a long-distance flight over the Atlantic Ocean.

Songbirds generally avoid ocean crossings. During migration, many species choose to stop and go, to touch down among trees where they can rest and refuel. But the blackpoll is a mariner this season. From its boreal breeding grounds, it moves southeast toward the coasts of maritime Canada, New England, and shoreline points south. Then something dramatic happens.

When crisp autumn winds blow from behind, the blackpoll – in what is less a leap of faith than a fine example of evolution – launches out to sea for three days and more than 2,000 miles of nonstop flapping toward the northern shores of South America.

At least that's the prevailing hypothesis. Although we can't track these warblers as they fly, we have ample evidence to support this iconoclastic route: lots of blackpolls at coastal sites in the fall, blackpolls spotted from ships at sea, and relatively few blackpolls in southeastern states and Central America (where we would expect to find them on a more terrestrial southbound route).

The sea and its trade winds welcome the arctic tern and American golden plover, celebrated transoceanic migrants. But a warbler? How can a woodland bird make a similar journey?

It does so with the same currency as the tern and the plover: fat. The blackpoll gains weight – a lot of weight. After breeding in July, the average blackpoll warbler weighs in at about 10 to 12 grams (no more than half an ounce) which means you could mail two blackpolls anywhere in the U.S. for the price of a first-class stamp. But before the fall flight, blackpolls nearly double their mass as they binge on insects, spiders, seeds, and fruit. They store the feast as fat and then burn it efficiently at sea.

Generally, the greater a bird's fat reserves (as a percentage of its body weight) the farther it can fly without pausing to refuel. After all, risks await birds during those rest stops, including uncertain habitat and predation by hawks, house cats, and other animals.

Yet, the benefits of fat reserves and nonstop flight carry their own risks. A bird focusing on food before migration may be less alert and an easier mark for predators. A fatter bird may lack the acceleration and agility necessary to avoid hawks and falcons in flight. And for a warbler over the ocean, there is no rest stop, no port in a storm.

On balance, the blackpoll warbler, more fat than feather, takes a course evolution has charted at sea. Making the flight from, say, Maine to Brazil, a blackpoll burns less fat than we find in a single serving of Ben & Jerry's Coffee Heath Bar Crunch.

If only the rest of us had such an effective use for ice cream.

Bryan Pfeiffer is an author, wildlife photographer, guide, and consulting naturalist who specializes in birds and insects. He lives in Montpelier, Vermont.

BRYAN PFEIFFER

MBC DESIGN / WARBLER: JIM BLOCK

By Todd McLeish

Low pH: what's a newt to do?

A new study of eastern red-spotted newts, by a biologist at Bennington College in Vermont, suggests that these amphibians are able to adapt to dramatically different aquatic conditions.

Elizabeth Sherman said that her research is often derived from "serendipitous walks through the forest." On a recent walk in the Green Mountains, she noticed several newts in a pond, and upon testing the water found the pH to be 4, a level acidic enough that she almost didn't believe her results. (Water is considered "neutral" at pH 7; pH 4 is 1,000 times more acidic than pH 7.) She tested several other ponds in the area, with similar results. Later, 15 miles away in the Taconic Mountains, she found newts living in pond water with a pH of 8.

"The chemical properties and buffering capabilities are very different among the Taconic and Green Mountains," Sherman said. "The Taconics are sitting over limestone that buffers the water. When I hike there, the water is very clear, but when I hike in the Greens, the water is tea-colored – an indication of the presence of big organic acids."

Sherman said that low pH (the lower the pH, the more acidic the water) drains amphibians of sodium ions, which are essential to their ability to regulate physiological processes. "If the pH is too low, they become overwhelmed and die," she said. But the Green Mountain newts have adapted to tolerate the unusual conditions.

In a study to assess the newts' pH tolerance, Sherman collected animals from ponds in the Green and Taconic Mountains and placed them in tanks of water with various pH levels. "Everybody did fine in the high-pH water, and everybody did fine in the low pH until it got below 4," Sherman said. "That's when we saw a distinction between the animals from the low-pH ponds and those from high pH-ponds. The high-pH newts from the Taconic Mountains died in the low-pH conditions after about 10 days."

Sherman also tested the newts' water preference by offering them a choice of water taken from Taconic or Green Mountain ponds. The Green Mountain newts had no clear preference, but the Taconic Mountain newts almost always selected Taconic water. In an effort to determine whether pH was the only factor in the newts' water choice, Sherman offered them high- or low-pH water from her laboratory. They all chose high-pH water.

"Here's what I think is going on," said Sherman. "The big organic acids in the low-pH Green Mountain water may be mitigating the problems that low pH typically causes for amphibians. But what's more important is that the newts, and perhaps other animals, may be adapting to conditions that have been presented to them by humans. I'm not seeing newts dropping dead from low pH. I'm not seeing differences in the numbers of newts I'm finding in various ponds. We are now studying whether the differences among the newts from high- and low-pH ponds are due to divergent evolution or phenotypic plasticity."

ELIZABETH SHERMAN

Red-spotted newts were collected by biologist Elizabeth Sherman to test their ability to adapt to varying pH levels.

Pigeons give robots a bird's-eye view

Researchers from Harvard University and the Massachusetts Institute of Technology are attaching high-speed cameras to pigeons to gain insight into how the birds navigate through dense forests and around other obstacles. They believe this information may lead to new developments in robotics and auto-pilot technologies.

"Most bird navigation studies have looked at the larger context of migration," said Harvard's Huai-Ti Lin. "We're interested in short-range path finding, how to get from point A to point B, in the context of the forest environment or obstacles in an urban environment."

Attaching a camera to the birds, and filming them from several other angles, enables the researchers to reconstruct both what the birds see and how they move. Pigeons were selected as study subjects because they are easily trained, are

very maneuverable, and their 300-degree panoramic vision allows them to assess obstacles on either side.

The researchers tracked pigeons as they flew through an indoor track with artificial trees as obstacles, then conducted an optical analysis of the film to identify what information was prominent from the bird's-eye view. Among other things, they found that the birds most often chose the straightest route through the obstacles, and they exited the course heading in the same direction as they entered, despite making numerous twists and turns.

"These birds don't seem to plan very far ahead, which is surprising because they could see far ahead," said Lin. "Depth perception is tricky for birds with that kind of vision. If they try to plan too far ahead, they don't have enough information to tell them which way to go. Some information is only available to them as they are approaching obstacles."

The researchers believe that flying animals use a set of simple rules to determine how to maneuver around obstacles, and those rules can be applied in a variety of engineering technologies. Lin's collaborators at MIT are using the pigeon data to develop an obstacle avoidance algorithm for flying robots that may be developed in the future. "If there are simple rules of thumb in biology that get you through obstacles without causing much damage," Lin said, "then that could be a good rule to apply in robotics," including unmanned aircraft that must navigate through nonuniform environments.

TALIA MOORE

A pigeon gets ready to fly through an obstacle course, a high-speed camera attached to his head.

The next step for Lin and his colleagues is to determine if the obstacle avoidance rules birds use over a short course are also used over longer routes, at higher speeds, and through denser forest environments. The next course they build will include obstacles that move in real time, forcing the birds to make last-second changes to their route.

A comeback through cloning

American elms were once a favorite tree in urban landscapes across America, prized for their elegant shape. When Dutch elm disease found its way to the United States in the 1930s, it slowly moved across the continent and killed nearly 95 percent of the population. The pathogen continues to infect trees not previously exposed.

Most efforts to clone healthy, mature elms for studies of resistance and conservation have failed. Now a research team from the University of Guelph in southwestern Ontario has succeeded in developing a process for cloning the trees that they say can quickly produce thousands of plants.

"We want to make a collection of American elms from those that have survived over a long period of time and preserve that germplasm. If we find that the specimens are resistant to the disease, we can use our cloning technology to make multiple plants and distribute them where they are needed," said Praveen Saxena, professor of plant agriculture. "Once you have a large population available, you could study them and select for disease resistance. When you clone plants, there are occasional genetic mutations, which might give us a clue to resistance."

Saxena said his process is akin to photocopying the trees. Starting with one mature tree, planted on the Guelph campus sometime between 1903 and 1915, the researchers collected fresh shoot tips and dormant buds and grew them on a culture medium to create genetic clones, which were separated, recultured, and planted in a greenhouse. Those plants are scheduled to be transplanted outdoors this year.

UNIVERSITY OF GUELPH

Several elm clones growing in the laboratory.

"The key to our success was that we figured out that the trees have high levels of plant growth regulators already," explained Saxena. "To optimize the plant hormone levels for multiplying, the key is to reduce hormone levels to effectively clone them." The hormones, or auxins, were reduced by adding an auxin inhibitor to the growth medium, which also reduced callusing at the cut end of the plants.

The researchers also learned that elm shoots and buds collected from April to June had reduced rates of contamination, better growth, and less browning than buds collected at other times of the year.

Writing in the Canadian Journal of Forest Research, Saxena and his colleagues said that their research provides "a framework to establish germplasm collections of other recalcitrant threatened and endangered woody plant species. Application of the techniques of genetic engineering can overcome many of the limitations associated with conventional breeding programs of tree species."

Saxena plans to continue his study of American elms and other trees to try to understand the genetic mechanism of disease resistance.

Last May 11, at our booth at the Northeastern Loggers' Association EXPO, Kathleen Wanner bought a chance, saying: *"Well, you never know, I could win."*

Kathleen's granddaughter, Annette

Sure enough she did, and today George Ainley's handcrafted Windsor chair sits proudly in her Chittenden, Vermont home. The chair raffle raised $4,700, which will go to support the Center for Northern Woodlands Education's mission of advancing a culture of stewardship in the Northeast. Thanks to all who entered the raffle, and congratulations Kathleen!

By Carl Demrow

Freeing a hung tree

When felling trees, Plan A has the tree falling right where you want it to go. Once you hang one up, though – and even the best of us do – the game changes and it's time for Plan B. If you've got the equipment, you could just put a chain around the bole and pull, but the following trick may work if a chain's not handy. It's especially helpful if you are cutting sawlogs, because if it works, it will keep the valuable butt log intact. The one catch is that the tree needs to still be attached to the stump for this to work

Start by taking a good look at your tree and how it is hung up. You'll have to make a decision: Are you going to try to make the tree move to the left or the right? A lot of this will depend on where your tree is relative to the main stem of the tree it is stuck in. Generally, you will want to try to move your hung tree away from that main stem.

Once you've determined the direction you want to go, the next step is to saw an undercut notch into the stump under your semi-felled tree at three- or nine-o'clock (assuming your half-felled tree is at noon). Make the bottom or slanted cut of the notch first, cutting up until you reach the hinge wood, then cut out the section of hinge above your undercut. This type of notch is known as a Humboldt notch, and is commonly used on large-diameter trees in the west. Your undercut notch face should be angled toward the direction you want the tree to fall or roll in, and should go nearly halfway through the stump. If your hinge sheared or is largely broken, make the cut carefully and set wedges as you go to keep your bar from getting pinched.

Creating the undercut notch removes wood that is helping to support the tree and places the remaining section of the hinge under tension. Next, cut the remaining hinge wood starting at the back behind your new undercut hinge. Depending on how the tree is balanced, it may just slide off the stump or it may twist. It may also stay put, but with half of the original supporting wood and all of your hinge now gone, just a little bit of leverage should get the tree off the stump. If it hasn't come down by the time it slides off the stump, then it is probably time for Plan C. But that's another column.

Now see it all in action. Head to **NorthernWoodlands.org** for a video of Plan B and Plan C.

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By Robert Kimber

Baffling Beavers

Whenever the interests of animals come into conflict with the interests of human beings, I'm inclined to side with the animals. There are just too many instances in which animals have gotten the short end of the stick. So even with species like beaver, that are no longer threatened and are even thriving in environments considerably altered by humankind, I tend to accommodate animals and let them have their way.

Then, too, where beavers are concerned, I've always had a particularly soft spot in my heart. Anyone who imbibed a Yankee work ethic with his mother's milk, as I did, can't help but think well of beavers, and it's not just their hard-working ways that recommend them. They have other virtues that make them model citizens. They mate for life, raise well-behaved kits, don't kill, don't steal, mind their own business, and don't covet their neighbors' houses or wives (though they are territorial and don't take kindly to invasions of their turf). And like all model citizens, they exert an influence for good that extends beyond their immediate circle and is felt by generations to come. The wetlands their dams create provide habitat for myriad other creatures, ranging from wood ducks to mink and muskrat, salamanders and crayfish, not to mention the woodpeckers that hollow out their nesting cavities in water-killed trees and feed on the insects drawn to the rotting wood. The list of animals that benefit from beaver flowages and meadows that remain long after the beavers have abandoned them goes on and on. And then one of the great treats of roaming the Maine woods is following small streams up into the hills and finding one abandoned beaver meadow after another, like the stepped terraces of some ancient Inca site in Peru.

Mindful of all these benefits beavers provide their fellow creatures both great and small – including us humans – I've done my best to stay on friendly terms with the beavers that live in the stretch of Temple Stream behind our house. That has demanded some willingness to compromise, on both my part and theirs, because we have had our differences over the management of the drainage ditches in our hayfield. Unwilling to see that field turned into a beaver pond, I want to keep the ditches clear so the water that flows under Intervale Road through two huge culverts can continue on its way into Temple Stream. The beavers want the ditches dammed to give them water access to the alders, willow, and young birch trees growing along the ditches.

The solution we've arrived at is a tug-of-war conducted over the summer months. I tear a hole in the dam large enough to drain the water down to the level I want. That night, the beavers build it back up to the level they want. We go back and forth like this a few times until the beavers give up. I've always assumed, perhaps wrongly, that the beavers realize that it's a waste of time and energy repairing this constantly disappearing dam when they could be filling their winter food cache from more productive and more stable foraging areas closer to home.

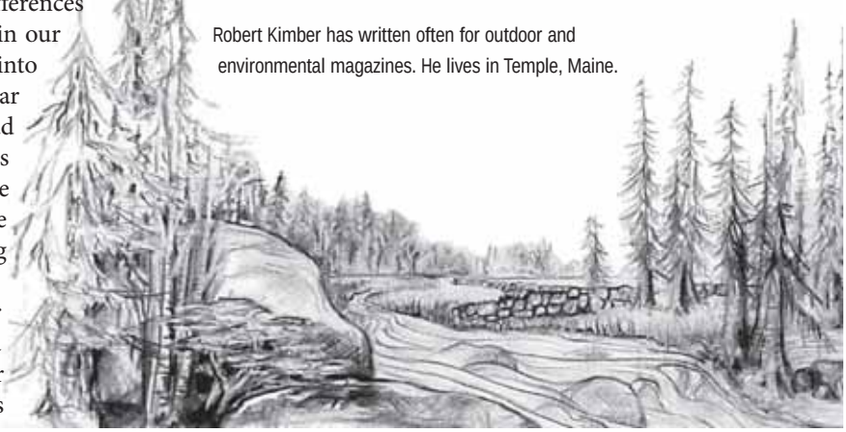
This arrangement has served us well for the last four decades. Our friend Charlie, who does the haying on our place, has been able to mow and rake and ted and bale without sinking hub deep in mud and water, and the beavers, ever hopeful, have returned every year to have another go at colonizing this outpost.

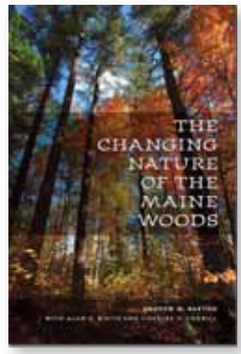
But now it appears the game has changed. In the summer of 2011, Temple's road commissioner had to install heavy wire-mesh fencing on the far side of the Intervale Road to prevent the beavers from plugging the culverts there and flooding the road. And after I thought the beavers on my side of the road and I had reached our equilibrium point last August, I didn't return to check on them again until well into October, when I found the dam had been raised to a height and thickness never achieved before. I may have been able to baffle my beavers up to now with our dam-wrecking and dam-repairing routine, but Temple's growing beaver population is forcing me, along with Temple's road commissioner, to come up with better means of coexisting peacefully with our beaver neighbors.

Fortunately, the resurgence of beavers throughout the Northeast has inspired a wave of effective beaver baffler designs dealing with my problem. The basic idea is to install a pipe long enough and of large enough diameter to extend through the dam, keeping the pool drained to the level you want to maintain.

I'll have one of these in place well before the leaves start turning this fall, and what I'll particularly enjoy about this project is that while it may appear to be baffling the beavers, what it's really doing is accommodating them.

Robert Kimber has written often for outdoor and environmental magazines. He lives in Temple, Maine.





Life Everlasting: The Animal Way of Death

By Bernd Heinrich
Houghton Mifflin Harcourt, 2012

On a December morning, a decapitated buck, one leg hacked off, showed up in a gully near my home. Once I deciphered what was bleeding in the tawny leaves, I begged my neighbor with a backhoe to do something. "We don't have to," he smiled. I wondered. By day three, only a tuft of pelt remained. Who convened to consume the buck? I longed to know more about the gift economy of death. Then I received Bernd Heinrich's Life Everlasting.

Professor Heinrich's sixteenth book is a primer and meditation on the uses of mortality in the natural world, inspired by a letter from a terminally ill friend requesting a green burial on the author's land in Maine. Rejecting the waste, pollution, and isolation of western funeral practices, the friend writes, "Death is … also a wild celebration of renewal, with our substance hosting the party."

In 194 pages, Heinrich transports the reader to the movable feast of hunter, scavenger, and prey: intricate dances of interdependence linking bacterium, virus, fungus, weed, maple, beetle, mouse, botfly, raven, salmon, elephant, and whale. Heinrich learned about the hunger dance as a refugee child after World War II. His family survived by trawling the German forest for acorns, mushrooms, roots, berries, rodents, or the larger windfalls luck would offer. When he and his sister found a dead elk, their parents, like cats or ravens, concealed it with brush. Only the proximity of civilization keeps scavengers from their prize. Reflecting on his youth, he writes, "I think I was then a dyed-in-the-wool predator."

Heinrich's evenhanded empathy for hunter, scavenger, and prey enriches his scientific inquiry. For each tale told, he assures us, many more could be spun. Through his eyes, the reader witnesses the sky dance of ravens, the noble undertaking of vultures, the suicidal spawning rites of salmon, the drowning death of whales, the metamorphosis of the sphinx moth, and human rites that plan for transformation.

Heinrich's tone is casual, lyrical, and often jovial. In forest or jungle, his gusto for any carcass and its guests is contagious. "The fresh mouse … I put out this morning is no longer visible," he effuses in his journal. The mouse's disappearance is the undertaking of burial beetles. They lie on their backs together to "walk" the dead mouse to a burial destination, spray it with a personal antibiotic to retard spoilage, lay eggs nearby, and harvest the carcass for their larvae, which crawl over to the carcass upon hatching. So it goes: with death comes deep sustenance from the salmon, the elephant, the giant tortoise, or the tiny grub.

Always alert to teachable moments, Heinrich invites students to his place in Maine, where a road-kill doe putrefies in the meadowsweet. The revelers, with their elderberry wine and maudlin songs, keep "the big guys" at bay, while the botflies make a meal of the deer. A fitting wake, he thinks. "I might be envious, were it my turn to return to the cycle of life."

Heinrich illustrates the text. His rendering of mated ravens, "in portrait and while preening each other," is soft and tender, as if to say, until you draw them, you don't know them. The reader marvels at his stamina: the details of his data and the global significance of his insight. Detective, advocate, philosopher, who is he? How did one man figure all this out? Google "Bernd Heinrich." Deadpan Wikipedia mentions that the prolific professor emeritus, now 72, can run a hundred miles in record time. Like a persistence hunter of the Kalahari Desert, the author may exhaust an antelope, yet he never leaves the reader in the dust.

Verandah Porche

The Changing Nature of the Maine Woods

By Andrew M. Barton with Alan S. White and Charles V. Cogbill
University of New Hampshire Press, 2012

One thing that still amazes me about living and working in Maine is the amount of ecological diversity one can find in a fairly small area. The other day, I came across a black spruce stand in the southernmost corner of the state where I would have expected red spruce to be growing. The glacial outwash plain, covered with a dense rank of uniform, small-crowned conifers, reminded me more of forests I have seen in central Labrador than anything I have witnessed in Maine, save for a few locations near the St. John River near Quebec. Only the white carpet of caribou lichen and swarms of midsummer black flies were missing.

And yet this site is only 10 miles from Maine's Mount Agamenticus, which Drew Barton and his co-authors in The Changing Nature of the Maine Woods describe as being more reminiscent of southern New England, or even Virginia. At Mount Agamenticus, one can find a temperate deciduous hardwood forest with species such as chestnut oak, shagbark hickory, sweet birch, sassafras, and mountain laurel.

The Changing Nature of the Maine Woods traces the history of Maine's forests from the end of the last ice age through the present, describes current forest conditions, and offers a glimpse at changes that may occur in the future. Pollen grains found in peat bog cores indicate that spruce, which is characteristic of Maine's northern and maritime forests, was abundant shortly after the glaciers receded, but then virtually disappeared about 10,000 years ago, only reappearing about 1,000 years before the present as

the earth's climate suddenly cooled. At the same time spruce disappeared, white pine appeared and soon became much more plentiful than it is today. Significant amounts of charcoal in lake sediments when white pine was most abundant suggest a warm, dry climate and frequent forest fires caused by lightning. Maps, charts, and text describe how the major species that comprise Maine's forests today have come and gone over time and migrated at different speeds and in different patterns across the landscape of eastern North America since the end of the last ice age.

Charles Cogbill's database of over 23,000 witness trees that were noted in land surveyor's records provides a picture of what tree species were found across the state at the time of European settlement. The authors use this information and data from the few remnants of old-growth forest as benchmarks in their review of forest changes from the Colonial era to the present. Unlike most of New England, Maine's forests were never extensively cleared for agriculture, so the ecological and human history account is different than that of neighboring states.

Looking forward, the book covers the factors that contribute to the diversity of Maine's ecoregions today, and discusses potential changes due to acid rain, land-use change, climate change, and what the authors call a "rogues gallery" of invasive insects, pests, and diseases.

The book is more than a simple compilation of the changes in Maine's forests over time. The authors show how scientific thinking has evolved and why some debates are still far from settled, such as the debate over what caused the sudden disappearance of the late Pleistocene "megafauna." The authors have distilled information from hundreds of scientific sources and decades of professional experience and presented the synthesis in an easy-to-read narrative that readers without technical expertise will enjoy. However, this book is sufficiently detailed that forest professionals will also find it well stocked with useful information.

Robert Bryan

The Mindful Carnivore: A Vegetarian's Hunt for Sustenance

By Tovar Cerulli
Pegasus Books, 2012

Environmentally conscious Americans have been partaking, for some time now, in long, spirited, and often muddied discussions about energy. Whether it's wind, hydro, wood, nuclear, natural gas, or solar, we've come to understand that every form of energy comes with some sort of ecological cost.

In The Mindful Carnivore, Tovar Cerulli explores how food, like other forms of energy, comes with an ecological cost. His desire to minimize those costs led him to be a vegan, and later a hunter. It's that transformation – from carrot cruncher to tenderloin taster – that makes up the narrative of the book.

Cerulli's book serves as a well-reasoned blueprint for why people hunt – particularly why they hunt white-tailed deer, an animal most woodlot owners are all too familiar with. It also pulls back the curtain on the steep environmental demands of the developed world's food system. You sense early on that even when he was filling his craw with hummus, Cerulli struggled with people who refused to consider the toll big agriculture exacts on landscapes and water tables, not to mention its dependence on fossil fuels.

Cerulli was already contemplating his role in this system when his doctor suggested that he needed more protein in his diet. As the book progresses, he begins to eat eggs, then fish, and then chicken. Not long after, encouraged by friends,

Starting the First Fire, Autumn

Once again we start to act hospitably.
Today we blackened the stove, swept up
The spiders from the wood box, split kindling.
Tonight's frost recalls debilities
More thorough than a chill or twinge.
We didn't perish like plants; we weren't houseflies:
The pungence of brevity was our false pride.
Now warmth suffices for philosophy.
The fire says it is the fire it was before,
That there is only one fire, the way
There is only one single earth or sky.
My hand in the light is faintly freckled but
Age doesn't figure in this basic mathematic.
Fire is not calculable like bodies.
We keep living the same life over and over…
Distinction blurs like embers turning cold.
We sit beside this familiar heat
On a night so deep it could never be rehearsed.

BARON WORMSER, from
Atoms, Soul Music and Other Poems
Paris Review Editions, 1989
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family, and a chance encounter with a well-mannered hunter on his central Vermont property, he turns to hunting. It seems like a natural progression, really, for a guy who gardens and logs and tries to live like a localvore.

Exactly what drove Cerulli from the salad bar to the tree stand is a pretty personal story. Certainly not every hunter is motivated by the same forces that inspired Cerulli, and his story will likely not cause every vegetarian to reconsider the lack of meat in their diet. Ultimately, Cerulli's point is that food doesn't just come from the grocery store; it can, in fact, come from the beech ridge on the back 40 or the overgrown apple orchard on the outskirts of town.

If you're already a mindful hunter, much of the ground Cerulli covers will be familiar. He quotes liberally from the likes of Aldo Leopold, Ted Kerasote, Richard Nelson, and José Ortega y Gasset. Like a jazz musician, Cerulli picks up their riffs, noodles around a bit, and lays down a few solid tracks that are distinctly his. It's an old story, but Cerulli's version is worth reading anyway.

Thankfully, there's not a lot of navel gazing when Cerulli kills – first fish, then a snowshoe hare, and eventually deer. He touches briefly on the soul-searching and the sense of remorse most hunters face when the life leaves an animal's body, but he doesn't dose the reader heavily with the drama.

Cerulli doesn't deliver the definitive manuscript on why humans hunt – and that clearly wasn't his aim. This is the story about a man coming to the realization that if he wanted to make peace with his food, he was going to have to head into the woods to do it.

Matt Crawford

These prices are for #1 hardwood logs, at least 8 feet long, with three clear faces and a minimum 12-inch top diameter. In the timber world, this is a log of average quality, not a prime sawlog and not a poor one.

Landowners should remember that the dollar amount here indicates what is being paid for logs that have been felled, limbed, skidded, bucked, and delivered to a mill or buyer. The costs of logging and trucking need to be subtracted from these figures to arrive at the price paid to the landowner. Because every job is different, these costs vary widely.

These data are compiled from interviews with suppliers and buyers and from the most recent print and online versions of the *Sawlog Bulletin,* and are used by permission. For more information on the *Sawlog Bulletin*, call (603) 444-2549 or go to sawlogbulletin.org. Please note that many of these prices were reported three months prior to our publication date, and current prices could be higher or lower.

	NY	VT	NH	ME
DOLLARS PER THOUSAND BOARD FEET				
White Ash	304	338	350	340
White Birch	350	200	325	350
Yellow Birch	338	438	433	505
Black Cherry	483	433	358	NA
Sugar Maple	556	531	475	450
Red Maple	279	300	325	200
Red Oak	379	419	392	NA

Logs scaled with the International 1/4-inch Rule.
Prices compiled August 1, 2012.

The Goods on Woods

We've been reporting hardwood mill prices for 18 years, so by now many of you are familiar with the ups and downs of the big four (maple, oak, yellow birch, cherry) and the little three (ash, white birch, red maple). But what about the hardwood species we don't cover on this page? Here's a quick snapshot of what mills are paying for other hardwood lumber species in our region.

Based on reports from nine mills in New York, average-quality **hickory** sawlogs are currently bringing $209/MBF (MBF means 1,000 board feet). The handful of reports we received from Vermont and New Hampshire indicate that the prices there are about the same. Ryan Collins, a log buyer for Baillie Lumber Company, said that he's paying the same for shagbark and bitternut on a price per grade basis, but shagbark doesn't typically grade out as well. When asked why hickory is not more competitive with oak, he said he doesn't have a good answer. Some is availability: there's more nice red oak. Some is simply what the market wants. "More of the log market is driven by fashion than people are willing to admit," he said.

Average **beech** sawlogs are bringing $179/MBF, this from eight reports from around the region. If there's 4,000 feet on a log truck, you'd gross about $700 for this load of beech; if you sold the same load as firewood at $110 a cord, you'd gross around $880. This seems to suggest that in areas with healthy firewood or pulp markets, there may not be any such thing as an average beech sawlog anymore – you'd be better off selling less-than-stellar logs to a firewood processor or a pulpmill than to a sawmill. Basswood and yellow poplar, our soft hardwood species, are in the same ballpark as beech. Reports from nine mills have **basswood** sawlogs going for around $175/MBF. **Yellow poplar** is averaging $170/MBF.

Black locust, a midwestern native that has naturalized and found a niche in parts of New York and New England, is quite valuable. The four mills we found that are buying it are paying around $550/MBF for average stuff. We found a pitched debate on one wood forum about the merits of locust flooring, with one passionate proponent proclaiming: "It's gorgeous! Picture the grain of oak and color it with gold and add a glow that shifts in the light." When someone asked, "But isn't it hard to work?", he shot back, "Use sharper tools."

There are still markets, albeit spotty ones, for **butternut** and **elm**, even though both species have been ravaged by disease and good logs are hard, if not impossible, to find. Average butternut sawlogs are being sold from $150/MBF to $450/MBF throughout the region; elm's averaging $150/MBF to $300/MBF. We asked Bill Sayre, a log buyer for A. Johnson Company, why these now rare species aren't commanding a premium. He told us that in both cases demand is declining faster than supply. There's also the matter of what economists call "the substitution effect": in light of the shortage, buyers have simply switched to other species.

The bright spot amongst these unreported species? **Black walnut**. Middle-of-the-road sawlogs averaged $790/MBF in a survey of 10 mills in New York. For exceptional wood, one mill was paying as much as $8,000/MBF for slicer veneer logs. All of this makes us think Jack Saul's family had the right idea when they planted black walnuts in their tree plantation twenty-plus years ago (Stewardship Story, page 17).

Figured black walnut.

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Ad Index

A. Johnson Co. 8
Allard Lumber Company 22
American Forest Foundation 66
Bay State Forestry Services 7
Berry, Dunn, McNeil, & Parker 69
Britton Lumber Co., Inc. 7
Cersosimo Lumber Co., Inc. 8
Cersosimo Mill 52
Champlain Hardwoods 6
Chippers 52
Classifieds 62
Coldwell Banker Residential Brokerage 14
Columbia Forest Products 70
Consulting Foresters 9
Econoburn ..... inside front cover
Farm Credit 6
Fine Furniture Festival 14
ForesTech Resource Solutions, LLC 33
Fountains Forestry 33
Fountains Land 58
Gagnon Lumber Inc. 56
Garland Mill Timberframes 50
Hancock Lumber Co 53
Harwood Forestry Services, Inc. 53
Hull Forest Products 59
Innovative Natural Resource Solutions 56
Itasca Greenhouse 59
L.W. Greenwood 6
Land & Mowing Solutions, LLC 22
LandVest Realty ..... inside back cover
LandVest, Inc. 68
Liberty Head Post & Beam 52
Lyme Timber 66
Maine Forest Service 58
McNeil Generating 8
Meadowsend 68
N.E.W.T.: Northeast Woodland Training 53
NE Wood Pellet 14
NEFF 53
NJD Publishing 52
Northland Forest Products 69
Oesco Inc 14
Sustainable Forestry Initiative 50
SWOAM 52
Taylor-Palmer Agency, Inc. 8
Tilton Equipment Company 33
Timberhomes, LLC 7
University of Maine ..... back cover
Vermont Woodlands Association 22
VWACCF 12
Wagner Lumber 59
Watershed Fine Furniture 33
WBCJ&P, LLP 50
Wells River Savings Bank 58
West Branch Pond Camps 7
Woodwise Land, Inc 69

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Bryan Nash Gill, Leader, 2011, 30.5" x 21.5", relief print on Okawara paper, 80 years printed

We often come to understand things by isolating them. We pluck something from its environment, look at it under the microscope, and the knowledge we gain helps clarify our understanding of the object and, by extension, the world. We are all natural history investigators at some point in our lives.

Bryan Nash Gill has developed an artistic practice that revolves around investigation. From the woods near his large studio in northwestern Connecticut, Gill extracts information from dead and damaged trees. As Gill explained, "When a tree comes to me, or when I know a tree is being taken down, I'll cut up what I want, often looking for a specific area, such as where the tree divides or branches intersect. And I'll keep cutting until I find something in the cross section that I think is engaging, until I have something I can work with." Gill's art might be the result of a lightning strike, tap-hole scars, insect infestations, or simply the mesmerizing patterns of the growth rings alone.

Gill's tools include a chainsaw, a hand planer, a belt sander, a Bunsen burner, a wire brush, and a spoon. After cutting and sanding the block, Gill burns the surface of the cross cut to enhance the texture of the growth rings and then seals it with shellac. The block is then inked and paper or cloth is carefully placed over the surface; it is then carefully burnished by hand or with a spoon.

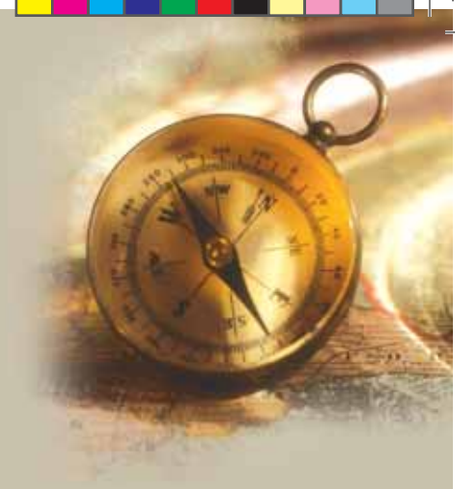
Leader is a print made from a cross section of an 80-year-old ash tree. Like a cartographer, Gill points to where the trunk has divided in two, where a rotted branch healed over (lower right), to the included bark in the center. It is a map of time, weather, disease, and growth: a specific history illuminated by Gill's labor-intensive artistic process.

Gill's woodprints are real, unique, and often stunning. They are a reminder of the histories that lay hidden in our natural environment.
— Adelaide Tyrol

Woodcut, a book about Bryan Nash Gill's work, has just been published by Princeton Architectural Press, New York. His work is found in many private and public collections, including IBM Corporation in New York and the Boston Public Library. There is an upcoming exhibition of his work at Homer Babbidge Library's Norman D. Stevens Gallery, University of Connecticut from October 29, 2012 to February 22, 2013. Bryan can be contacted through his website: www.bryannashgill.com

Call for entries: Send us your Outdoor Palette submissions. Contact Adelaide Tyrol at (802) 454-7841 or atyrol@ostudio.com for details.

Julia Shipley



The Road to Town

The Creek Road is a half-dirt, half-paved thoroughfare in Northern Vermont. It runs two trucks wide in some places, one in others, crisscrossing watercourses – first the Black River, then Lord's Creek. Helical, you might think if you saw this interplay of creek and road from above, like two strands in a hank of twine.

On a moonless night, it seems the Milky Way floats over the road like mist clings to a river.

The road spends 10 miles traveling north, tying Craftsbury Village to Irasburg Common, communities of barely a thousand people. The houses beside the road are modest and infrequent, often a hay field apart. Instead of knowing the faces behind each place, you might just know the mailbox, a proxy, the way the scarecrow stands in for the farmer. They keep to themselves. Except you'll come to learn, eventually, a little, such as his wife died of cancer or they had a son over in Iraq.

If you grew up here you call it the Crick Road, and thus, my calling it the Creek, well, now you know I'm from away. Yet I dare say I know a fifth of this road, the two miles from my dooryard to the village, better than anyone, for having walked the stretch prit' near a thousand times. Through my forays back and forth, to run the dog, to fetch the mail, and to heel my racing mind, my means of getting from one place to another has become a place itself.

Ah, but what do I really know of this road, and moreover, what is the value of it?

I know that cobalt Bud Light is the beer most frequently pitched, and it gleams like tiny silos, toppled amid the bedstraw and clover.

I know that an elderly man who lived in the village, across from the Catholic Church, used to hang a single pair of red briefs, the color of a rooster's wattles, on his front porch laundry line for all to see.

I know that Eddy Williams stores his tractor in a chocolate-brown garage spruced up with posters of puppies and God Bless America.

I know the buckeye tree with a handwritten warning tacked on it: Don't Eat. I know the Chases' black dog that likes to sneak up and then bark, the house the color of margarine that sits vacant all winter, the seeps that buckle the road come spring, the field where I watched the Reil boys catch grasshoppers, the field where autumn milkweed seeds rise and drift like the nicest utterances of a curmudgeon.

I know the rogue apple trees that are exactly one devouring apart.

I have seen bear's tracks in the road like a fork rasped across mashed potatoes, and the huge mud-clod prints of moose.

I have followed the color yellow as it goes moseying from coltsfoot to marsh marigold, into dandelion then buttercup, from bird's foot trefoil to black-eyed Susan to goldenrod and, finally, through every popple leaf.

And all this? It is my invented song of belonging. Irish poet Patrick Kavanagh relates his dismay and pride for the little he knows and owns in the final lines of his poem, "Inniskeen Road".

July Night,
A road, a mile of kingdom, I am king
Of banks and stones and every blooming thing.

Which makes me, maybe, Queen.

Of the beer cans and the burdock, the rumors and hunters, the vistas of cornfield backed by hills and mountains, the straightaway shaded in hemlocks, the mast-sized white pines, the pull-off by the Whitney Brook, the mailbox with its busted maw. Here I am, year after year, walking back and forth to the village, writing my own right of way, the lyrics to my song of belonging, meanwhile the liquid twins of the road, Black River and Lord's Creek, keep running north, up out of the county, into Canada, and eventually the sea.

More of Julia Shipley's writing about place, especially roads, can be found in Wildbranch: An Anthology of Nature, Environmental and Place-Based Writing.

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