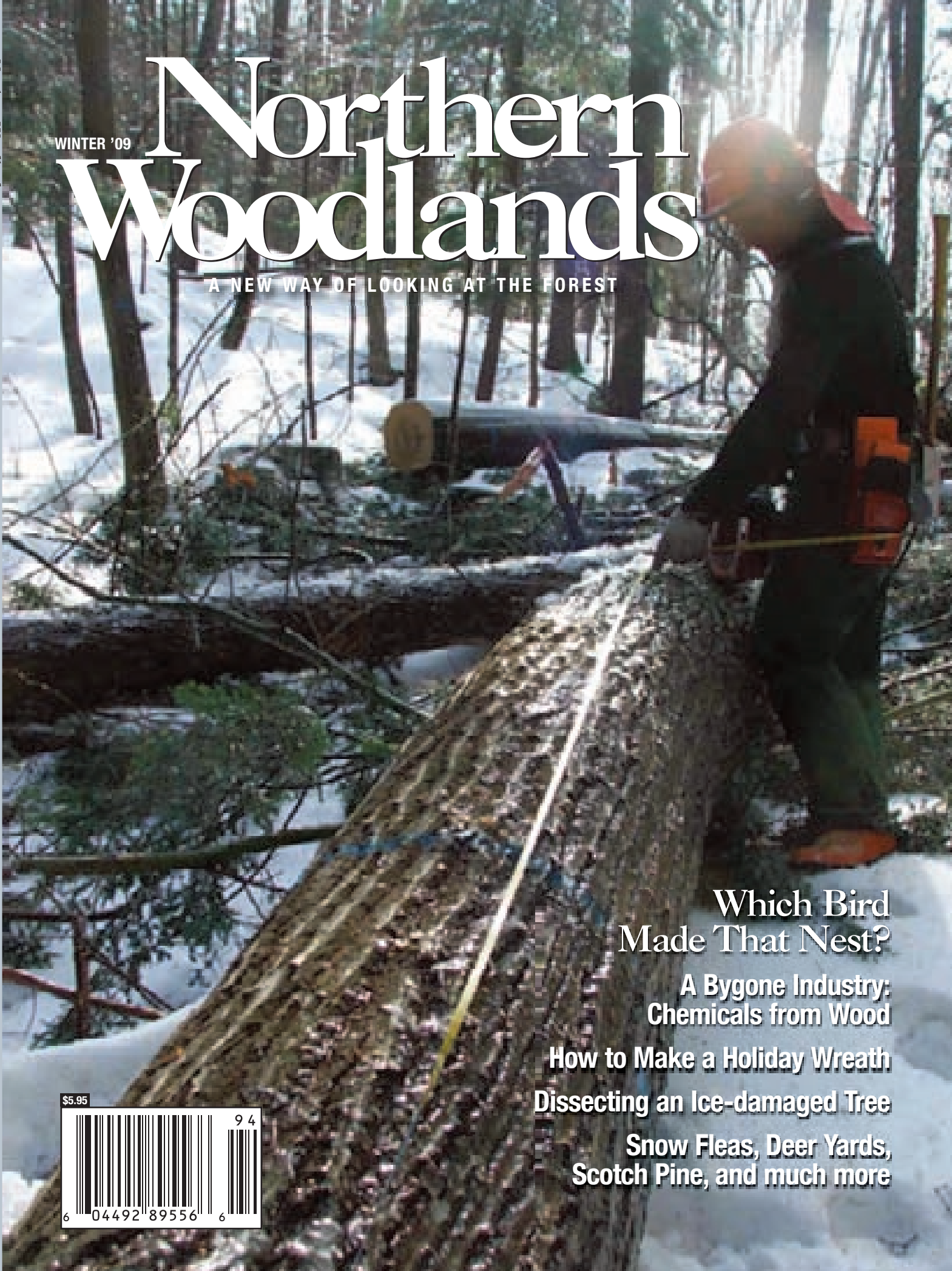

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Northern Woodlands' mission

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

From the center

"Follow the money" was Deep Throat's advice to Woodward and Bernstein as they investigated the Watergate break-in, and it has also been the watchword for people trying to figure out who is funding a politician or a nonprofit.

At the Center for Northern Woodlands Education, we do regular, ongoing financial analysis of our operations, and in the midst of this economic slowdown, we pay even closer attention. We thought our readers would be interested to know where our funding comes from, and, since our fiscal year has recently ended, we have good, up-to-date information we can share.

Who doesn't love a good pie chart? The accompanying chart gives the big picture of where our revenues came from this past year. Despite the challenges, we're pleased to be able to report a successful year. The percentages shown are all based on our total revenues of $554,000, which is within the range of our revenues for the last few years. On the strength of that, we have been able to increase our cash reserves over the past 12 months.

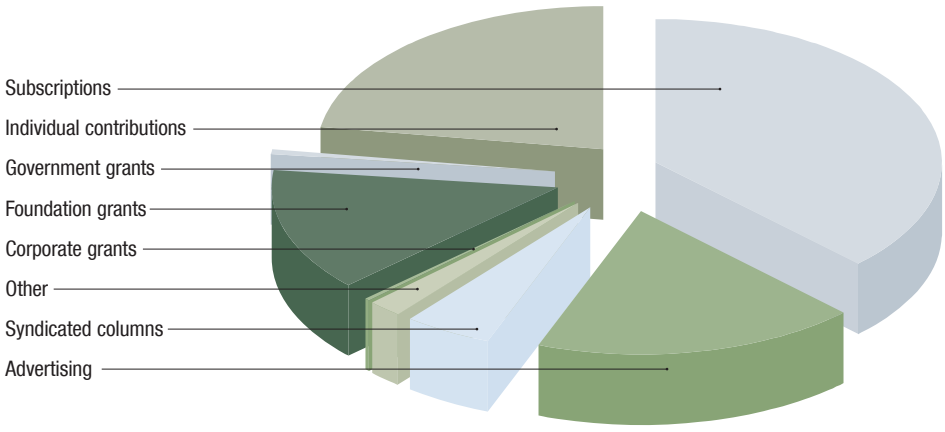
As can be expected, because our advertisers are suffering, our advertising income has fallen off some this past year. Two years ago, advertising was 22 percent of our total revenue; this year, it dropped to 18 percent. As you read through this edition of *Northern Woodlands*, take special note of our advertisers, each one making the commitment to maintain their presence in front of our 15,000 readers. We thank them for having the confidence to keep advertising in tough times and for supporting our work.

What I find most remarkable about the chart – and well worth trumpeting – is how much of our funding comes from individuals. If you combine subscriptions with individual contributions (those are donations on top of the cost of the subscription), that accounts for 60 percent of our budget. That is truly impressive. So when you follow the money that funds our efforts, the trail leads to you, our readers.

On page 68, we list all of those generous individuals, businesses, government agencies, and foundations who have supported our efforts this year. Thank you for helping us continue to do this important work.

Let me close with another word of thanks, this one to Charlie Levesque, who has just completed his term on our board. Charlie served as board president for the last four years, a crucial time for us in our short history as a nonprofit. He was the right man at the right time, bringing to the organization a focus and a discipline that has served us well and ensured that we are on the right track.

Succeeding Charlie as president is Julia Emlen, of Seekonk, Massachusetts. We are grateful to her for taking on this important role. We are also pleased to welcome two new members of the board, Tom Ciardelli of Hanover, New Hampshire, and Timothy Fritzinger of Essex, Massachusetts.—Stephen Long



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In this Issue

Cover photo by Krista Muller

In 2008, photographer Krista Muller accompanied Willem van Loon and his German Shepard, Kita, to a job site in West Brattleboro, Vermont. She remembers the shot being challenging, on account of deep snow, a fast-moving subject, extreme cold, and a dog that enjoyed helping a little too much. "Watching Wim in the field, doing a job that he enjoyed, that he talked about every day, made me proud to be a part of that moment," said Muller.

A Look at the Season's Main Events

By Virginia Barlow

	DECEMBER	JANUARY	FEBRUARY
First week	Goldthread stays green all winter. It is a small plant with three-lobed, toothed, shiny leaves / Raccoons and skunks are nomads with a limited sense of territorial ownership. They'll sometimes take turns using the same woodchuck hole for temporary shelter / Beavers and muskrats must adjust the structure of their lodges to accommodate various water levels. Winter floods or, conversely, a significant drop in water level, combined with a hard freeze, can mean death	Jan. 3-4: The Quadrantids meteor shower may produce up to 40 meteors per hour. Best viewing is after midnight / Now the birds are down to a skeleton crew: chickadees, blue jays, a couple of nuthatches, and a few woodpeckers are holding down the fort. Other species pitch in from time to time to brighten the day / Red foxes can't easily walk through snow that is more than 6 inches deep. They can bound over deeper snow, but that requires far more energy	Hawthorn fruits are nobody's favorite, but they stay on the tree and are valuable emergency food / With body temperatures now near 40 degrees, woodchucks awaken in their burrows every few days, raise their temperatures to over 94 degrees and urinate / Beginning of the nesting season for great horned owls, our earliest nesters / The viburnums, such as nannyberry and hobblebush, have naked buds, with no bud scales. You can see their miniature leaves all winter
Second week	Dec. 13-14: The Geminid meteor shower peaks. This reliable, multi-colored shower is on a nearly moonless night this year / December to March is a good time to look for bald eagles fishing in open water below dams. Bald eagles can live for over 30 years in the wild / The brown upright seed stalks of Indian pipes often remain right through the winter and sometimes through the following summer / Lichens are an important part of a flying squirrel's winter diet	Honeybees also appreciate the January thaw. On a warm day they can leave the hive briefly and void their accumulated excrement / The Virginia opossum is the first marsupial in North America since the asteroid hit. They came from South America 2 million years ago and now are wintering farther north in New England each year / During bad weather, mink will stay in their dens, usually near water, under tree roots, or in old muskrat or beaver bank burrows	Tan galls that stay on oak trees all winter and look like ping pong balls are called oak apple galls and are made by a wasp / Most mammals sit tight during a snowstorm, tucked in their dens. Wait two days and the woods will be full of their tracks / Look for common golden-eyes and common mergansers on ice-free sections of large rivers / Brown creepers typically fly to the base of a tree and then walk up it in a spiral pattern, picking off insects as they go
Third week	Crabapples are favorites of cedar waxwings, and the birds sometimes descend in huge numbers to clean out the fruits / Underwater excursions in winter can drop a beaver's core body temperature to below 93°F. Back in the lodge, the beaver warms up within 60 minutes. / The bills of evening grosbeaks are strong as well as large; they can even open cherry pits / Cow-parsnip stalks grow to 10 feet tall and their hollow stems may now be harboring a variety of insects	Although beavers pack away a lot of branches for winter food, they spend the winter in relative poverty. Their tails, used for fat storage, are usually smaller in the spring / Male chickadees begin the songs that will help establish their breeding territories: "feebee, feebee;" the first note higher than the second / Birds and small mammals are an important part of a mink's winter diet. Mink don't like to spend a lot of time under water in the winter	Sugar maple sap is rising; watch for red squirrels chewing on branch tips to lap up sap / Acrobatic aerial courtship displays by ravens are under way. Rolling, tumbling, and soaring are accompanied by the loud territorial call, a resonating "quork" / Meadow voles breed almost year round. Fortunately, they are eaten year-round, too, and are now a major food of hawks and owls / Coyotes are sexually active. Five to nine pups will be born from mid-April to May
Fourth week	Carpenter ants are clustered and motionless inside big logs or trees. You might find them if you are splitting substandard firewood / Golden-crowned kinglets are the smallest of our winter birds. They are often very tame, and can be seen feeding on insects and spiders, usually in softwoods / The prickly inflated pods of wild cucumber, a climbing vine, have dried up and become paper thin. Light as feathers, they are blown about to release their seeds	Hibernating black bears maintain a core temperature of 88 degrees, only 8 degrees below normal / Deer mice cache food to avoid prolonged exposure to cold / When not confined by deep snow to a deeryard, a healthy white-tailed deer eats six to eight pounds of twigs a day. / Bad weather will send tree sparrows to birdfeeders. In normal times they prefer self-reliance and feed on weed seeds / Red foxes are pairing off. By March they will begin looking for a den	Blind, hairless gray squirrels are born. In good food years, another litter will be born in July / Buttonbush seed heads often stay intact all winter. Spring floods will carry the floating seeds to new shores / On warm days look for stoneflies perched on rocks near clean rivers and streams. They will mate, and the female will lay eggs back in the water / The mournful coo of the mourning dove has been mercifully absent all winter; you will hear it soon

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.

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The Long View

By Stephen Long

Every few years, I'm treated to a recurring dream, an archetypal dream that I've heard others describe as well. In it, I have just moved into a new house, and as I settle into my new place, I walk into a room and see a door I don't remember. When I go through the door, I see a whole new room. Oh my god, I say to myself, I didn't even know I had that, what incredibly good fortune. It gets even better – I keep going and I discover all sorts of new rooms. Sometimes there's a hayloft in a barn, sometimes a roomy attic. It's a wondrous dream, and I wake up full of a sense of possibility.

In the first few centuries that Europeans explored and settled North America, a dream like this pervaded the collective – and then national – consciousness. The pioneers kept going west, and they kept finding more: more forests full of timber and fuel, more rivers teeming with fish, more food, more goods in a land of plenty. Possibilities were limitless. This continent was a gold mine, a cornucopia, a land of infinite opportunity.

Though the continent was fully settled more than a century ago, we've only recently awakened from that dream, but rather than waking refreshed, it's more like we have a hangover. We understand that the years of plenty are over, that limitless growth has consequences, that resources are not infinite. We've come to realize that our way of life may not be sustainable, particularly since the rest of the world wants to share our good fortune.

In the forestry world, I've been familiar with the term "sustainability" for as long as I've been covering forests and their uses. One of the green certification programs – the Sustainable Forestry Initiative – incorporates it in its name; all of them have it at their core.

The concern over forest sustainability is much older than this, of course. It dates back at least to Gifford Pinchot's return from Europe in the late 19th century, where he'd gone to study forestry, since it didn't yet exist in any curriculum in this country. He brought back the concept of sustained yield, which is the forestry version of conserving wealth by living off the interest and not touching the principal. The idea was that forests grow a certain amount of wood each year, and if we remove no more than that, our forests can sustain us far into the future.

From that beginning, our understanding has become more sophisticated over the years, and the study of ecology has evolved to focus on the interrelatedness of all elements in the larger system. Today, we don't measure sustainability only in timber, because we recognize that the entire support system must be sustained as well.

A forest is a tremendously complex assemblage of plants, animals, and inorganic materials, some of them minuscule, like soil bacteria and scale insects, and some imposingly grand, like white pine and bull moose. We continue to study and marvel at the interactions among the parts in this living, breathing system, and many ecologists believe that our understanding is in its infancy. Still, if we look at the system purely through the very limited lens of the benefits it provides humans, it is spectacular.

Wood products are the most obvious: lumber, paper, fuel for heating and electricity. But the forest's resources go far beyond those made of wood fiber. Trees breathe in nutrients (some of them pollutants) from the air and exhale oxygen, thereby cleaning the air we breathe. Forests absorb rainfall and release it slowly, reducing the frequency of damaging floods. This also filters the water, which gradually makes its way into our wells and water systems. In fact, the drinking water for our two largest cities, Boston and New York, requires little in the way of additional filtration, springing as it does in the midst of forests that surround the municipalities' reservoirs.

Clean air and drinking water are not luxuries to be enjoyed by some but rather necessities for all. And there's even more. Stunningly beautiful, forests provide us a place for spiritual or psychic renewal; or for those not on that kind of quest, there's

recreation: hiking, hunting, skiing, snowshoeing, and watching the animals that are integral to the system. And given the headlines we're all growing accustomed to, I would be remiss if I didn't mention the forest's great capacity to sequester carbon. As part of its respiratory system, a tree absorbs carbon dioxide and stores it, primarily in its limbs, bole, and root system. Carbon also remains sequestered when harvested trees have long-term uses, such as buildings and furniture.

These ecosystem services, as they've come to be known, are not coming to us through a public works project or a government program. The government doesn't own this land. In fact, unlike the more recently settled West, our region has very little publicly owned land. Even in New York, with its two grand forest reserves in the Adirondacks and the Catskills, the government only owns 15 percent of the land. In the six states of New England, the government owns only 7 percent. All of these ancillary benefits come to us free of charge, compliments of the people who own the land.

In New England and New York combined, there are 450,000 people who own at least 10 acres of this forest, most of them living in or near their woodland holdings, sprinkled here and concentrated there. That means that for sustainability to be measured, social and cultural elements need to be considered as well.

Our forests, as they have developed over the last few centuries, have our fingerprints all over them. We live in them, work in them, recreate in them. The region's wealth is spread among the landowners and the people who work in the woods and in the mills and factories where wood is turned into products we all use. The forest is the primary rural economic engine, even though the industry's presence might seem invisible to someone flying over the Northeast's forests. Spread throughout the region, mostly in relatively small facilities, forest-based manufacturing in New York and northern New England contributes $14.4 billion to the economy, according to a 2007 report by the Northeast State Foresters Association. The same report estimates that landowners were paid $557 million annually in stumpage payments for trees cut from their woods.

Over the years, people have realized that all of that economic activity – logging, trucking, burning, manufacturing – can adversely affect the system. Today, mills and factories are taking significant measures to avoid polluting the air and water. In working in the woods, loggers are more careful to protect the soil and the water.

These improvements have resulted largely from pressure from environmental activists and conservationists. Their justifiable outrage at some of the most egregious violations has pushed those who want to stay in business to be ever more accountable to the public. And while the certification systems that sprang up 15 years ago – Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) – have still not put significantly more money in the hands of people whose work has been certified, they have contributed to a wholesale improvement in the management of the woods, from silvicultural prescriptions (choice of trees to cut) to harvesting operations (how the work is accomplished).

So doesn't it seem that we are on the right road and that everything is going in the right direction? There's one problem, and, unfortunately, it's a large one. That economic engine, the recently robust $14.4 billion engine, has stalled.

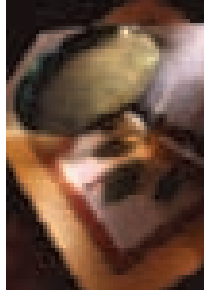
Prices paid today for stumpage are half what they were three years ago. Hardwood and softwood sawmills are selling much less lumber, and what they manage to sell leaves the yard at prices last seen in 1996. The housing slump that began in 2006 reduced demand for lumber at a time when the wood business was already struggling to compete with an emerging industry in Asia. Doug Britton, who owns a white pine sawmill in Fairlee, Vermont, said, "Every board we saw, we lose money on. The more we produce, the more we lose." Despite that, he has kept his mill operating at nearly full capacity, largely in order to keep his work force employed. His company, like all of those who have survived thus far, is counting on the cycle coming around again. If they're right, they will be in position to supply lumber to a hungry market. If they're wrong, the consequences will be dire – not only for them but for the sustainability of the forest system.

If the forest industry fails, there's nothing standing in the way of a wholesale sell-off of forestland. Think back to that $557 million in stumpage payments parceled out to landowners across the region. Those payments helped people pay their property taxes, helped them to make improvements or repairs, helped them to justify the cost of holding onto their land. It turns out my dream of endless possibilities does not pertain to potential sources of revenue from the land. If the lumber business dries up, then the only remaining source of income for most landowners is the land itself.

It's a time-honored rural tradition to sell off a building lot when the going gets tough, because land is often a person's only savings account. The trend toward smaller parcel size has seemed inexorable as families or individuals sell or bequeath parts of their holdings when life circumstances change: four siblings inherit the family farm and divide the land, or a daughter is given a 10-acre lot so she and her new husband can build a house.

This ordinary rate of parcelization, however, will progress geometrically if we all lose the opportunity to sell timber. Parcelization is a cause, and fragmentation is the effect. As parcels are developed, driveways and dwellings fragment the natural system. All of the ecosystem services that accrue in an intact forest are compromised in a fragmented landscape that becomes not rural but suburban. The process would also quicken the erosion of the culture and backwoods ethos that is cherished by those born here and has been a drawing card for many who've moved here.

Bit by bit, as we learn how interconnected all of the parts of the system are, we come to an ever-expanding definition of sustainability. It's not really a paradox – though you'd be forgiven if you thought it one – that the people who cut down trees and turn them into products are the single most important and effective means for keeping this forest intact. NW



By Annette Lorraine

What Do Women Want?

Are women different from men when it comes to owning and managing a forest? If so, do those differences matter?

With more than 60 percent of private woodland owners in the U.S. older than age 55, we will soon see rapid transitions in ownership. Statistics show that women outlive men by about 5.4 years, so many women are likely to become the sole owners of these properties, in many cases as interim owners until the handoff to the next generation. This phenomenon may already be widespread, though hard data don't exist.

When more woodland is owned by women, what will this mean for the regional landscape? What will this mean on a personal level?

Darlene Belknap lost her husband, Sherry, last year to cancer. Together they owned several parcels of woodland in the Northeast Kingdom of Vermont. She said, "Sherry always took care of the land and environmental things. I would help out by typing or backing him up, but my interests were tied up in running the store and my apparel business. Sherry was the woodsman." After he died, Belknap realized she did not fully grasp the legal implications of some of the title conveyances and contracts Sherry had arranged.

"I wish I had paid more attention to what he was doing and why he was doing it," Belknap said. "I would tell other couples to sit down together with a lawyer so everyone understands what is what." Now she meets with their lawyer, forester, and other people in her support system, but confides that "to learn something out of my realm has been very difficult for me."

Belknap is determined to keep the land. It's her home. And Sherry always envisioned that it would provide them with retirement income. But it is easy to see how other women who don't feel a personal connection to the land might quickly sell it. If they suffer economic uncertainty after their partner's death, women might be more likely to sell or subdivide their lands into smaller parcels for income. It would be tempting for anyone not accustomed to managing woodland to divest herself of it just to simplify her life, especially in a time of transition and grief.

In a case where a woman like Belknap wants to hold on to the family land, how might she manage the parcel differently than a man would. Or, to put a twist on Freud's famous question: What do women want with their woodland?

The few studies available show that women often view working landscapes differently than men do. Surveys of owners of forested land in Wisconsin and farmland in Iowa show women tend to view their land more as a legacy than a means of income.

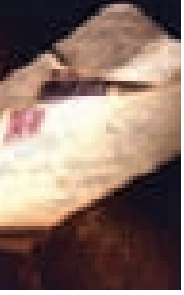
Studies of woodland owners in Finland show that female owners feel it is important to be able to visualize the post-harvest landscape in very detailed ways prior to committing to a cutting plan. In the Southern U.S., female farmers who own their land alone were more likely than their male counterparts to keep larger tracts of woodland rather than subdivide them from their farmland. Yet these women are less likely to seek commodity loans or other governmental supports for any of their lands. All these considerations might influence harvesting decisions, type of stewardship, and the next transition in ownership.

What about women as partners who have been on the periphery of management decisions? As Belknap's case illustrates, once a woman becomes the sole owner of a parcel of woodland, she can face a steep learning curve. Can this be made any easier? Again, studies of farmers in Iowa show that women learn differently than men. They often prefer to learn in the company of other women and prefer to learn by hands-on activities or storytelling rather than lectures. Many women have time constraints due to their own jobs or ongoing care of children or parents.

The little we know of the next generation of woodland heirs hints at some differences between how daughters and sons are treated by their parents. Studies in Wisconsin and Pennsylvania show that daughters are more likely than sons to be left out of management activities of family-owned forests, including the decision making. In Wisconsin, more than 80 percent of sons said their parents had talked with them about the future of the family forest, but only 65 percent of daughters reported the same. Many of the heirs *wanted* to be more involved. All heirs, whether male or female, were concerned that the high cost of medical care, taxes, or other unforeseen expenses could be factors that might force them to sell their family forest despite their intentions to keep it.

I know it is risky to speculate on gender differences. Every person is multidimensional. Isn't there an old joke about putting three women in a room with a question and out come nine different opinions? I just hope women choose to enter the room – or in this case, the forest – early enough to prepare for possible sole ownership. And I hope that other people will be encouraging and supportive when they do, because women will help determine the shape of our northern forests in the near future.

Annette Lorraine is a real estate attorney and land conservation consultant. She lives adjacent to the Groton State Forest and has an office in Montpelier, Vermont.



Letters to the Editors

Pushing and Pulling a Crosscut Saw

To the Editors:

Carl Demrow's article on the crosscut saw ("Tricks of the Trade," Autumn 2009) awakened an old memory of felling and bucking large white pine on timber holdings north of Blind River in northern Ontario. What did it, in particular, was his admonition to let the saw float in your hands on the "push" stroke, and pull steady and straight on the other.

I had finished my freshman year in Forestry at the University of Toronto and was putting in summer work experience in logging operations. I was assigned to a three-man crew consisting of a skidder (using horses), an experienced Newfoundlander logger, and me. On the first morning, while felling and bucking 2- to 3-foot diameter pine, I was determined not to be the first to call for a rest break. I was tremendously cheered when Old Mac, the Newfie, suggested a break after about an hour of sweaty labor (with black flies galore).

As we sat, he took from his vest pocket (as if it were a cigar) one of his rolled up pancakes from breakfast and said these unforgettable words: "Look laddie, I don't mind you 'riding' on the saw, but do you have to drag your feet along the ground?" These humbling words were followed by a lesson on "floating" when he pulled, and "pulling straight" through when I pulled. I had been pushing a little on his stroke, and bending the saw slightly toward my body as I pulled back.

The following summer, I was pulling again, but this time on oars, in a bateau, as we "brought down the rear" on a white pine log drive on the Mississagi River – possibly the last true log drive in the East. I conducted myself without any major gaffes.

Larry Hamilton, Charlotte, Vermont

Fair Chase

To the Editors:

Robert Kimber's Autumn 2009 "Up Country" column talks about deer hunting. He mentions using stands. After reading the column, I talked with a friend, a 75-year-old trapper and hunter. He said that in the old days, no one used scent lures or deer stands. While not offering an opinion one way or the other about artificial tactics, he said that if it's legal, some hunters use whatever ways they can to deceive their quarry.

My friend's hunting methods matched my personal, also old-fashioned, idea of hunting: even odds. Hunters use their natural talents and skills to stalk deer that blend into the landscape and tap into native abilities like keen hearing, scent, and eyesight.

So, I ask Mr. Kimber and other hunters: why a change in hunting tactics?

For the record, I am not anti-hunting. Since most natural predators have been extirpated in New England, the need exists to cull the herd to prevent starvation and wasting disease. Hunting for food is understandable.

Grace Lilly, Swanzey, New Hampshire

Robert Kimber responds: *First, a matter of definition: my impression, perhaps incorrect, is that Ms. Lilly understood my use of the word "stands" to mean tree stands. My stands are simply places where I sit or stand quietly, waiting and watching for deer. I choose places I know deer are likely to frequent and where my chances of seeing one are much improved. That said, I have sometimes made use of stable and reasonably comfortable perches in trees in promising locations, and though I personally have never used a commercially manufactured tree stand or constructed a homemade one, neither I nor the fish and game laws of the State of Maine consider that the use of tree stands gives the hunter an unfair advantage over the deer.*

As for the question of even odds and what constitutes fair chase, that's territory with some clear black and white but a lot of gray in the middle. Most of the animals we hunt have much keener senses and can run faster than we humans do. Some of them can swim underwater; some can fly. So we try to even the odds with our bows and arrows, spears, firearms, snares, deadfalls, decoys, and on and on. Our laws are there to protect animal populations from technologies and practices that tip the odds too far to the hunter's advantage (for example jacking deer) and ultimately destroy the population. At the same time, they leave considerable leeway for individual choices on appropriate technology and tactics, leeway that many non-hunters and hunters alike sometimes think excessive and leeway that leads all of us to debate, sometimes fiercely, over what we consider ethically proper. As I think the foregoing suggests, my own preference is for the minimalist approach. I have a rifle and sights that enable me to kill quickly and cleanly. That's it.

Nuisance Raccoons

To the Editors:

Another reason to damn the Third Reich! Ich habe ein washbar argernis! I would love to know how to curtail the raccoon visits to my corn patch and the bird seed that does not include a final solution.

I am trying garlic capsules. Any other ideas?

Rachel A. Hexter, Greensboro Bend, Vermont

Editors respond: *Your best bet to keep raccoons out of corn is an electric fence. If you have a garden fence already, you'll just need to hang one strand of electrified wire across the top, so the*

raccoon will touch it as it crawls over. If you don't have a fence, use two strands of electric wire, the lower one about eight inches off the ground. Sometimes it's necessary to "train" the animals by rubbing a little peanut butter or jelly on the wire in a way that ensures direct nose or tongue contact. This lets them know you mean business.

If you don't want to buy a fence charger, you can try the old folk method of paper lunch bags over your ears of corn. Another method is to use reinforced filament tape and tape the ear to the stalk.

As for bird feeders, some report success suspending the bird feeder on a movable clothesline.

Good luck!

Tulips in New Hampshire

To the Editors:

In the Autumn 2009 "Species in the Spotlight," one of your editors, Virginia Barlow, speaks appreciatively of tulip poplars she remembers growing in Connecticut and her poor success trying them in Vermont. Their range must be a little further north than she suggests, as illustrated by this photo of a pair growing across the street from the Peterborough Public Library in southwest New Hampshire. They are maybe 16 inches at breast height and were apparently topped years ago, perhaps to control their growth under the power lines, for they branch into several leaders about 10 feet off the ground

Incidentally, the Peterborough library is the oldest library in the U.S. – and maybe the world – to be supported by public taxes, antedating even the Boston Public Library. Certainly there are older libraries, but they started as private, church, or university collections.

John Patterson, Peterborough, New Hampshire

JOHN PATTERSON

Tulip poplars at Peterborough Public Library

Role of the Beaver; Roll of the Tree

To the Editors:

The Autumn 2009 issue includes a great beaver story, "A Logger with Four Feet and a Tail," by Bernd Heinrich. The author gives one very interesting reason why the beavers enjoy a high success rate and usually get the trees to fall all the way to the ground with few hang-ups: hardwood trees naturally extend their branches toward the light, so as long as the beaver cuts the trees growing nearest to the pond, they will fall toward it, since most of the branch weight will be on the pond side of the tree.

Another reason for their success, I think, is this: since the beaver's cut is completely around the trunk of the tree, there is very little wood left to hold, therefore the tree is free to roll one way or the other off other nearby trees rather than hang up. When loggers cut a tree, they usually cut toward the notch with their backcut and leave some hinge wood to guide the tree's fall. When cutting in dense woods, though, they might cut into the hinge from the sides before making the backcut. With a shortened hinge, the tree is free to roll off other trees and fall all the way to the ground, as in the case with the beavers.

Alfred Balch, Lyme, New Hampshire

To the Editors:

The fine cover photograph of the beaver (Autumn 2009 issue) had me hoping for an enlightening and sorely needed educational article on this keystone species's invaluable work. But I was disappointed in the article "A Logger With Four Feet and a Tail" by Bernd Heinrich, who wrote in his book, *Winter World,* "Without beavers this would be unbroken forest. There would be no painted or snapping turtles, no bullfrogs, greenfrogs, mallards, Canada geese, dragonflies, giant predacious water beetles, snipe, Virginia rails, willow flycatchers, yellow warblers, red-winged blackbirds, sunfish, minnows, catfish, kingfishers, great blue herons, mink or muskrats."

Unfortunately, Heinrich's article made little significant mention of the truly critical importance of beaver activity, which is so often being lost due to human conflict, destructive trapping, and wetland draining. I highly recommend naturalist David Carroll's book, *Swampwalker's Journal,* for further illumination of the beaver's values.

Heinrich's contemplative account of the felling and ultimate utilization of a single hung-up birch tree is a curiosity. Perhaps there is a lesson there about not being wasteful, though I've seen many unutilized, hung-up, beaver-felled trees; or maybe it has more to do with a human-altered landscape growing in smaller and thicker tangles? All I do know is that the value of beaver work is much underappreciated and worth much more effort to preserve.

If we truly care about restoring biological health to our part of the planet (clean water and recharged aquifers, healthier populations of native, cold-water, and other fish, restoration of many rarer species of animals and plants, less soil erosion, and less destruction from major floods), we must do much better at accommodating these amazing creatures and the wetland complexes they manage.

Richard Hesslein, Brownfield, Maine

A beaver's incisors grow continuously. Lower incisor has been pulled out of mandible to show its length.

DAVE MANCE III

To the Editors:

In the Autumn 2009 article, "A Logger with Four Feet and a Tail," author Bernd Heinrich is surprised at the apparently wasted effort by beavers chewing a tree trunk. Possibly this is to wear down their teeth that constantly grow out (in rodents, horses, and camels) just like our fingernails, which we file down. Beavers have been found dead, unable to close their mouths, from overly long incisors. Mice and rats compulsively chew anything, too.

John Petersen, Concord, New Hampshire

Recovery through Nature

To the Editors:

Recently, since I had successful major cancer surgery, I have become aware of the therapeutic value of walking in the woods. I have been a volunteer conservationist for over 36 years and never really appreciated the deep, moving value of walking softly on my own trails and observing and identifying the many features that I passed by many times before. There is something magical and stimulating about this activity while the body and mind are in the healing process.

I was particularly moved by the article in the Winter 2008 issue, "The Nature of Healing," by Aldebra Schroll. That article prompted me to develop a trail handout for the Town of Littleton, Massachusetts, entitled "Walking for Recovery: A Guide to Easy Off-Road Walking at Prouty Woods and Morgan Land." I am starting to do another one that covers other conservation areas in town. As a forest steward for the New England Forestry Foundation and a local land trust trustee, the whole idea of staying involved and doing a creative activity in a healing environment is rewarding. I don't think any of my doctors and medical specialists have mentioned the value of walking off the roads. I, for one, am not relaxed and healing while dodging speeding trucks and cars with accompanying noise and dust.

I pass these thoughts on hoping that it will help others in recovery and generate interest in the value of healing in a forest and meadow environment.

Art Lazarus, Littleton, Massachusetts

Tell Us More

To the Editors:

Great article by Michael Snyder ("What are Indicator Plants?") in the Autumn 2009 issue. But it was a tease! I want to know more. Could you follow up with a simple chart of common indicator plants in the northern woodlands, and what they indicate? Or provide a resource for readers to follow up on their own? Thanks!

Carolyn Haley, East Wallingford, VT

Editors respond: *Stay tuned for a full treatment. Until then, here's what forest soils scientist Martha Mitchell had to say:*

There is no simple answer to this request. Where plants grow is linked to many factors, including underlying bedrock, soil type, soil drainage, elevation, microclimate, and human activity. Most plants are able to survive across a wide range of variability within these factors, thriving where they most closely match ideal growing conditions. Plants growing "off site" grow less well and often exhibit less than favorable growth characteristics. As a result, communities of plants tend to "indicate" or better reflect growing conditions than individual species.

Learning to "read" indicator plants requires woodland observation experience. An easy exercise is to pick a favorite common plant. Observe where it grows, how well it grows, and what other species grow with it each time you encounter it. Dragging along a shovel and checking soil conditions will help. Keep a record or journal of these observations, including date and place. Soon you will begin to recognize its growth pattern under different conditions.

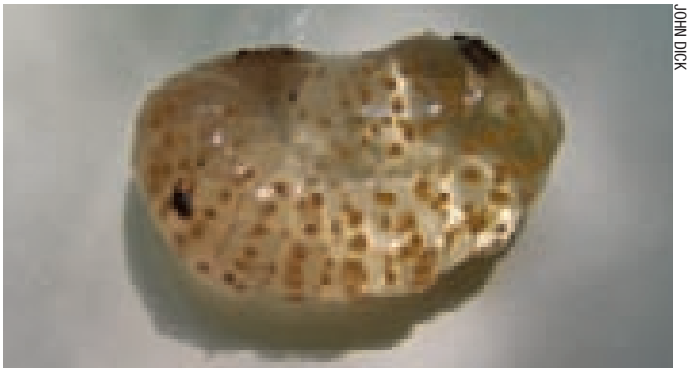
Upping the Ante

To the Editors:

Caddis flies in the Autumn issue? I'll see your larval case and raise you an egg mass.

John Dick, Salem, Massachusetts

JOHN DICK



Caddis fly egg mass, taken late August in Boxford, Massachusetts.

We love to hear from our readers. Letters intended for publication in the spring 2010 issue should be sent in by January 1, 2010, and should be addressed to Letters, *Northern Woodlands*, P.O. Box 471, Corinth, VT 05039. Or fax to (802) 439-6296, or e-mail to dave@northernwoodlands.org. Please limit letters to 400 words, and include a name, address, and daytime telephone number. Letters may be edited for clarity and length.

By Michael Snyder

Do Tree Stems Freeze in Winter? If So, Does this Damage the Tree?

Trees are about half water, maybe a little less in winter. And if the temperature drops low enough, the water in even the most cold-hardy tree will freeze. Since ice crystals can shred cell membranes, a hard freeze can be devastating to living tree cells, leading to dead leaves, branches, and even whole trees. But most trees actually live through the winter, bearing up somehow despite prolonged exposure to brutally cold air and wind and snow.

So how do trees survive winter's freeze? They can't move south or generate heat like a mammal. Sure, the below-ground parts of a tree are kept insulated by a layer of snow, and that is important to winter survival, but the exposed parts of a tree are not so protected.

To survive winter cold, a tree begins its preparations in late summer as day length shortens. Cold acclimation occurs gradually and includes a number of physiological changes in leaves, stems, and roots. And while fall color seems to get all the attention, it's what trees do later in autumn that is the most stunning, if harder to see.

Some of these later changes really do seem to border on magic, and while some of the details remain a mystery to science, general mechanisms have been explained. Paul Schaberg, a research plant physiologist with the USDA Forest Service's Aiken Forestry Sciences Laboratory in Burlington, Vermont, has led many investigations of cold tolerance in trees, particularly in the foliage of montane spruce and fir in New England.

Schaberg's work suggests three basic ways in which living tree cells prevent freezing. One is to change their membranes during cold acclimation so that the membranes become more pliable; this allows water to migrate out of the cells and into the spaces between the cells. The relocated water exerts pressure against the cell walls, but this pressure is offset as cells shrink and occupy less space.

The second way a tree staves off freezing is to sweeten the fluids within the living cells. Come autumn, a tree converts starch to sugars, which act as something of an antifreeze. The cellular fluid within the living cells becomes concentrated with these natural sugars, which lowers the freezing point inside the cells, while the sugar-free water between the cells is allowed to freeze. Because the cell membranes are more pliable in winter, they're squeezed but not punctured by the expanding ice crystals.

KATHY LUND JOHNSON

Paper birches like these can tolerate cold temperatures as low as 112°F below zero.

The third coping mechanism is altogether different. It involves what Schaberg describes as a "glass phase," where the liquid cell contents become so viscous that they appear to be solid, a kind of "molecular suspended animation" that mimics the way silica remains liquid as it is supercooled into glass. This third mechanism is triggered by the progressive cellular dehydration that results from the first two mechanisms and allows the supercooled contents of the tree's cells to avoid crystallizing.

All three cellular mechanisms are intended to keep living cells from freezing. That's the key for the tree; don't allow living cells to freeze.

A tree doesn't have to keep all of its cells from freezing, just the living ones. This is significant, since much of a tree's living trunk is made up of cells that are dead (though it's strange to think of these cells as dead, because they're still involved in functions, such as sap flow, that keep the tree alive). Dead cells can and do freeze, but even the lowest temperature can't kill an already dead cell. And that's the magic: while the overwhelming majority of a tree's above-ground cells do indeed freeze regularly when exposed to subfreezing temperatures, the small percentage of living ones don't. There are living cells in the trunk that remain unfrozen even though they are right next to – and at the same temperature as – dead cells that are frozen solid.

This cellular magic of pliable membranes, sweet antifreeze, and glasslike supercooling, with frost on the outside and viscous dehydration on the inside, helps trees avoid freezing injury to living cells, but it is not without consequence. According to Schaberg, the freezing of those dead cells does have implications for the tree's health. For example, gas bubbles can form among them upon thawing, and these can prevent sap flow in spring. But Schaberg says that trees have other means to overcome those temporary problems and that it is far better for the tree to deal with these than to allow the water-based contents of nearby living cells to freeze and possibly kill the tree altogether.

Michael Snyder is the Chittenden (Vermont) County Forester.

Springtails under magnification. Note the "furcula" on the above springtail.

GUSTAV W. VERDERBER

If Winter Comes, Can Springtails Be Far Behind?

Given an estimated around-the-globe average of 100,000 of them per cubic meter of soil, it seems astonishing that springtails (the tiny creatures often called "snowfleas") are frequently overlooked. Spotty distribution isn't to blame for their invisibility. They occur in woodland and in grassland, in deserts and on permanent Arctic snowfields, in caves and greenhouses, even on fresh and salt water. Nor are populations thin. One study in Denmark concluded that 16 million individuals of a single species inhabited a 1-acre forest plot.

We go about our outdoor business blithely unaware of springtails because they are tiny, silent, and live for the most part hidden in duff and leaf litter and in the top inch or so of loose soil. Most species are dark of hue – black, gray, dark blue – which is why casual encounters hereabouts are likely to occur on warmish winter or early spring days when springtails are active on the snow surface, where they appear to wide-eyed, first-time observers as animated pepper grains.

But what exactly is a springtail? Your natural history handbook or insect field guide probably identifies springtails as a primitive order of insects. But specialists in the field are now largely agreed that springtails aren't insects at all but rather organisms forming an order – even a class – of their own. They do share characteristics with insects – most notably three body parts and six legs – but they differ from them in important regards. For example, their mouthparts – external in insects – are enclosed in the head. And unlike insects, typical springtails absorb oxygen directly through the soft cuticle and feature either small patches of simple eyes (which provide poor vision) or no eyes at all.

With the aid of magnification, one can see toward the rear of a springtail the celebrated action feature, the "furca" or "furcula." This two-prong-tipped organ is normally held forward against the underbody, secured by a catch called the "tenaculum." When alarmed (or merely traveling), the springtail releases the catch, and the tensed furca drives down and back into the ground (or log or leaf or snow or water), catapulting its owner up and away, antennae over tea kettle. We are likely to notice these minuscule soft-bodied creatures only en masse. When an assemblage has detected your presence, they will begin to jump, and because the human eye can't follow them in flight, the pool of organisms will seem simply to evaporate. It is, as far as I know, the only demonstration in nature of the reverse of spontaneous generation.

Taken as a group, springtails consume a remarkably varied diet. A few are predatory, hunting down tardigrades, nematodes, rotifers, even other springtails. Some cave-dwelling species may live entirely on soil bacteria, while those roaming the surface of stagnant pools are probably grazing on algae. Certain highly specialized springtails live their entire lives on cleanup patrol in ant or termite nests, where they are thought to subsist on bits of food dropped or regurgitated by their hosts. Species that periodically or permanently occupy snow or ice fields are assumed to glean wind-blown pollen grains and spores. Many species eat frass (arthropod droppings), while fungi and plant material, both fresh and decayed, are standard food for the majority of species.

Typical insects rely on copulation to initiate the critical business of reproduction. Lacking external genitalia, springtails employ a fastidiously impersonal method. A male secretes a viscous material which, by raising his posterior, is drawn up into a stalk, on top of which he deposits a spherical packet of sperm. This structure, which looks, microscopically, like a golf ball perched on a long and very thin tee, is called a spermatophore, and males produce a number of them during periodic reproductive phases. If a receptive female of the appropriate species happens by, she takes the sperm packet up through her genital slit.

Liquids inside her body cause the packet tissue to swell and burst, releasing the sperm for egg-fertilization duty.

If this system for combining precious genetic material seems to us haphazard, it apparently strikes a few springtails that way as well. Males of certain species build a fence of spermatophores around a likely female, a strategy presumably designed to ensure reproductive success by prompting the "eenie-meenie-miney-moe" response. Males of a few species even drag females to their spermatophores. Clearly, however, earth's environments are yearly strewn with quadrillions of what are destined to be leftover springtail spermatophores. Nothing is wasted in nature, of course, and many of these end up as minute contributions to soil fertility. But others serve springtails more directly. Encountering intact sperm packets – particularly those teed up by other species – foraging males are likely to eat them.

Alan Pistorius

Four Centuries of Slow Growth

While conducting a study of old-growth trees at Huntington Forest in Long Lake, New York, research specialists Steve Signell and Colin Beire came across a fairly nondescript, fallen hemlock tree. The tree had blown over and blocked a path; it had subsequently been cut and pushed to one side. Though the tree was only 20 inches in diameter, the dense growth rings on the butt end caught the men's attention.

After removing a cross-section from the trunk, and really squinting their eyes, they established that the tree was almost 400 years old. Signell detailed his finding in a recent edition of *The Spruce Moose,* a publication of the State University of New York College of Environmental Science and Forestry.

As you can see from the accompanying cross section, the tree grew very slowly at first. In 280 years, it put on about 10 inches of growth. Around 1890, the growth rings widened. According to Signell, this likely indicates a response to increased light following the harvesting of large spruce that was common to the area at the time.

"You hear people talk all the time about how there are no old growth forests around; and that may be true, but there are a lot more old growth trees out there than people think, said Signell. "And they're not necessarily big."

"I'm sure this wasn't the oldest tree out there."

Northern Woodlands staff

Wood Industry Woes Drag On

"It's a weird time in the wood industry," said Bob De Geus, wood utilization specialist with Vermont's Department of Forests, Parks and Recreation. He paused then, trying to synthesize hard data, speculation, and the fighting spirit of the men and women in the woods business into a sound bite he could give a journalist who was asking way too broad a question.

STEVE SIGNELL

"The crash has been bad but it's worse than that – mills have been limping along on subsistence incomes for twice that long," he said. "I think it's safe to say that sawmills are having a thoroughly filthy time of it."

Things haven't been this bad in a long time for the wood industry in the Northeast. National lumber markets hit historic highs in the past decade, then crashed right along with the speculative housing binge. Softwood markets, which directly fed the housing boom, have declined dramatically. Pulp and paper markets are down and stagnant. Hardwood markets are pale visages of their former selves. As recently as 2007, New York mills were buying prime cherry sawlogs for over $1,000 per thousand board feet; today, a logger would be lucky to see half that.

This hurt seeps though the entire food chain. Sawmills have cut hours, cut inventories, scrambled to diversify. Wausau's paper mill at Jay, Maine, is gone. Ethan Allen furniture recently closed plants in New York and Vermont. Maine's flagship furniture firm, Moosehead, recently went through a painful bankruptcy.

In nature, the web of life is a familiar concept. If the mycorrhizal fungi on the forest floor are damaged, the entire forest feels it – from the trees to the mice to the foxes. The same concept holds true in the rural economy.

"As a society, we don't necessarily notice when something isn't going well," said De Geus. "Or if we do notice – if we do pass an empty log yard, a silent mill – we look at it abstractly; we see it as just another bad thing. The problem is that it's easy to overlook the ripple effects this way. There's a tendency to think that the forest products industry directly benefits a landowner. While this is true, there's a much larger, community-wide benefit as well. A working forest provides property taxes that pay for local roads and schools. It provides jobs in the harvesting, transportation, and processing sectors. The ripples go out from here and touch many people beyond the landowner and the businesses that handle the wood."

So is there any good news to report? It depends on who you talk to. One log buyer I spoke with said it's not so much that he sees light at the end of the tunnel; it's more like someone's walking around in the dark tunnel with a very weak candle. Still, there is light.

"I had a mill owner tell me recently we're still hemorrhaging, but not as bad as we were," said Sarah Smith, a forest industry specialist at UNH Cooperative Extension. Smith says that pine markets have ticked up slightly to fuel the renovation markets but that new home sales are still stagnant.

In central New York, Ken Decker, forest manager at Quality Hardwoods, reports the same thing. "Things are slow," said Decker, but we're starting to see some bright spots in hard maple, in red oak. Things have been bad, so supply is down; demand is starting to come back a little. It's not going to happen in 30 days, but things will recover.

Chip Bessey, a forester who operates log and pulpwood concentration yards in Maine and New Hampshire, reports that folks in the business have hunkered down to weather the storm.

"Most of the people who are still in this business – whether they're mills, loggers, or truckers – are smart people," said Bessey. "They've reduced their operating costs and improved efficiency. They realize things aren't going to get any better for a while, and they're watching their pennies."

De Geus echoed this sentiment.

"The timber industry is among the least-regulated markets in the U.S.," he said. "There's almost no government management – compare this to dairy for a gross example. As a result, the men and women in this industry are accustomed to rough cycles. Many of these are family businesses that have been built up over generations, so they know how to manage long term for these savage cycles."

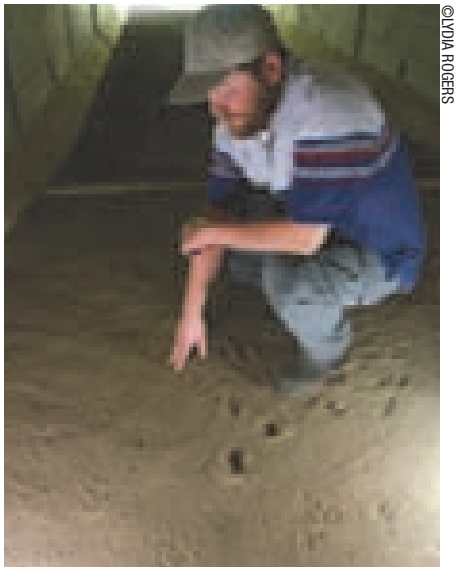
Fuel wood remains a bright spot. Region wide the biomass industry is evolving – albeit slowly. The markets haven't been fully realized yet, but the promise is there.

Firewood continues to sell well. One log buyer I spoke with in northern Vermont said that all the #2-grade beech, red maple, and ash sawlogs that he was buying were being processed and sold as firewood. Low-grade red oak was teetering right on the edge of being worth more to burn than to saw into boards. The mill this buyer worked for was using their lumber kilns to dry fuel wood; not the most efficient use of the kilns, but it was keeping people in work.

Dave Mance III

White pine logs through a skidder cage

ANDREW CROSIER



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©LYDIA ROGERS

Left: Dan Stimson checks the tunnel tracking bed; above: wildlife underpass; at right: woodchuck, fisher, weasel

©WILDLIFE PASSAGES TASK FORCE

Safe Passage

Crossing a four-lane highway that sees 50,000 vehicles a day can be a daunting task for an animal. So a group of organizations and individuals in Concord, Massachusetts, teamed up with MassHighway to install wildlife-friendly box culverts under a suburban stretch of Route 2. Since the project's completion in 2005, the Wildlife Passages Task Force, an eight-person volunteer group of citizen scientists, have monitored the tunnels with motion- and heat-sensitive cameras and a tracking bed.

They've found that, like the baseball diamond in *Field of Dreams,* if you build it, they will come.

"We've been able to answer with a resounding 'yes' the question of whether these box culverts will allow the passage of local wildlife across a busy highway," says task force member Dan Stimson, assistant director of stewardship at Sudbury Valley Trustees. In the past three years, the group has recorded 29 different species of wildlife using the tunnels. "If we'd given up after a month," said Stimson, "we would have said that no animals had gone through."

It all began with a permit request from MassHighway to make road improvements where Route 2 crosses wetlands in Concord. This highway forms a barrier that many creatures die trying to cross. Planned safety improvements for human traffic included Jersey barriers between travel lanes – which, for animals, would turn a hazardous crossing into an impossible one.

So Concord's Natural Resource Commission asked for wildlife underpasses to be included. After much discussion, design, and engineering, MassHighway built four box culverts under the roadway, at approximately one-tenth the total project cost. Working with the commission, they added natural plantings nearby and a natural substrate underfoot. Sites were determined by construction viability and established game trails.

"We put in the largest tunnels the landscape could hold," says Lydia Rogers, an expert tracker and prime mover in the task force. Tunnels range from 3 to 6 feet high, 5 to 9 feet wide, and 82 to 96 feet long. Three are susceptible to springtime flooding, though that doesn't deter white-tailed deer from swimming through.

"The urge to cross is obviously strong," says Stimson, but it's not universal: at one tunnel, deer tracks show regular approach but no passage through. "We don't know why, or what variables are at play," says Rogers. "Size? Smell? Noise? Shadows? What's on the other side?"

Different animals prefer different tunnels, although some species, such as red fox and coyote, aren't picky. The task force observed greatest use by most animals in the smallest tunnel, and least traffic in a larger tunnel closest to the river. Four choices allow animals to suit themselves. Fishers now include tunnels in their hunting territory. Gray squirrels and beavers carry building materials through. Mice live in seep holes. Deer traverse the larger tunnels, and one doe has been observed repeatedly with her fawn, perhaps teaching the next generation the safest crossing.

Rogers says, "Their opportunistic behavior is incredible. Wherever there is road construction, [tunnels] can go in; and if you put them in, animals will use them."

Other tunnel users are raccoon, opossum, skunk, gray fox, otter, weasel, mink, cotton-tail rabbit, woodchuck, muskrat, chipmunk, mole, vole, snapping turtle, snake, frog, salamander, mallard, robin, mourning dove, and bat. In addition, photos show use by domestic dogs and cats – and humans.

The task force would prefer that humans leave the tunnels to the wildlife, and they have posted signs describing the project and asking people to stay away. "We're careful not to tell people where the tunnels are," says Rogers.

Carolyn Haley

Maine Commission Approves Plum Creek Plan

In 2005, Plum Creek Timber Company, a Seattle-based real estate company, announced plans to subdivide its holdings around Moosehead Lake in north-central Maine. After years of debate, a revised proposal was unanimously approved by the Maine Land Use Regulation Commission in September 2009.

The approved plan will allow Plum Creek to create 821 house lots and two resorts comprising 1,204 additional housing units on 6,052 acres near Moosehead Lake. The plan also includes a 363,000-acre conservation easement, the second largest in U.S. history. The easement guarantees public access, sustainable forestry, and no future development on the conserved parcel. An additional 29,000 acres is being sold to the Appalachian Mountain Club for $11 million. In all, four percent of the Plum Creek parcel will be rezoned to allow for development: this amounts to around 16,900 acres.

Supporters of the project say the housing units will help the region economically; they also applaud the fact that nearly 400,000 acres – more than 600 square miles – will be permanently conserved.

Critics suggest that development will irreparably damage the character of these North Woods, an area they say is the largest undeveloped tract of land east of the Mississippi.

At press time, three opponents (Restore: The North Woods, Forest Ecology Network, and the much larger Natural Resources Council of Maine) have filed lawsuits in state court seeking to overturn the commission's decision.

Other environmental groups (The Nature Conservancy, Forest Society of Maine, and Appalachian Mountain Club) negotiated with Plum Creek on the easements and are supporting the permit, saying that the plan will prevent future haphazard development over hundreds of thousands of acres.

The planned development will take place over the next 30 years under the terms of the plan. Since Plum Creek has yet to win construction permits, it could be years before construction begins on the parcel.

Northern Woodlands staff

Corrections Department

In our review of *Forest Trees of Maine* in Autumn 2009, we incorrectly stated the price of the book. The correct price for everyone (Mainer or not) is $15.00, tax and shipping included. You can obtain a copy by calling (207) 287-2791. Maine residents can also find the book in a number of bookstores around the state.

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By Virginia Barlow

Scotch pine, *Pinus sylvestris*

Some stands of Scots pine in Europe (that's what it's called in its native range) are gorgeous, with straight, unbranching trunks that self-prune nicely, revealing the lovely orange bark that is characteristic of mid-sized stems. But the Scotch pine plantations growing in the U.S. rarely live up to that ideal. Some planted stands are successful, but the species is susceptible to a great variety of insects and diseases. When it was first attempted here, nursery stock was grown very densely, so when the spindly seedlings were transplanted, they were easily knocked over by snow. As they matured, many of these stems became s-shaped and only slowly resumed vertical growth. Nowadays, nurseries grow sturdier seedlings.

Scotch pine has the largest geographic range of any pine, from Great Britain, Ireland, and Portugal east to eastern Siberia. It grows above the Arctic Circle in Scandinavia and south to the Mediterranean. There is significant genetic variation across that vast expanse, and Scotch pine seeds from some areas seem to be particularly mismatched when grown in North America. All of the plantations I have seen have been hopeless for timber, though if you can put that goal aside, the irregular, flat-topped shape of the tree, the blue-green needles, and the orange bark are quite picturesque.

Many introduced plant species are oblivious to our native insect and disease pests – in this way, the exotic species have a competitive advantage over native plants. Scotch pine proves that this is not always the case. The white pine weevil, for one, has found Scotch pine to its liking and causes the same distorted growth on a Scotch pine as it does on a white pine. Although Scotch pine has modest nutritional requirements, lop-sided growth seems to be more pronounced in trees grown on poor soils. Because the tree is often grown on poor soils in land-reclamation and windbreak plantings, its reputation for being hopelessly crooked is reinforced.

Christmas tree growers appreciate Scotch pine because it survives transplanting easily and seems well adapted to a plantation existence. Like most other Christmas tree species, Scotch pines need to be sheared. Insect and disease control is a normal and accepted part of the Christmas tree business, and this keeps crookedness from developing. Scotch pines hold their needles very well and still look good three or four weeks after being cut. Even dried-out trees keep most of their needles.

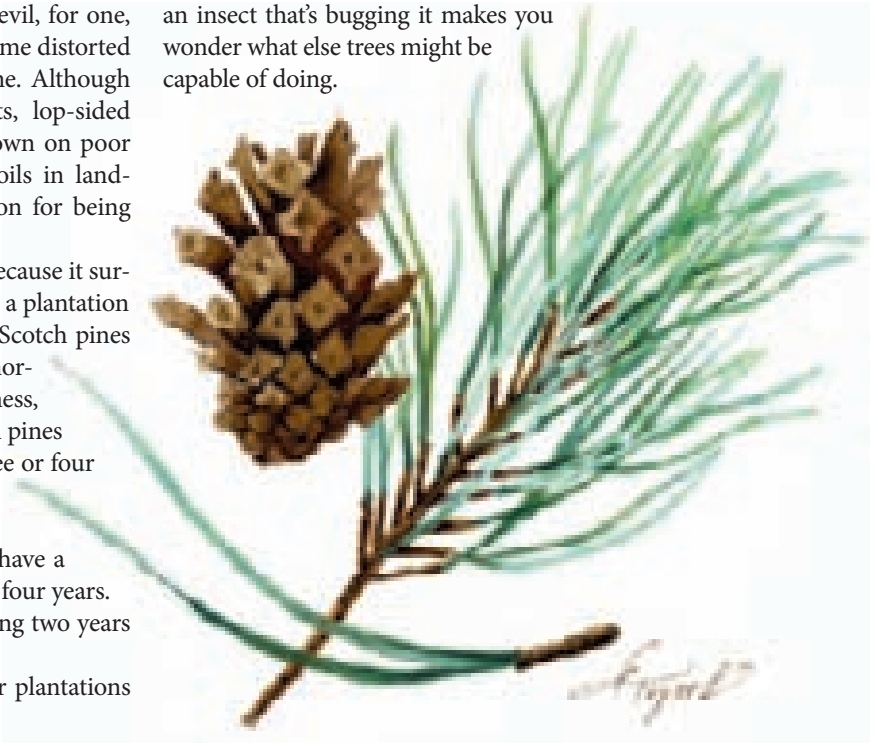
The 1- to 2-inch-long needles are in pairs and have a characteristic twist. They stay on the tree for two to four years. The brown cones have the pine family habit of taking two years to mature.

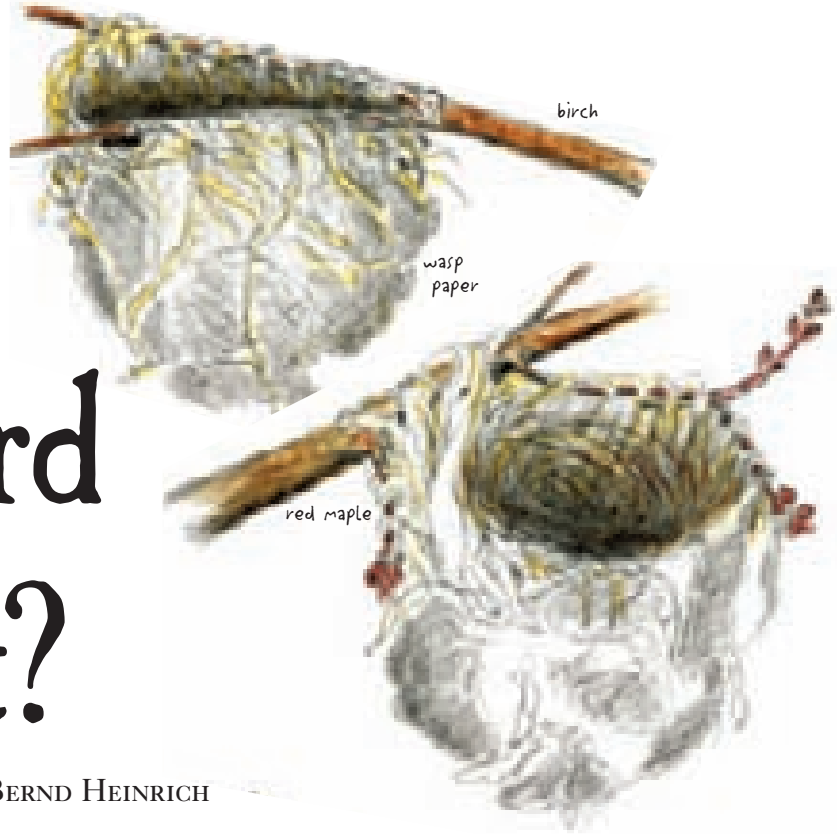
Once in a while, Scotch pines spread from their plantations out to adjacent fields and forest. Like most pines, the seedlings will die out in a dark forest, and on fertile sites, they are likely to be overgrown by many other trees. In some places, however, it is considered to be an invasive species.

We don't normally think of plants as being able to call for help, but a study of Scotch pine's reaction when the eggs of a sawfly (*Diprion pini*) were laid in its tissues suggests that the tree is quite capable of using the plant version of 9-1-1 to defend itself against at least one insect pest.

Soon after sawfly eggs have been deposited in Scotch pine needles – and well before they hatch – the tree reacts by releasing volatile compounds that attract a tiny parasitoid wasp, *Chrysonotomyia ruforum,* that specializes in sawflies. The wasp flies in and lays its own eggs, one in each sawfly egg. A gruesome drama unfolds as the eggs of both insects hatch and the wasp larva proceeds to slowly consume its sawfly host. The combatants both consume nutrients from their mutual host, the Scotch pine, but the damage is minimal, and the sawflies that are parasitized do not survive to make more sawflies.

Many plants have been found to release chemical calls for help in response to caterpillar feeding, but this preventive defensive strategy – before a bite has been taken – is less well known. It has also been discovered in elm trees; when eggs of the elm leaf beetle are deposited on its leaves, an elm leaf beetle parasitoid is summoned. Knowing that a plant can call in an insect specialist to kill an insect that's bugging it makes you wonder what else trees might be capable of doing.





which bird made that nest?

Story, Photos, and Illustrations by Bernd Heinrich

The diversity of behavior among bird species is nowhere so dramatic as in their nest construction. Each species builds a specifically precise nest that differs in functional ways from those of almost all others. The variations are as endlessly diverse as the color patterns on a feather. Chimney swifts use their saliva to glue dry twigs onto vertical walls in a chimney cavity or hollow tree. A masked weaver bird's nest is a finely woven bag with a long, vertical entrance tunnel that is hung from the tip of a thin branch, whereas a sociable weaver builds a communal structure that may weigh a ton. An eagle's massive structure of branches can support a large man, while a plover merely scratches a few pebbles together on a sandbar. Owls never build anything at all but use others' nests or nest holes. A murre lays its single egg on a sea ledge, and a fairy tern "nest" is a bare fork on a tree limb.

While some northern woodland birds build their nests on the ground, many nest in trees. One of the pleasures to be had in the winter months is seeing these nests that had been hidden by summer foliage. When leaves drop, nests are revealed; full of snow, they seem to glow against stark tree limbs. The nest owners are no longer around, making positive identification difficult, but many of these nests can be identified if you match them to geographical area, habitat, and other aspects of nest location.

Above: red-eyed vireo nests; at right, conifer twig indicates blue-headed vireo

Below are descriptions of some of the more common nests likely to be found and identified in the winter woods. You may not find them all in one winter, but this "field guide" should provide you with the basis for a continuing adventure.

Robin

Turdus migratorius

A robin's nest is both universally familiar and frequently misidentified. Nests are built at any height but generally in a protected place, such as inside a barn or where a thick limb forks. The giveaway clue is a mud cup about 3 inches across that in the summer is lined with a thin layer of fine grass. The exterior of the nest is a rough jumble of twigs, leaves, and pieces of bark. Nests exposed to the weather will usually dissolve and collapse by spring; nests under cover can persist for years.

Red-eyed vireo

Vireo olivaceus

Red-eyed vireos build their nests at any height, but always in a deciduous tree. Their nests can be found in both forest and edge habitat. The nest is always a hanging cup suspended along its edges from a thin, horizontal, forked branch. It is a neat, tidy, compact structure that will have bits of birch bark, and usually also wasp paper, decorating the outside. The inside cup diameter of a vireo nest is 2 inches.

Baltimore oriole

Icterus galbula

Oriole nests are baglike nests woven out of fibers, most commonly those stripped from old, decaying milkweed plants. Nests are almost always high in deciduous trees and at the tips of branches, not in deep forest.

Chestnut-sided warbler

Dendroica pensylvanica

Chestnut-sided warblers nest in open, edge habitat and also close to the ground, in small shrubs and bushes. This nest, with its very light and flimsy appearance, is made almost entirely of very fine grasses.

Cedar waxwing

Bombycilla cedrorum

Cedar waxwings nest in small evergreens or deciduous trees in edge habitat. The nest cup is untidy on the outside like a robin's and of similar size, but it lacks the mud cup and is typically garnished on the outside with lichens and/or moss.

American goldfinch

Carduelis tristis

American goldfinches make solid and tidy cup nests out of plant fibers and line them with thistle down. Nests are usually found out on a branch of a deciduous tree in fairly open habitat, such as a bog, edge of field, or suburban area. The nest is built with its base on the branch, not suspended like that of the vireo. Droppings are a dead giveaway (although they may be washed off by late winter), since goldfinches are the only local open-nesting songbird that allows feces to accumulate on the nest edge.

Least flycatcher

Empidonax minimus

A narrow (1.5 inches across) but deep nest cup placed into a thick, vertical fork so as to be almost hidden by it. Nests are found in deep edge habitat.

Red-winged blackbird

Agelaius phoeniceus

Red-winged blackbird nests could be confused with catbird nests, except that they're found in relatively open marshland. Nests are often built into a tuft of grass, or in a bush, or in cattails within a foot of the ground or water. Common grackles may nest in the same sites (but also in many others). Grackle nests can be distinguished from those of red-winged blackbirds by their larger (inside diameter about 3.5 inches), more compacted nest cup.

Clockwise from top left: Cedar waxwing, American goldfinch, Red-winged blackbird, Robin, Least flycatcher

Clockwise from top left: Baltimore oriole, Marsh wren, Red-eyed vireo, Scarlet tanager, Red-breasted nuthatch

Scarlet tanager

Piranga olivacea

Unlike the other nests in this story, scarlet tanager nests are composed almost entirely of twigs. Nests have an interior nest cup 3 inches across and feature a thin lining of rootlets. They are almost see-through in the winter. They can be distinguished from the similar-looking nest of the rose-breasted grosbeak by their location: tanagers nest high in forest trees, whereas grosbeaks tend to nest in young bushy trees. Mourning dove nests have a similarly flimsy structure but no visible cup. Most mourning dove nests are blown away before winter arrives.

Red-breasted nuthatch

Sitta canadensis

Chickadees, nuthatches, and woodpeckers nest in holes in trees, and the nests of these species can be differentiated, to some extent, by the size of the hole. A pileated woodpecker nest hole is 4 inches in diameter, a hairy woodpecker's is 2 inches, a sapsucker's is 1.5 inches, a chickadee's is 1 inch (in those cases where it makes its own nest hole), and a red-breasted nuthatch's, like the one pictured here, is also 1 inch. The holes are almost perfectly round.

Red-breasted nuthatches build substantial nests of moss, down, and fibers in their nest cavities, whereas woodpeckers never put in any nest material. When abandoned, tree-hole nests can be recycled by any of a variety of birds or by other tenants. Note the diagnostic globs of pitch brought to the nest to plaster at and below the entrance to the hole; this pitch probably functions to restrict predator access. The tree in this photograph is a dead red maple.

Winter wren

Troglodytes troglodytes

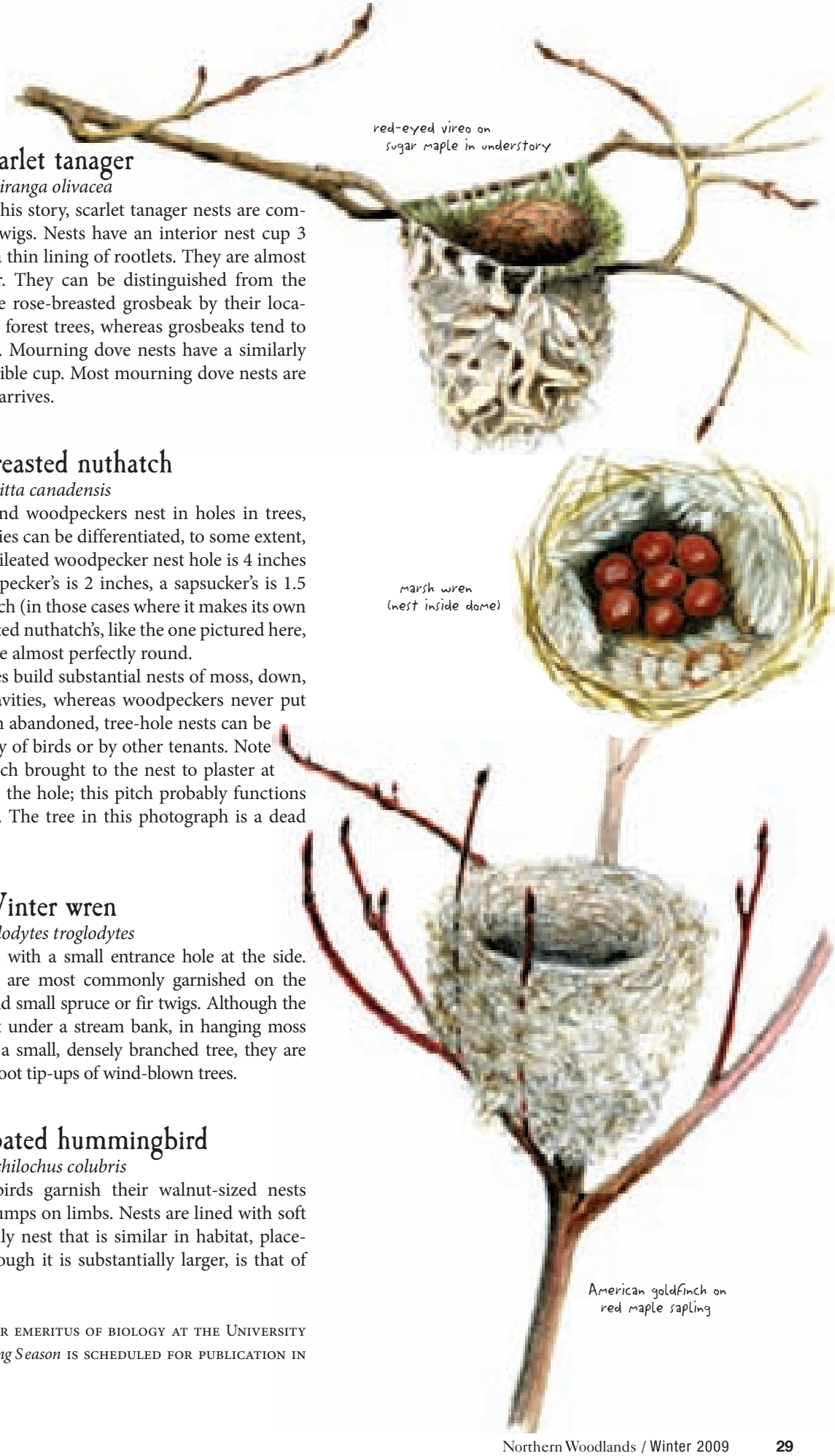
All wren nests are domed, with a small entrance hole at the side. Those of the winter wren are most commonly garnished on the outside with green moss and small spruce or fir twigs. Although the wrens may place their nest under a stream bank, in hanging moss close to the ground, or in a small, densely branched tree, they are most commonly found in root tip-ups of wind-blown trees.

Ruby-throated hummingbird

Archilochus colubris

Ruby-throated hummingbirds garnish their walnut-sized nests with lichens to "mimic" bumps on limbs. Nests are lined with soft white plant down. The only nest that is similar in habitat, placement, and appearance, though it is substantially larger, is that of the wood peewee.

Bernd Heinrich is professor emeritus of biology at the University of Vermont. His book *Nesting Season* is scheduled for publication in March 2010.



While a landowner with a stand full of storm-stained maple has lost a great deal of timber value, a consumer can make out well on the deal. This "brown maple" floor features all the structural integrity that sugar maple is famous for but with a more interesting, colorful finish. Best of all, it cost half as much as a traditional light-colored maple floor.

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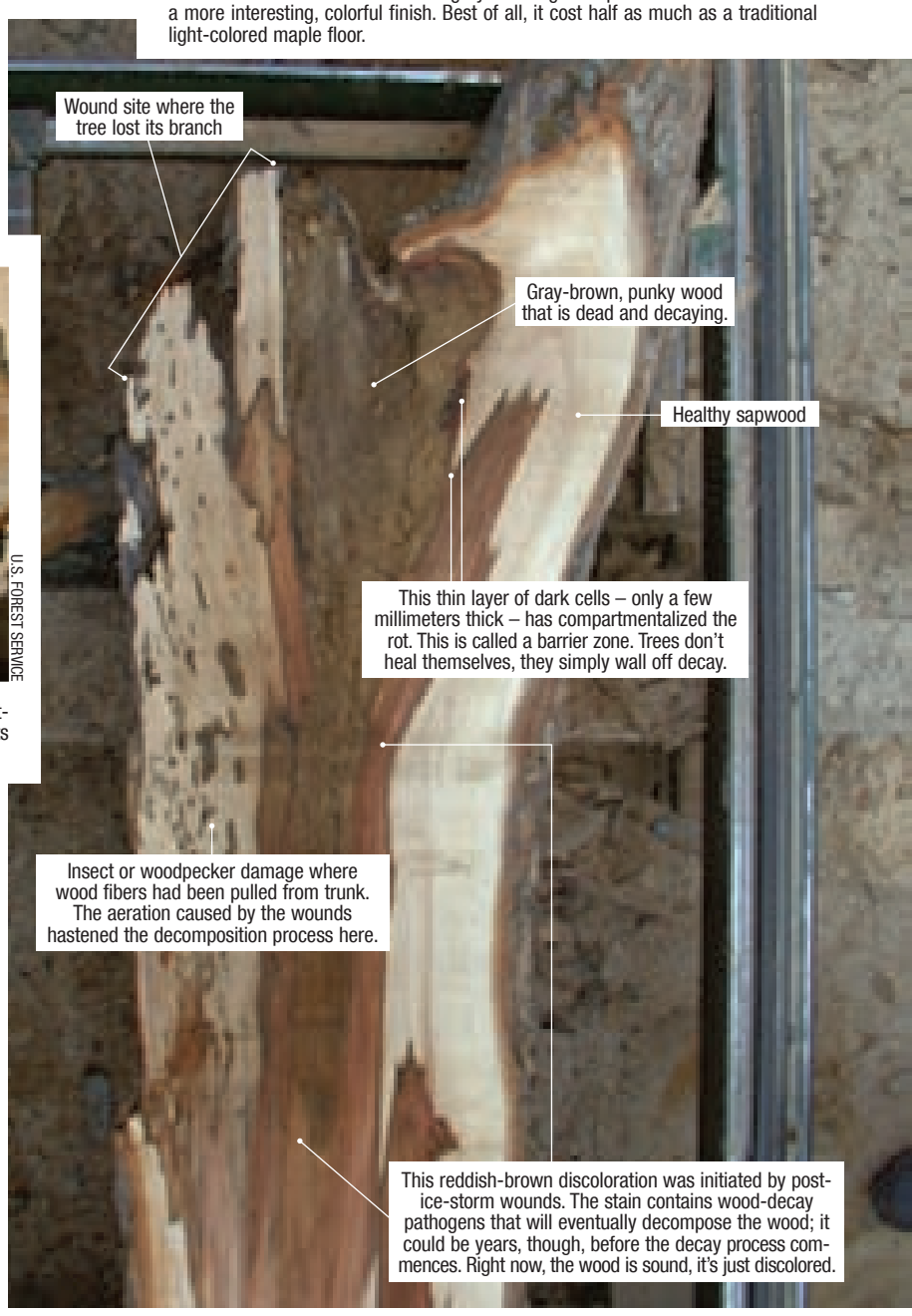
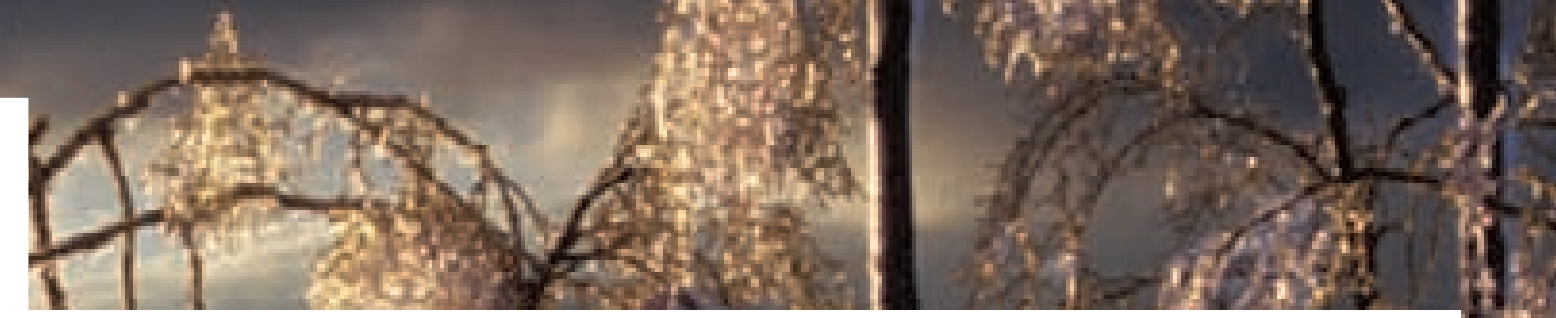
Although trees can be remarkably effective at compartmentalizing decay, stains caused by wounding events can eventually bleed through the whole stem.





Anatomy of an Ice-damaged Sugar Maple

By Patrick Bartlett

I have been managing woodlots in central Vermont since 1987, and in that time, two major ice storms have hit my area. Those two storms damaged thousands of acres across the region, and many landowners each time chose to salvage timber. Since 1987, I have managed salvage operations on 6,000 acres of sugar maple and northern hardwood stands in Windsor County, and my logging contractors have harvested over two million board feet of ice-damaged sugar maple. The cuts followed the guidelines set by the Vermont Forestry Division for ice-damaged trees. In most cases, about 50 percent of the trees in a given stand had to be harvested.

I happened to be overseeing a sugar maple sale in January 1998 when the big ice storm hit. Interestingly enough, this same stand had been hit by the previous ice storm 10 years earlier. The landowner wanted to salvage timber, and because these were trees that had been damaged by the earlier storm, I thought it would be interesting to dissect some of the logs.

I called Neil Lamson of the U.S. Forest Service. He and his colleagues bought and sawed some of these trees for educational purposes. What they observed (and what the accompanying photos show) turns out to be very common in ice-damaged sugar maples in central Vermont.

Once a tree has been wounded, it's common for a dark stain to discolor the core of the tree. This stain is not true heartwood, which results in a darkening of the wood from natural aging processes within the tree; rather, the discoloration is a reaction to the wound and the infection that follows. The stain is typically black or reddish brown in color and it makes maple lumber less valuable. According to Walter Shortle at the Forest Service's Northern Research Station, the rate of stain spread, which travels both upward and downward in the tree, is likely to be no more than 6 to 10 inches per year. But a storm-damaged tree is a weakened tree, and any pre-existing infections near the butt log could spread, as the tree puts more energy into rebuilding its crown and less into compartmentalizing its wounds. Many of the storm damaged trees we dissected showed staining in the top section of the valuable butt log. Since sugar maple log buyers pay the most for logs that have one-third or less stained wood showing on the cut ends of the sawlogs, it seems clear that overall log value has definitely been compromised by the ice storms.

I have revisited all of these stands over the past five years, and I've learned quite a bit from looking at the remaining trees. Most of the sugar maple trees still standing after the salvage operations had some ice damage, including lots of broken limbs. When a branch gets ripped off a tree, it is not a clean break. Wood fibers are pulled from the main trunk. The wound on a sugar maple will bleed out sweet sap in the spring, and some of that sap just sits in the wound. This sugar naturally attracts insects, then woodpeckers looking for a meal. About six years after the 1998 ice storm, I started noticing significant woodpecker damage around wound sites on the main stems of trees. After 10 years, I am now witnessing a number of pole-sized to log-sized sugar maples breaking off right where the woodpeckers have been feeding at ice-storm wound sites on the main trunk.

On the bright side, the storm site now features astonishing sugar maple and ash regeneration that is today between 8 and 16 feet tall. This is in an area where deer and moose are abundant, and in the past they've eaten all the regeneration. The thousands of fallen branches that littered the forest floor after the ice storm protected the new seedlings from browsing ungulates, and because large tracts of land were all regenerating at the same time, animal damage was diluted. The regeneration was also enabled by the fact that the remaining trees had a good seed year following the storm, and ample sunlight was able to reach the forest floor.

All of this food and cover has made the forest more hospitable not only to woodpeckers but also to grouse and snowshoe hare and the animals that prey on them, so the landowners have experienced increased wildlife sighting in the past 10 years.

Patrick Bartlett is the founder of Bartlett Forestry & Wildlife LLC. He currently manages 65,000 acres of private land for 315 landowners in Windsor County, Vermont.

MARK JONES

U.S. FOREST SERVICE

JIM BLOCK

Story and Photos by Susan C. Morse

Hardship in the Deeryard

Before entering the deeryard, we reveled in the sight of spring's emerging green forbs and the sounds of red-winged blackbirds. Inside the whitetail's winter quarters, however, we were abruptly thrust back into winter. We were conducting a "winter kill survey" – searching the deeryard for evidence of deer mortality due to harsh winter conditions. We discovered the remains of 12 dead deer that day; they lay in disarranged and scattered silence beneath the dark conifers.

Throughout the north woods, hundreds of thousands of deer may perish in severe winters. When 35 feet of snow hammered New York's Tug Hill Plateau in 1977, roughly 85 percent of the herd died.

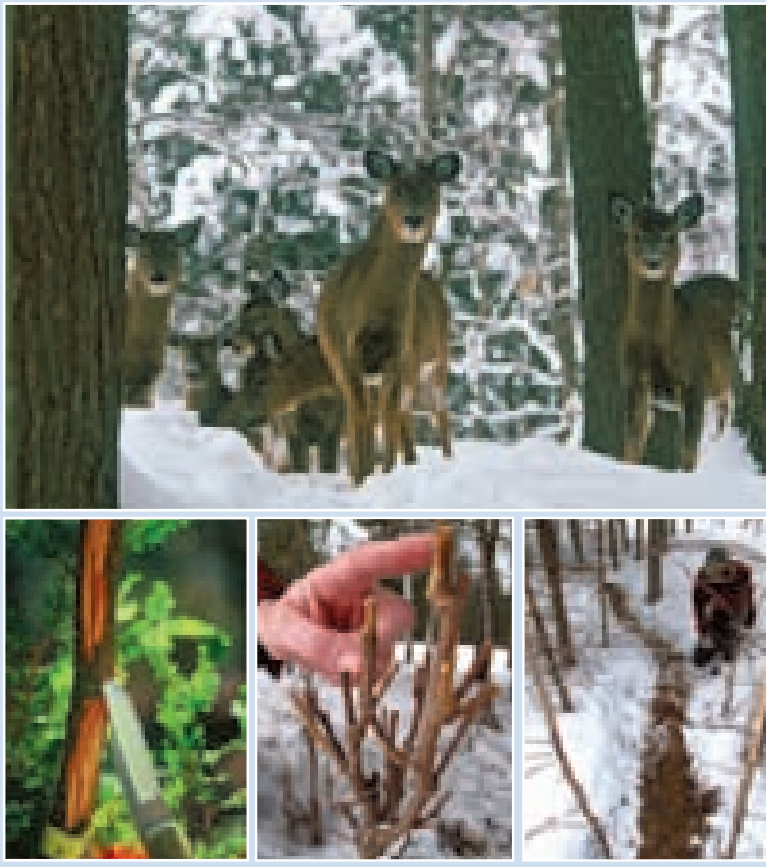
Deepening snow and bitter winds cause whitetails to migrate from 5 to even 50 miles. They concentrate within dense softwood cover that features the interlocking crowns of white cedar, eastern hemlock, spruce, and balsam fir. The closed evergreen canopy reduces snow depth and allows deer to create and maintain an energy-saving network of packed trails. Wind abatement and a decidedly warmer microclimate within deeryards are the most important winter habitat attributes and are critical to a northern whitetail's energy conservation plan.

In addition to the behavioral adaptations that impel whitetails to select deeryards, various physiological adaptations also serve to reduce the fatal consequences of cold stress and inadequate nutrition. High-quality summer and fall forage enable deer to grow a thick, insulating coat and store a protective fat layer from shoulders to rump. Furthermore, brown adipose fat accumulates around organs and intestines. Despite meager amounts of food, deer can subsist by drawing energy from their stored fat and thereby minimize costly food-seeking activity. Basic metabolic rates decrease dramatically, compensating for food shortages. During all but the warmest portions of the day, deer remain in their beds, conserving energy by not moving about and exposing themselves.

Unnatural disturbances and loss of deeryard habitat caused by development, new roads, inappropriate logging, free-ranging dogs, or human recreationists cause frightened or disoriented deer to expend precious energy – often with disastrous consequences. Miraculously, deer might lose up to 25 percent of their fall body weight and still survive. Underweight fawns, older deer, injured deer, and even rut-exhausted bucks may expire, however, particularly if winter starts early and ends late.

Even lacking signs of winter's culling, deeryards are readily recognized:

- Look for generations-old trails that are etched into the landscape. These pathways often have exposed roots where hooves have worn away the soil.



Clockwise from top: Within a protective softwood microclimate, many deer can survive winter's hardships; packed deeryard trail covered with winter's accumulated deer feces; there is no digestible food value in this coarse browse. More wood fiber and less digestible bark means that more energy will be used to digest the browse than can be gained by eating it; year-to-year bark stripping caused by the teeth of feeding deer is evidence that the yard is still being used.

- Excessive browse pressure causes "brooming," a broomlike growth of lateral twigs that proliferates in response to an herbivore's repeated removal of bud and stem tissues.
- Compacted deer trails, often dark with accumulated deer feces, are unique to deeryards where deer have been concentrated within the yard area for four or more months.
- Clusters of bed sites facing different directions illustrate where deer have rested near one another and protectively aimed noses, ears, and eyes in all directions – ever on alert for danger.

Periodic deer losses are as natural as they are heart wrenching. In the big picture, winter kill improves a habitat's carrying capacity by reducing excessive herbivory, which benefits surviving deer, as well as countless plants and other animals.

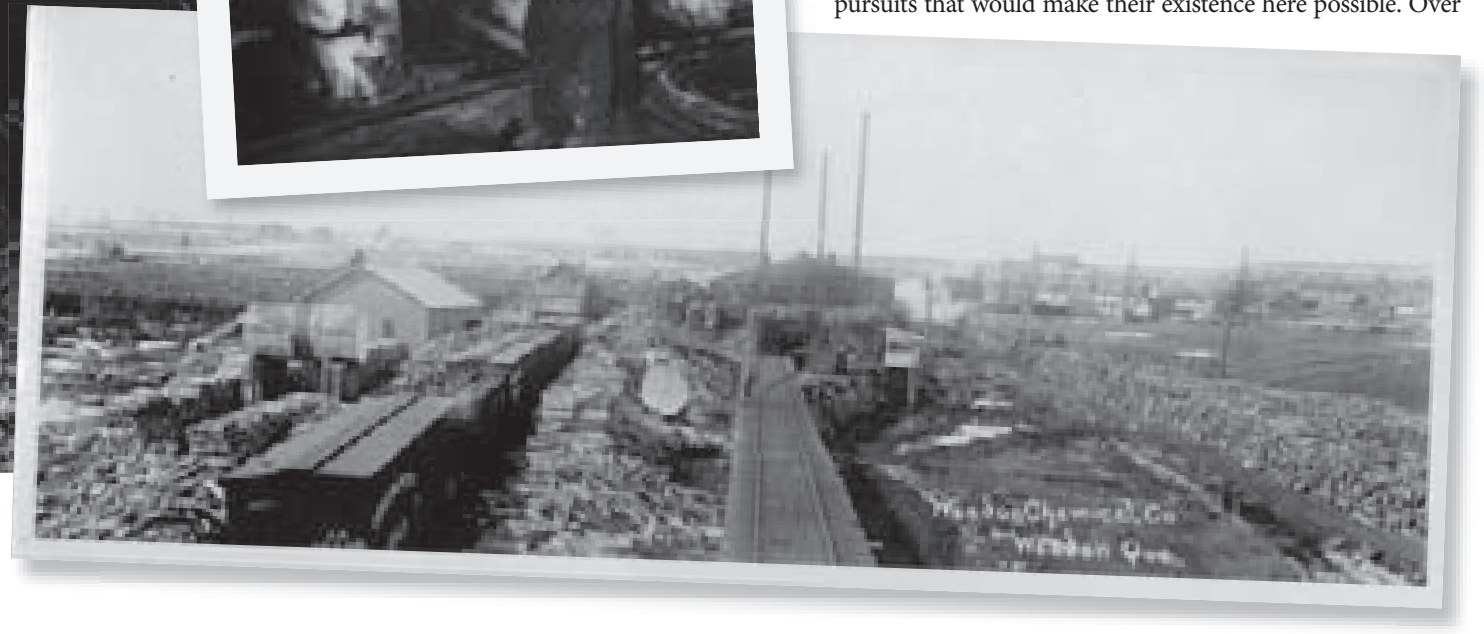
Susan C. Morse is founder and program director of Keeping Track in Huntington, Vermont.

Clockwise from top: Melvin Parks, at right, was a scaler for the George I. Treyz company; a worker poses by an acid still. He's covered in charcoal soot, probably surrounded by asbestos; approximately 12,000 cords of 4-foot wood are pictured here outside the Weedon, Quebec, chemical plant.

The Wood Chemical Industry in the Northeast

An Old Industry with New Possibilities

By Hugh O. Canham / Photographs courtesy Dan Myers



With the discovery that crude oil could be refined into a seemingly endless variety of products, petroleum became one of the most important substances on earth. Now, more than a century later, oil has lost some of its allure in the U.S., primarily due to climate change and our overdependence on unpredictable foreign sources.

Today, scientists are scrambling to find alternatives to oil and another fossil fuel, coal. Their search has led back to the source that was once as dominant as oil is today: wood. Beyond being processed into pellets and chips for power and heat, wood has chemical properties that are being explored for various uses. Turning wood into ethanol (cellulosic ethanol) might seem like a new idea, but we have been extracting chemicals from wood for centuries. In fact, long before our society ran on petroleum and synthetic chemicals, it ran on wood.

Wood contains a variety of useful chemicals. In colonial times, the Northeast's European settlers were faced with a nearly unbroken forest that was in the way of the agricultural pursuits that would make their existence here possible. Over

the next centuries, in the process of clearing the land for agriculture, these settlers fulfilled their need for heating and cooking wood, and they also burned piles of wood for the ashes, which they soaked in water and filtered to make lye (potassium hydroxide), saltpeter (potassium nitrate), and potash (potassium oxide). The lye was used to make soap, which was used commercially to clean wool both here and abroad. (Europe, having turned its forests into sheep pasture, was desperate for lye.) Saltpeter was used to cure food and make black powder.

Another product from the millions of acres of Northeastern hardwood forests was charcoal, which had been in use in Europe for hundreds of years for refining iron ore. (Charcoal burns hotter, cleaner, and longer than wood; to smelt iron you need intense, even heat.) Charcoal kilns quickly developed throughout the region, especially in Vermont, Massachusetts, and New York.

Manufacturing charcoal involves heating wood in a closed environment with very limited oxygen. Through the heating process, moisture and gases are removed from the wood. Early charcoal kilns were simple affairs, little more than earthen pits where wood was ignited, then smothered with sand. Later kilns were built of stone, and later still, brick.

In these early kilns, the gases created by the burning process were simply lost into the atmosphere. In time, charcoal makers developed methods to capture and process these gases into various acids, alcohols, aldehydes, ketones, and other organic compounds. These wood chemicals were key ingredients in many of the day's revolutionary conveniences – from rubber to paint thinner.

Where there's smoke, there's...pyroligneous acid

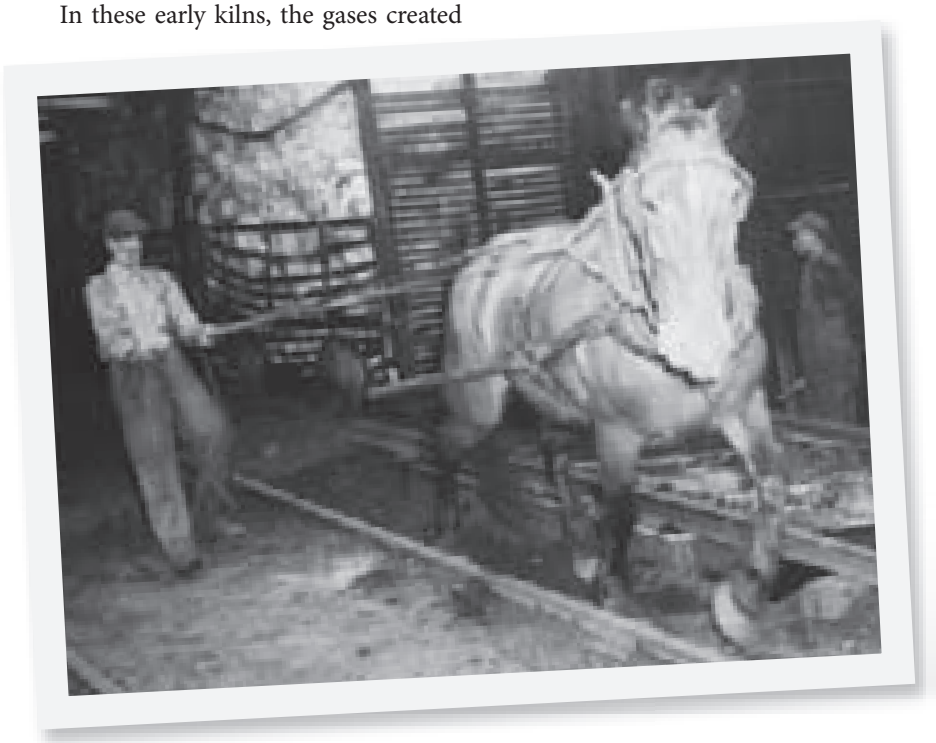
While the chemistry was complicated, the process these early engineers used to refine wood chemicals was fairly straightforward. The primary byproduct of charcoal production was pyroligneous acid (from the Latin *pyr,* meaning fire, and *ligneus,* meaning wood). Pyroligneous acid was created by capturing wood smoke in the charcoal-making process, then condensing it in a copper still.

The resulting pyroligneous acid was then decanted through a series of stepped barrels and pipes; this allowed the insoluble wood tar to settle out. The wood tar was used as a fuel source and as a cure for meat, before it was discovered to be carcinogenic.

After the wood tar had been removed, the pyroligneous acid was neutralized with slacked lime. Workers slowly stirred lime into the liquid until it achieved a rich wine color. In the early days, this mixture was dried in pans directly over the retorts and the resulting grayish powder was bagged and marketed as "acetate of lime." This product was sold to textile mills, where it was converted back to a liquid form and used as a dye fixative. Acetic acid was also used to make cordite, the first smokeless substitute for black powder, and acetone, a popular solvent. Liquefied acetate of lime is acetic acid – the key ingredient in vinegar.

As the factories became more sophisticated, the lime slurry was heated in an iron "lime lee" still to produce acetate, methanol, and wood alcohol. Methanol was widely used as a solvent and antifreeze solution. Methanol could also be converted to formaldehyde by passing its heated vapors through a platinum catalyst filter. Formaldehyde found uses as a preservative, to strip lanolin from wool, and as a key element in the manufacture of phenol formaldehyde, or "Bakelite," an early plastic material.

Eventually, the chemical byproducts created in the charcoal-making process became more valuable than the charcoal itself. The industry came to be known as the "acid-wood" industry.

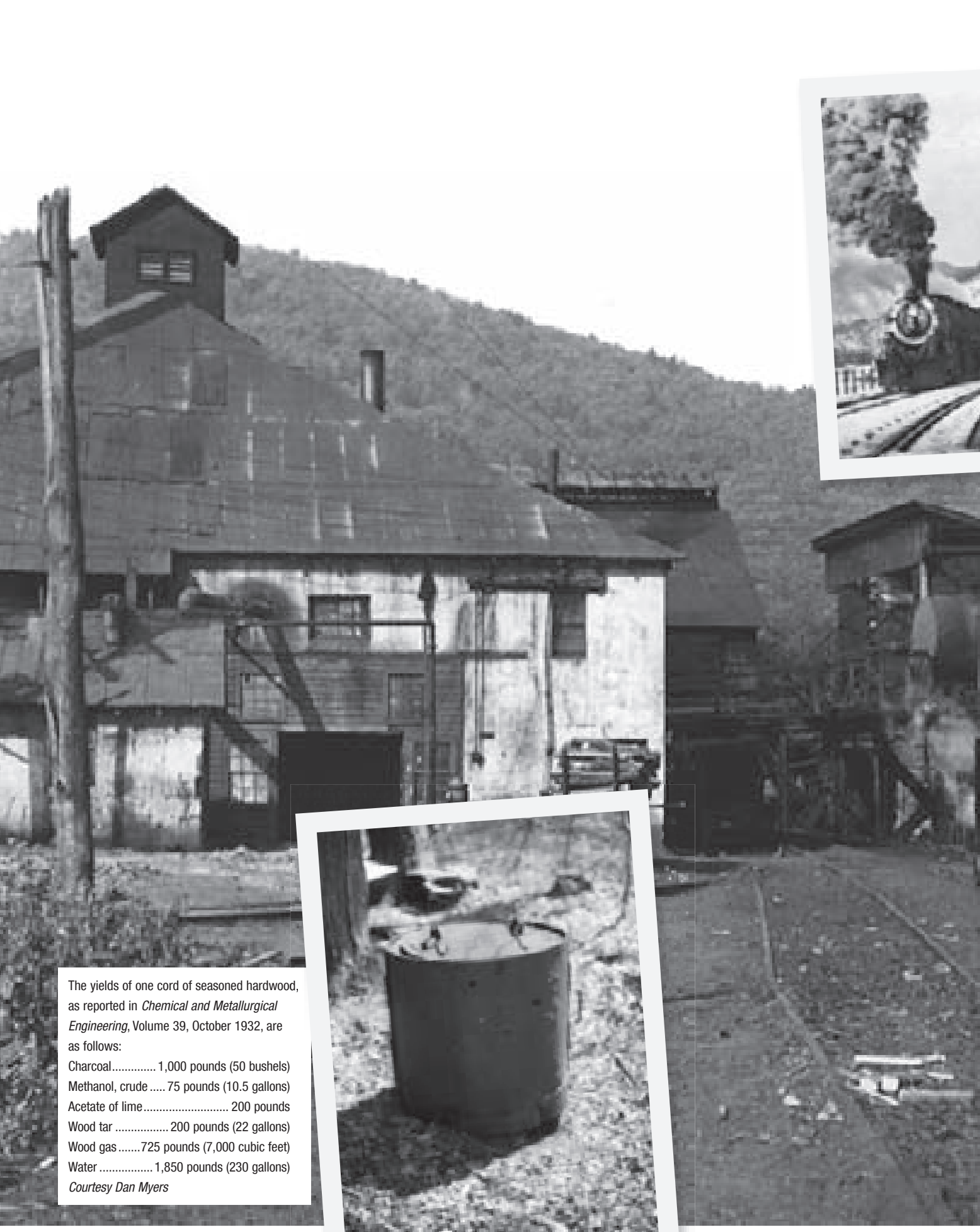


Distilling wood

The acid-wood industry became firmly established in the Northeast in the 19th century. In 1830, James Wood successfully manufactured pyroligneous acid at Northhampton, Massachusetts. John Turnbull, of Scotland, settled in 1850 at Millburn (now Conklinville) in Broome County, New York, where he built the first successful wood distillation plant to produce acetate of lime. The technology quickly caught on, and by the late 1800s and early 1900s, wood chemical plants were springing up across wide areas of New York, Pennsylvania, and New England.

The region was well suited to produce wood chemicals. There were abundant hardwood forests, and water was readily available. Many of the rural residents welcomed the opportunity for further

Left: 73-y ear-old J ohn K linegardner a nd h is h orse " Cubby" p ull an a cid-wood c harge to an o ven a t the H orton plant i n 1948. Top: P roducts cr eated b y t he d estructive d istillation o f h ardwoods. Right: F reelance w oodcutters c ould cu t a bout 40 c ords o f w ood p er month. They were paid $.80 to $1.00 a cord.



The yields of one cord of seasoned hardwood, as reported in *Chemical and Metallurgical Engineering*, Volume 39, October 1932, are as follows:

Charcoal..... 1,000 pounds (50 bushels)
Methanol, crude ..... 75 pounds (10.5 gallons)
Acetate of lime..... 200 pounds
Wood tar ..... 200 pounds (22 gallons)
Wood gas.....725 pounds (7,000 cubic feet)
Water ..... 1,850 pounds (230 gallons)
Courtesy Dan Myers

employment. Manufacturing plants in the Northeast offered ready markets for products, along with an ongoing charcoal industry.

The charcoal and acid-wood plants typically used 4-foot lengths of wood in small diameters. Tree tops and waste from lumber production were used in the early kilns, but that source wouldn't suffice for long. With the introduction of more modern plants – called "retorts" – the economies of scale necessitated having a large inventory of wood on hand.

According to Dan Myers, author of *The Wood Ch emical I ndustry i n t he D elaware Valley,* some big factories owned large tracts of land that they managed for charcoal and sawtimber. The George I. Treyz Company in Cooks Falls, New York, for example, maintained a 25,000-acre woodlot; the high-quality logs were sawed, while the tops and low-grade hardwood were fed into the retorts. Many smaller plants were not associated with sawmills, though, and these companies simply cut and burned whatever wood they could get their hands on.

Crews of freelance woodcutters cut and processed hardwood trees in nearby forests. The expansion of the industry in the 1800s and early 1900s provided off-season work to farmers and others. Trees were felled during the winter, yielding wood with low moisture content. Wood was hauled by horse cart, and later by rail, to the factory site. Here the wood was usually air dried for a year before processing, to further reduce the water content and speed up the processing time.

Myers states in his book that a plant of average size, burning 36 cords of wood per day, six days a week, burned 11,232 cords of wood a year. Stacked in a block 4 feet high, this wood would have occupied 8¼ acres. As you can imagine, the region's wood resources were strained. Entire hillsides and the areas around the acid factories quickly became denuded, and as a result, roads and small railroads were built so that wood could be hauled longer distances. Motorized vehicles in the woods, such as the Linn tractor, enabled the cutters to increase their output. With the good growing conditions of the northeastern United States, second growth forests quickly made it possible for woodcutters to return to the same location after 20 to 30 years to harvest another crop. At the height of the acid-wood industry in the early 1900s in Delaware and Sullivan counties of New York, annual wood consumption is estimated to have been 190,000 cords, with 3,000 men employed in over 100 plants.

Work in the acid-wood plants was hard and often dangerous. Still, the industry provided many jobs for low-skilled laborers, with a few highly trained persons to engineer the process and run the retorts. Communities developed around the acid-wood processing plants. In the Catskills, places like Cadosia, Horton, and Corbett owe their beginnings to the acid-wood factories that once thrived there. A typical factory town contained simple frame homes without running water or electricity; single men lived in boarding houses. A company store sold food and other necessities; goods were frequently purchased with company-issued script. Most of the buildings in town were owned by the company.

Trees were felled, cut, split, and stacked using hand tools, and the wood was placed on wagons by hand. Horses hauled the wood to a truck or rail car, where men loaded and unloaded the 4-foot lengths of wood. At the mill, wood was loaded onto carts and wheeled into and out of the retorts by hand.

When finished charcoal came out of the ovens, it was extremely dangerous to handle. It had to be cooled, but any sort of breeze could cause the entire load to burst into flame. Reports abound of loads of fresh charcoal exploding from

Clockwise from top left: The former George I. Treyz plant in Horton, New York. It was razed in the 1960s; the NYO&W Heavy Mountain 4-8-2 departing Cadosia, New York. Note denuded hillside in background; a charcoal can, used in early factories to transport finished charcoal.

not being sufficiently cooled. One New England driver left his load of charcoal in the wagon for the night, returning the next day to find only the hardware from the wagon remaining.

Dangerous, dirty work was typical of the great movement of manufacturing across the United States in the early centuries of American industrialization. The odor from the acid factories lingered in the air, clung to clothes and skin. Tar from the distillation process that wasn't burned for fuel was dumped into lagoons, or piped directly into rivers. But that was a different age. People were proud of their accomplishments and their industry, and clear-cut forests and air or water pollution were not yet concerns. Producing an important product, earning a paycheck, and struggling to raise a family were all-consuming activities.

Further refinement

As time went on, better techniques were developed for both charcoal manufacturing and acid recovery. Twentieth century chemical factories featured long, horizontal ovens in which gases were controlled before being piped into the distillation apparatus. (This was an especially helpful refinement of the process, since early factories featured stills that were housed in a chamber directly above the charcoal-processing ovens. This design flaw led to more than one devastating explosion.) Some plants further refined the gases into various products, but others merely shipped the mixed pyroligneous acid to other locations. A complete manufacturing sector rose up, including timber harvesting, acid-wood plants, transportation networks, final distillation plants, and allied manufacturing that used the finished wood chemicals.

The heyday of the large-scale wood-chemical industry in the Northeast was from the early 1900s until the 1940s. The nation was expanding, and demand for the products was high. By the time the United States entered World War I (1917), the industry had consolidated and smaller plants had been replaced by larger, more efficient ones. The industry spread west into Michigan and the Lake States. Meanwhile, in the far West and the South, a related industry was developing using softwood (southern and western pine species) to produce turpentine and other chemicals. Pine tar, still used by baseball players to provide a better grip on their bats, is also created by this process.

Shortly after World War II, however, the industry collapsed. Research in both America and Europe led to substitution of petroleum-based products for wood-based chemicals. At the time, petroleum provided a means for cheaper methods of production and was better suited to very large-scale manufacturing. The industrial charcoal market was rendered obsolete by natural gas and by Appalachian coal, which was hotter-burning, longer-lasting, and readily available. Charcoal's principal use became fuel for outdoor cooking, as it is today. Some retorts persisted into the 1950s and '60s, but the surrounding communities declined, and acid-wood cutting eventually ceased.

In some parts of the Northeast, the recovery of the forest has been amazing. On better soils, with good reserves of basic chemicals (the clay and loam soils found in many hardwood regions), the third- or fourth-generation forest is thriving. Today, across much of the Southern Tier of New York, into Pennsylvania and in southern New England, stands of even-aged black cherry, oak, and maple are growing on old acid-wood and charcoal clearcuts.

Other areas have not fared so well. Soils of the Adirondack foothills and parts of central New England have not recovered from the years of potash production. These sandy soils have very little reserve nutrient capacity, and repeated clearings removed much of the potassium. In the late 1940s, this deficiency was revealed in the stunted growth on many pine plantations established on old farms in the upper Hudson Valley.

Back from the ashes

The acid-wood industry has been forgotten for the last 60 years. To be sure, research into the fermentation of sugars from wood to produce ethanol was done in Europe for many decades, but the availability of cheap petroleum-based gasoline in America hindered research and development. Today, however, there is renewed interest in obtaining vital chemicals from wood and in using wood directly as an energy heat source. Wood-fired electric generating plants are opening in many areas of the Northeast, with the feedstock coming from sawmill residues and wood harvested specifically for "biofuel." This has implications for forest management throughout the Northeast: because it provides a market for what was formerly "junk wood," thinnings and improvement cuts can be economical. In addition to natural forests, willow is being experimentally grown on old farm fields and harvested for biofuel.

In addition to burning wood for electricity, research has shown that it is technically feasible to produce ethanol from wood, and entrepreneurs are actively developing commercial-scale manufacturing plants. Rebirth of the wood-chemical industry, however, is not a sure bet. It is costly to produce ethanol from wood, and it is economically competitive only when oil prices are high. Events of the recent past have shown that oil prices fluctuate widely. Furthermore, there are social barriers to widespread clear-cutting and to harvesting small trees. Local governments may enact ordinances restricting timber harvesting. What the next 20 to 50 years will bring is unclear.

Wood could very well increase in importance because it has the advantage over fossil fuels of being a potentially renewable resource. With modern production and conversion techniques, it may be possible to recover virtually all of wood's byproducts, reducing fossil fuel use and moving us toward a more sustainable way of life.

Hugh Canham is Emeritus Professor of Forest and Resource Economics at the State University of New York College of Environmental Science and Forestry. He has researched and taught about forestry in New York and the northeastern United States for many decades. He currently resides in North Syracuse, New York, with his wife.

FieldWork

By Judith E. Harper

At Work with Lynn Malerba
Guiding in the Adirondacks

In winter, Lynn Malerba's peak experiences don't occur on mountaintops. Her idea of a great February weekend is to teach a small group of novice explorers how to thrive on the valley floor, by confronting the challenges of winter camping.

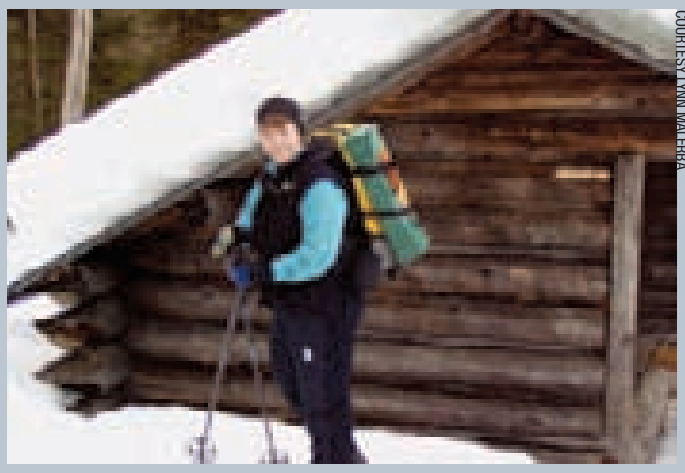
Malerba is a New York State Licensed Guide, and to make the title more distinguished, she's an Adirondack guide, following a proud tradition of rugged, never-say-die outdoorsmen and women who lead adventurers into the wilderness regions of the Adirondack Park.

Malerba explains that when she left teaching in 2001, it wasn't because she didn't like her job as a physical education instructor. She loved teaching. But after a 20-year career, she longed to spend more time outdoors – backpacking, canoeing, cross-country skiing, and snowshoeing in the Tupper Lake region wilderness where she grew up. The dilemma perplexed her for years until a friend suggested that she combine her passions for the outdoors and education. The conversation changed Malerba's life. First she worked toward attaining her guiding licenses in canoeing, camping, and hiking. Then, in 2002, she opened her four-season guide service, Adirondack Connections.

A few miles from the village of Tupper Lake, Malerba's family owns over a hundred acres on the Raquette River, the second longest river in New York. The Raquette flows north through wild country – a land of lowland fens, marshes, bogs, and forests. The family property borders state-protected "Forever Wild" land and is an excellent launching site for Adirondack Connections' wilderness adventures. Paper birches, silver and red maples, balsam firs, and alders dominate the landscape.

Malerba has been at home in the woods all her life. From the time she was four years old until she was in high school, she joined her father, a forester, on trips to mark trees in the lowland boreal forest northwest of the Tupper Lake Region. Malerba remembers carrying cans of paint in a canvas backpack and trooping along behind him. "There weren't any trails, so every trip was a bushwhack," she says. "Dad made me appreciate the value and importance of trees." An avid hunter and fisherman, Douglas King also taught his daughter not to be afraid of wildlife.

In her own work, Malerba has carried on her father's interest in teaching people to be comfortable in wild places. Her most popular winter adventure – the winter camping weekend – is not so much a trip as it is an experience, she says. Most attendees are beginners, and she has come to like it this way. Her primary objective is to teach her clients how to be warm and comfortable all weekend so that they can fully experience the joy of winter outdoor living in the wilderness. She hopes they will gain confidence, practice new skills, and try winter camping again.



COURTESY LYNN MALERBA

Malerba begins the weekends by inviting her clients into the comfort of her home early Saturday morning. "I make sure the living room is warm and cozy so that people start the weekend feeling relaxed." This is crucial, Malerba says, because she wants her clients to absorb what she's teaching them, which would be difficult if they were outdoors shivering. She explains the essentials of keeping the body warm as well as the dangers of hypothermia, and she discusses the reasons why she has asked them to bring each item of clothing and gear.

"How to Stay Warm in a Sleeping Bag," is the most important winter skill she teaches, Malerba says. Adirondack nights are infamous for dropping lower than expected. "It's crucial to have a bag that fits," she explains. "If it's too big, your body can't warm the air spaces around you. To stay warm, you should have just enough room to squeeze into it while wearing layers of microfleece from head to toe. You also need space to hold the next day's clothing close to your body."

And what if the bag is too big? "Cram the foot of the bag and all extra space with dry clothing." She also cautions her clients about the dangers of sweating and the importance of removing a layer of clothing before becoming drenched.

As soon as her weekend group is dressed warmly and has their gear packed, they drive or snowshoe to the wild area where they'll carefully select a campsite near the Raquette River, near the Bog River, or close to Bog Lake, all within 10 miles of her home. She helps them choose a tent site that's protected from wind and clear of overhanging branches, which may have become brittle from cold. She also gives each tent's occupants a small shovel to keep by the opening in case wind drifts snow in to block the exit overnight.

After a lunch at the campsite, everyone enjoys an afternoon snowshoe trek, usually over a frozen pond and wetlands. Malerba encourages the hikers to observe the snow ahead of them as they proceed. If the consistency of the snow changes—if it becomes crystalline or if a depression appears—there may be a hole in the ice beneath the snow. She also warns them to avoid rocky areas that attract heat during the day. For extra safety, she suggests snowshoeing in shady places wherever possible.

The group then heads back to camp to build a fire, prepare hot beverages, and make dinner – all tasks that require special

cold-weather strategies.

Sundays include breakfast, more exploration, lunch, and another short hike before driving back to Malerba's home. In past years, she's allowed the groups to fill to a maximum of six people. This winter, she's reducing it to four people. "Six is workable," she says, "but with four, everything is more manageable and allows me to give my clients more individual attention."

"The magic of these winter weekends is that they're new for me each time," she says. "I just love watching people try something new and enjoy it. For me, it's partly helping them through their fear of the unknown – surviving a cold winter's night outdoors and having fun doing it. On Sundays, toward the end of the trip, I'm thrilled to hear how excited they are about the experience. They beam."

In the spring, summer, and fall, Malerba guides "pond-hopping trips" with her Hornbeck boats. Hornbecks are built in the southern Adirondacks and are famous for their light weight and portability, durability, and ease of use.

Any professional guide will tell you that it's a spartan, demanding life. Finding clients is the greatest challenge. And dedicated attention to the business details is what makes or breaks a guide. Survival in this business is all about marketing – targeting the most appropriate advertising outlets, maintaining a website (Malerba designed her own), appearing at outdoor sports expos, and most importantly, responding quickly to email from prospective and former clients.

These tasks gobble up time and are never done. Striking a balance is difficult, Malerba says. Sometimes she must sacrifice the days she needs to spend scouting new trips. At other times, she has to postpone the cross-country skiing, hiking, and paddling that help maintain her top-notch physical condition. What's unusual about Malerba is that she has persevered in clocking the desk hours that make Adirondack Connections a success.

Active participation in the New York State Outdoor Guides Association (NYSOGA) has helped her master other aspects of the guiding life. She now serves on the board of directors and helps other guides learn wilderness first aid, build rapport with clients, and advertise their skills.

Malerba's dreams for her business have changed over the years. Three years ago, her goal was to make a simple living and keep her business afloat. As Adirondack Connections has steadily grown, her dreams are changing. "I love exploring new places," she says.

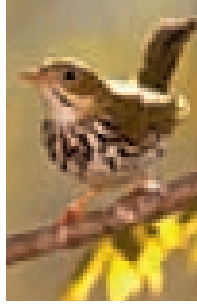
Last August, Malerba led four trips, each lasting a week, in Acadia National Park in Maine, adventures that combined bicycling, mountain climbing, sea kayaking, and hiking, with plenty of free time for sightseeing, sunbathing, or relaxing. She says it's a joy to work in Acadia, the place that "has it all."

Malerba plans on further expanding the scope of her guiding service. "I'd love to guide on the John Muir Trail in the Sierra Nevadas," she said, "and take clients to hike portions of the Pacific Crest Trail."

Yet she admitted that she can't imagine life without the unique beauty of the Adirondacks. "It's so peaceful here," she said. "I can take my clients to wild places and we rarely see anyone. People are always amazed by that and I think it makes them feel even closer to nature."

Judith Harper is a freelance writer and an Adirondack hiking guide.

COURTESY LYNN MALERBA



Story and Photos by Bryan Pfeiffer

Winter's Visitors

No birdwatcher's life is complete without experiencing the penetrating gaze of a great gray owl. Even a glance from those lemon-yellow eyes will cut through your Carhartts. Designed for the cold, great gray owls are mostly feathers – a deep, downy layer covering a relatively small body. A great gray can locate its prey, often a small mammal, not by seeing but by hearing it move within deep snow. It will float on broad wings and then plunge, face and talons first, to snatch a vole or some other unlucky prey from beneath the snowpack. Great grays range from central Canada up into Alaska. And with that arsenal of adaptations, they need not migrate south in winter. Great gray owls scoff at winter.

Yet every so often, great grays do indeed move south and show up in the northeastern United States. It is a winter birdwatcher's dream fulfilled. And it is but one example of winter birding at its finest.

Great gray owl and pine grosbeak

Birds migrate to survive but not necessarily to escape the cold. Migration is often about food – or the lack of it. Those flycatchers arriving in May, for example, leave us when we run out of flies for them to catch. This type of exodus is inevitable and predictable for roughly three-quarters of our nesting birds. Yet while many birds leave us for the winter, some exciting replacements, mostly from the north, come to stay.

The lanky rough-legged hawk, which nests across the arctic, heads south and adopts our agricultural lands to hunt for meadow voles. The elegant American tree sparrow, which nests in scrubby areas of tundra, visits our shrubs and birdfeeders for seeds each winter. These are among the predictable winter visitors. They vacate their arctic breeding grounds entirely for the beckoning country farther south. But other species are more or less nomadic, moving south some winters and not in others. We call these "irruptive" species, and what often drives them south are episodes of food scarcity in their usual wintering grounds.

Great gray owls move south when their prey base of mammals crashes. Bohemian waxwings, which breed from Hudson Bay and across the taiga into Alaska, appear in huge numbers across New England some winters, presumably after exhausting fruit supplies in their northern wintering grounds. And that classic group of irruptive species, winter finches, including the pine grosbeak, descend upon us when their winter diets of buds, seeds, and fruits are in short supply. Sometimes food isn't the only factor. A good breeding year, producing an abundance of birds and, therefore, greater competition for food in winter feeding areas, will force some of the excess population south.

Those grosbeaks, which breed and spend winters in subarctic and subalpine coniferous forests, and therefore rarely encounter people, like to feed on the fruits of our ornamental crabapples in cities and villages. They are normally tame and approachable – even more tame and approachable if, while imbibing on fermented fruits, they have had a "few too many."

So do indeed keep those binoculars at hand this winter. You never can tell when you'll happen upon a determined owl or a tipsy finch.

Bryan Pfeiffer is an author, wildlife photographer, field guide, and consulting naturalist who specializes in birds and insects. He lives on Bartlett Hill in Plainfield, Vermont.

Balsam, Bunches, & Bows

How to Make a Wreath

Story by Amanda Kuhnert
Photographs by Adam Frehm

On a raw December day in northern Vermont, with a nor'easter bearing down on New England, the kitchen in Sarah Taparauskas's circa 1850s farmhouse is a warm, inviting place to spend an afternoon. A fire blazes in the woodstove, and the scent of freshly cut balsam fills the space.

Dressed in a grey woolen hat and worn Carhartt pants, her hands stained black with balsam pitch, Taparauskas is the perfect picture of a Vermont-born and -raised craftsman. She began making wreaths 13 winters ago, as a side job in college, under the tutelage of Steve Chamberlain of Castleton, Vermont.

Chamberlain decided to bow out of the wreath-making business in 2001 and sold his supplies to Taparauskas after her three years of apprenticeship. Since then, she has made 150 to 200 per season – more than 1,200 wreaths.


1

1 Find your branches

Every year, around Veteran's Day, Taparauskas starts the annual wreath-making season by loading up her borrowed truck with a chainsaw, twine, and clippers and heading to a friend's overgrown Christmas tree farm, where she collects her balsam branches. This is no small feat for a woman who can't weigh much more than 110 pounds. She hunts for balsams that are 5 to 8 inches in diameter; then she cuts the tree down and shears off all the branches. (Editor's note: Balsam trees can be pruned for a continuous supply of tips; see story on page 49.)

Although cedar and white pine are also viable options for wreath-making, Taparauskas prefers the softer needles and the aroma of balsam. She mentions that some wreath-makers like to mix in a little spruce for its slightly rougher texture, but she's a balsam purist.

Balsam fir is common throughout the northern tier of the *Northern Woodlands* readership area but can be hard to find in more southern locales. Those of us without a backyard full of balsam or the luxury of an overgrown

tree farm at our disposal can buy bundles of balsam from a local florist or pick up discarded branches at a Christmas tree farm or stand.

"After I cut the branches off the tree, I make them into bundles, with 20 to 30 branches per bundle, weighing in at around 30 to 40 pounds," Taparauskas says. Each bundle will produce about 10 wreaths. Once she returns home to Colchester, she stores her bundles in a cool place. "Everything always stays outside on the north end of the barn, where it's shadier and colder," she says.

2 Clip the branches

When Taparauskas is just a day or so away from assembling her wreaths, she begins the laborious process of clipping the branches, accumulating as many of the favored fuller tips of the balsam branches as she can.

The length of the pieces depends upon the intended size of the completed wreath. For a 10-inch wreath, she will cut pieces that are approximately 8 inches long. She cuts 6- to 7-inch-long pieces for an 8-inch wreath, her smallest size, and 10-inch-long pieces for an 18-inch wreath.

3 Put a "twist" on the traditional wreath ring

A wreath is measured by its inner diameter or the size of the ring used to make it. What's sold as a 10-inch wreath, on a 10-inch ring, has an outer diameter of 20 inches. Taparauskas buys her rings from Green Mountain Forest Supply or The Vermont Wreath Company, and then she adds her own inventive twist by cutting off the top of a clothes hanger and wiring it to the ring for a ready-made hanger.

4 Assemble smaller bundles

Next, Taparauskas takes her pile of pieces and begins to organize them into small bundles consisting of four or five pieces each, creating "fans" that are approximately 6 inches wide. She makes her fans by placing two or three choice pieces (the soft, needly pieces at the very tips of the twigs) in front, with woody pieces (the more twiggy pieces that originate closer to the branch) in back.

At the end of this stage in the wreath-making process, Taparauskas's table is covered with rows of beautiful little evergreen fans. It takes about 20 bundles to make a 10-inch wreath.

5 Attach the bundles

Taparauskas's wreaths are notable for their lovely, crisp form. They are also extraordinarily full. What's her trick? It's a combination of maximizing the number of bundles used per wreath and the art of tying the bundles to the ring.

She uses 24-gauge wire, which can be bought at any floral supply company or craft shop, and a pair of clippers. She begins by tying the wire to the top of the ring next to the hanger.

The critical step here is to hold the bundle tightly as you attach it to the ring. While pressing the base of the bundle to the ring with one hand, wrap the wire tightly around the base (about 1/4 to 1/3 of the way up the bunch, or about 1 to 2 inches from the stem end of the pieces, depending upon their length) of the bundle and the ring. Wrap the wire around once, then pull tight, wrap again and pull tight, and then maybe finish off with one last wrap.

The first bundle is tied onto the ring at a 30° angle (see photograph). The placement of each successive bundle is critical to making a fuller wreath. The next bundle should cover about half of the first bundle and be wrapped tightly again in the same manner. If the bundles are placed too far apart, you will end up with a deflated-looking wreath.

Another important thing to remember as you add bundles is to place each one at the exact same angle as the previous bundle. "The branches above should parallel the branches below," Taparauskas says. Resist the urge to angle the bundles so that they follow the curve of the ring.

She moves clockwise around the ring. "I rotate the ring as I go so that I'm always working in the same position – between twelve o'clock and two o'clock," she says.

6 Cram in the last bundle

"Just when you think you can't fit in another bundle on the ring, stick another one or two in," she says. When she finally reaches the last bundle, she wraps the wire firmly around it at least three times, and then she flips the wreath over and wraps the wire around the coathanger

handle five to six times. As a final touch, Taparauskas may clip a few twigs that are sticking out to make a nice symmetrical center.

7 Decorate your wreath

Taparauskas likes to collect cones from red or white pines, since they're larger than balsam cones, which are only one to three inches long. The red pine cones are small when they first fall from the tree (1½ to 2½ inches long), but they develop a nice round shape when they open. She gathers cones while hiking in the fall. "The cones are closed when you get them," she says. "But if you let them sit under the woodstove for a few days, they'll open up."

Taparauskas makes her own bows, having learned the art of bow-making from friends who had worked in floral shops. She also grows and dries her own flowers, such as German statice, globe amaranth, rosehip, and winterberry, and then stores them in the barn until the arrival of the next wreath-making season.

Amanda Kuhnert is a freelance writer and personal historian who lives in Stowe, Vermont. www.fourfoldlegacy.com


7

PRUNING BALSAMS FOR ANNUAL WREATHS

Balsam fir is ubiquitous throughout the northern New England landscape; in fact, there are more than 5.3 million acres of spruce-fir timberland in Maine alone. There, you could make a hundred wreaths a year for the next thousand years and you'll not put a dent in the supply.

It's a different story in more southern areas, however, where balsam fir is sparse. To maximize the natural resource upon which the trade depends, a wreath maker may need to think ahead. With some planning and a modest investment, small groups of trees can be managed for a continuous supply of balsam tips.

Find the right spot

When searching for the perfect wreath-production area, you'll want to find a healthy stand of balsam firs that are all about 10 to 15 feet tall. The fewer "intruders" (other tree species), the better.

Weed the area

Just as you would weed a vegetable or flower garden, you need to weed your fir stand to ensure that each tree gets plenty of sunlight. Remove any trees of other species that are growing between the balsams or are covering up any portion of the balsams' branches.

A healthy tree produces healthy tips, so thin the remaining firs so that they are spaced 8 to 10 feet apart, ensuring that they receive adequate sunlight on all sides. When trying to decide which trees to thin, look for some telltale signs that a tree is no longer thriving, including muted color, insect damage, or disease.

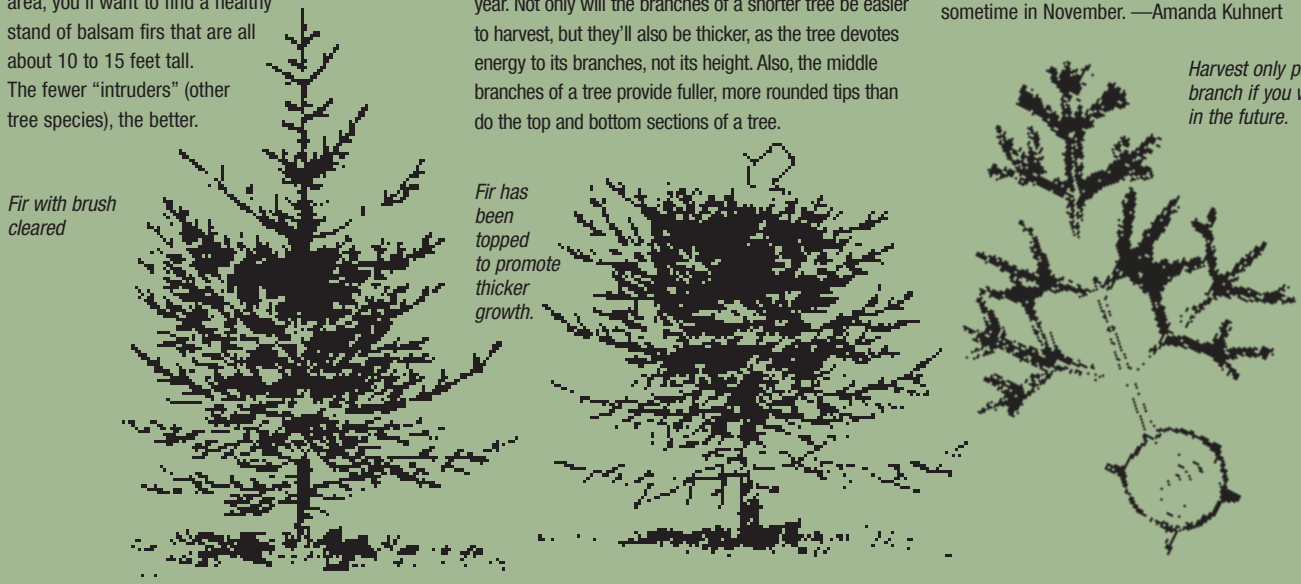
When managing for balsam tips, it's often a good idea to lop the top of the tree off and trim the new leaders each year. Not only will the branches of a shorter tree be easier to harvest, but they'll also be thicker, as the tree devotes energy to its branches, not its height. Also, the middle branches of a tree provide fuller, more rounded tips than do the top and bottom sections of a tree.

Trim carefully

The needles of the balsam fir produce the food that the tree needs to survive. In order for the tree to fully recover before the next harvest, gather needles from only one-third of the tree. It's also a good idea to set up a three-year harvest cycle, which gives a tree two years off before you prune it again.

Harvest at the right time

If you harvest balsam branches too early in the autumn, you'll run the risk of your wreath shedding its needles before the holidays. Only harvest balsam branches after the needles have hardened, or "set." This typically happens when the temperature has been below 40°F for at least 20 days in a row, or after three or more consecutive 20°F nights, typically sometime in November. —Amanda Kuhnert



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Stephen Long, s/s Editor.

Tapping Trees

By Carl Demrow

The act of tapping a maple tree is a fairly simple task, yet it's one that's often done incorrectly. Improperly tapping a tree can lead to lower sap production and, worse, poor tree health. It's always helpful for sugarmakers to remind themselves of the general rules.

A taphole is an open wound. The tree must expend energy to seal it off with new wood, so don't tap trees that are showing signs of stress (dead branches, insect damage, exposure to road salt are red flags). Choose healthy trees with large crowns: they have more leaves, which means more sugar.

Use "health spouts," which require a smaller taphole (5/16- or 19/64-inch) than the traditional 7/16-inch hole. Health-spout holes will yield slightly less sap than the traditional hole, but they'll close much faster after the season is over. Over the long run, your trees will be better off if you use them.

Choosing the right time of year to tap is critical. If you tap too early, the taphole will begin to dry up while the sap is still flowing. Tap too late, and you'll miss some good runs. As a general rule, figure on getting four to six weeks out of a taphole. Tap when you expect a run of days with temperatures 5–10 degrees above freezing. Tap your trees when the temperature is above freezing, because drills cut more cleanly in thawed wood. Redrilling holes that have closed because they were drilled too early is not recommended.

Be conservative with the number of tapholes per tree. Don't tap trees less than 12 inches in diameter. Trees that are 12–18 inches in diameter get one tap; trees more than 18 inches in diameter get two taps. To locate the place or places on the tree for your tapholes, stay at least 2 inches, and preferably 4 inches, to the side of old tapholes, and 6 inches minimum above or below old tapholes. Stay at least 6 inches from old branch scars. The goal is to tap only sound, healthy, light-colored wood. There is no need to worry about which side of the tree you are tapping. When the sap is running well, it will run on the north side as well as on the south.

With a clean, sharp bit (dull bits create ragged holes, which encourage the growth of bacteria that will inhibit the flow of sap), drill a hole no more than 2 inches deep, angled slightly upward into the tree. Drill your hole straight and true – you want a perfectly round hole. Oval holes allow faster contamination of your taphole and may allow sap to leak around the tap. Some older trees may have thick, shaggy bark, which will not help your tap seat well in the hole. Avoid parts of the tree with thick bark or break off the shaggy chunk above where you want to tap.

Once you have drilled your hole, clean any loose shavings out with a clean maple twig. Do not blow in the hole to clear it – this will only introduce bacteria. Do not add any sketchy "taphole sanitizers" such as bleach or vodka – they are counterproductive.

MICHAEL FARRELL

This photo shows why it's important to avoid previous tapholes when tapping. The dark wood above and below these tapholes will no longer effectively transport sap. The tree that produced this board was tapped so heavily that it had almost no white wood left, so it would have been almost impossible to find a productive area on this face of the tree.

Place your tap or spile into the hole and gently tap it in so it's snug. If you are using metal taps, use a wooden mallet. For my plastic health spouts, I use the flat of my hand until the tap makes the telltale "snick" sound that indicates it is seated. You can also use a rubber mallet on plastic taps. Over-driving a metal tap is very easy to do with a metal hammer and causes the edges of the tap hole to split and tear, causing unnecessary damage to the tree.

Once the season has come to a close, promptly remove your taps. This will allow your trees to begin growing new wood over their tapholes. Once again, take care not to further injure your tree during tap removal. Don't bang the spiles back and forth with a hammer to loosen them or place anything in the tap hole to "help" with the closing of the wound. Clean your taps carefully and store them until next season. Take good care of your maples – the rewards are sweet!

Carl Demrow is a trail consultant and carpenter when he's not busy tending his woodlot in Washington, Vermont.

By Todd McLeish

Digging for Worms

When Colgate University biologist Tim McCay began studying the impact of acid rain on soils and forest-dwelling animals in the Adirondacks, he started by heading into the forest and counting all of the species he could find. Much to his surprise, he didn't find any worms. When he conducted the survey again and still found no worms, he asked other scientists who'd studied the region's fauna, and they all reported similar results.

McCay eventually found two worm species in the Adirondack forest, but the overall dearth of worms had him wondering about the situation, especially in light of the fact that worms seemed to be thriving in other parts of New York state.

In a research study published this summer in the scientific journal *Northeastern Naturalist,* McCay and colleagues compared worm abundance in several forest plots in the Adirondacks with similar plots in central New York. They found more than five times as many worm species and 15 times as many individual worms per square meter in the central New York sites as in the Adirondack sites.

The researchers suggest that these differences may be due to soil chemistry disparities or differences in human settlement and land use. They believe that the soil qualities in central New York may enable it to neutralize acid rain and make it hospitable for worm survival.

"In areas where there is limestone bedrock, soils tend to be well buffered from acidic deposition," McCay said. "Those soil communities aren't affected because the limestone neutralizes the acid. That's not the case in most places in the Adirondacks, where bedrock has fewer calcium-containing minerals. Adirondack soils are not well buffered against acid inputs."

When McCay added crushed limestone to Adirondack soils in a laboratory experiment, the worms survived quite well. But it raises the question of whether less acidic precipitation, and the potential for expansion of worms into the Adirondack forest ecosystem, would be beneficial or not.

"If rain quality continues to improve, we should eventually start to see improvement in soil quality," McCay explained. "These improvements might be sufficient to allow other species of worms to tolerate forest conditions in the Adirondacks and allow the species already there to grow faster and become more abundant. If that happens, it may change the conditions of Adirondack forests. It would certainly cause a more dynamic turnover of forest floor organic matter. And that could affect forest floor animals like snails and beetles in ways that are hard to predict."

The prevailing notion among biologists is that most earthworm species that people are familiar with, including most of the species you see when it rains, are exotic to North America. Native worms were pushed southward by the advance of the glaciers and have been slow to move northward again. European species moved into the void after being introduced to North America in ship ballast, in plants brought from Europe, and in discarded fishing bait. McCay's study may shed additional light on the distribution of earthworms we see today.

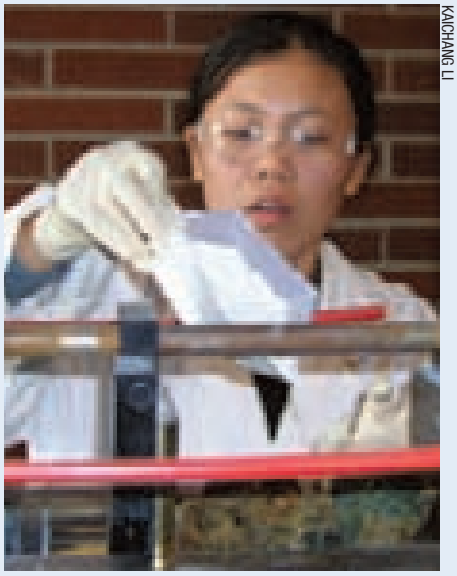
TIM MCCAY

*Adult octagonal-tailed worms (*Dendrobaena octaedra*), an acid-loving species found in forests of the Adirondack Mountain Region.*

Where the Cellulose Meets the Road

Wooden tires went out of style a century ago, along with buggy whips and horse-drawn wagons, but if an Oregon State University researcher has anything to say about it, a modern relative of the wooden tire might lead to the first major change in automobile tire design and production in quite some time.

Kaichang Li, a professor of wood science and engineering, thinks that automobile owners may some day be driving on tires that are reinforced with microcrystalline cellulose from trees, which



KAICHANG LI

Scientist Wen Bai mixes microcrystalline cellulose with rubber on an open rubber mill.

could make the tires cost less, perform better, and require less fuel.

While automobile design and technology have experienced a great many revolutionary changes in recent years, Li said that his research "could lead to a new generation of automotive tire technology, one of the first fundamental changes to come around in a long time."

According to Li, who received a 2007 Presidential Green Chemistry Challenge Award from the National Academy of Sciences for his work on sustainable wood products, cellulose fiber has been used for about 25 years as a reinforcement in some rubber and automotive products, including belts, hoses, mats, and insulation, but it has never before been used in tires. The preferred fillers in tires are carbon black and silica, which are expensive and energy intensive; they're also heavy, which reduces a car's fuel efficiency.

In his search for new types of reinforcing fillers for tires, Li and graduate student Wen Bai turned to microcrystalline cellulose, a product that can be easily made from almost any type of plant fibers using a low-cost process called acid hydrolysis. About 40 to 50 percent of wood is cellulose.

The researchers replaced about 12 percent of the silica used in conventional tire manufacturing with cellulose, which decreased the amount of energy needed to compound the rubber composite and improved the composite's heat resistance while retaining its tensile strength. The study showed that the traction of the cellulose-reinforced tires was comparable to conventional tires in wet and rainy conditions. In addition, when the tires were tested in hot summertime temperatures, they generated less rolling friction, which would improve the fuel efficiency of vehicles using the tires.

While Li said that he still needs to confirm the long-term durability of tires made with cellulose, he has already received a number of calls from tire makers a nd rubber processing firms that are interested in the technology. He made no estimates about how much money those companies could save using the new process, but he suggested that they could reduce their energy costs significantly.

Li's previous discovery – a nontoxic, soy-based adhesive for making plywood for cabinetry – was quickly commercialized under the PureBond brand, so it may not be long before we begin to see tires made with cellulose reinforcement on the roads.

Predicting Fishless Lakes

The woods of Maine host the greatest abundance of fishless lakes in the Northeast, but their abundance is declining due to state-sanctioned fish stocking for recreational anglers and illegal releases of fish by others. When fish are introduced, not only does the lake ecosystem change dramatically but the surrounding upland community can, too.

According to University of Maine researchers Cynthia Loftin and Emily Schilling, lakes that lack fish are home to a wider variety of invertebrates than those that contain them, and these lakes provide better breeding habitat for frogs and other amphibians as well. When fish are introduced to historically fishless lakes, the fish quickly consume many of the larger, free-swimming invertebrates, including dragonfly larvae, midges, whirligig beetles, and water boatmen, as well as the eggs and larvae of frogs and salamanders.

"There can be a lot of consequences for the upland habitat, too," said Schilling. "Researchers in the western U.S. have shown that loss of invertebrates may cause a decrease in songbird use of the area around the lakes because they lose that food source. It can cause changes in the plant communities in the riparian zone and garter snake population declines due to loss of their amphibian prey."

To provide the Maine Department of Inland Fisheries and Wildlife with guidance on how to conserve the diverse aquatic communities that thrive in the absence of fish predation, Loftin and Schilling have studied how to predict which of the state's 6,000 lakes are naturally fishless and which macroinvertebrates are indicators of fish absence. They identified two types of fishless lakes in the state: those that are fishless because they are hydrologically isolated, with no inflowing or outflowing streams, and those high-elevation lakes that have steep outflowing streams with waterfalls that fish cannot pass.

Using GIS data, the team developed a spatial model that predicted that 130 out of 2,500 lakes in two regions of the state would be fishless. They then visited 21 of the lakes to sample for the macroinvertebrates that indicate fishlessness to confirm that their model predictions were true. If they did find fish in a lake, they then scoured the lakebed for the mouthparts of a phantom midge, a species that does not survive in lakes with fish and indicates the lake was historically fishless.

"In this way we were able to tease out where our model didn't work and where it did work and find where undocumented fish stocking has taken place over time," Loftin said.

The biologists concluded that there are multiple ways of approaching the conservation of fishless lakes, and they recommend what they call a tiered approach based on the accessibility of particular lakes and whether or not a lake has ever been stocked before.

"If a lake is difficult to access or it hasn't been stocked in a while, the state might consider not stocking it," Loftin said. "And for lakes that have never been stocked, we recommend not stocking. But trying to keep people out of a lake that they've been fishing in for 50 years might not be worth trying, even if it was originally fishless."

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By Virginia Barlow

Sapstreak disease, *Ceratocystis virescens*

On a walk through a still, snowy sugarbush, the peacefulness can be overwhelming; everything looks to be in good order. But all may not be as perfect as it seems. In any sugarbush, there is a good chance that a fungal intruder has gained entry and is wintering unseen beneath the rich, dark bark of an unlucky sugar maple. If this invader is sapstreak disease, then death is likely to soon claim a valuable sap producer.

This fungus mainly affects sugar maples, and, because it enters trees through wounds in the lower part of the trunk or in the roots, it is more common in sugarbushes than in less frequently visited forests. Here there is more machinery, more intense management, and, especially when buckets are used instead of tubing, a lot more traffic. Sooner or later this will result in injury to a tree.

The sapstreak fungus colonizes sapwood; as it spreads, it disrupts the flow of water and nutrients from the roots to the rest of the tree. Long before there are any outward signs, a cross section of an infected tree shows a dark red or brown stain, with radiating streaks in a star-shaped pattern that give the fungus its common name.

It's after sugaring is over that the symptoms of sapstreak disease become visible. An early summer inspection of the bush should be a shady affair, beneath the dark green leaves of well-tended trees. The first visible symptom of sapstreak is likely to be from just one tree, a tree that fails to intercept the sun as well as its neighbors, allowing a worrying amount of sunlight to penetrate the canopy. During the early stages of this disease, there are plenty of leaves, but on part or all of the crown, each leaf is smaller than normal. In subsequent years, the leaves become off-color and sparse and the crown dies bit by bit. Typically, the whole tree is dead within four years. Armillaria, an omnipresent, opportunistic fungus, often moves in to hasten the process.

Most trees with sapstreak disease are along roads or skid trails, or near the sugarhouse where comings and goings are intensified. Wounds to the roots or to the base of the tree are invariably present. Cattle in forests also cause wounds that allow sapstreak to enter – another reason to keep them out of the woods. Wounds created in spring and summer seem to be more susceptible to sapstreak disease than winter injuries, but, of course, it isn't practical to stay out of a sugarbush in early spring.

When timber harvesting results in wounds to a large number of trees, sapstreak disease may become a more widespread killer, with symptoms showing up three to six years after the careless logging.

Why this fungus does not infect wounds higher in the tree is not known. If spores from sapstreak are introduced into tapholes, they almost always fail to cause disease. And when an infection is initiated high in a tree, the tree succeeds in walling it off so that it does not spread. Wounds to branches rarely, if ever, get infected by sapstreak. There is some evidence that the insects that carry sapstreak spores from tree to tree are ground dwellers, but that doesn't explain why the disease does not develop in experimentally inoculated tapholes.

When a tree infected by sapstreak is cut down, the fungus may produce abundant sticky spores in a mat over the stained surface of the wood. Some researchers believe it is important to remove infected trees to reduce the number of spores, but since the fungus is very common, this may not be worthwhile.

The value of the lowest log on the bole, which is usually the best log, is greatly reduced because of the discolored wood. Dissection of sapstreak-killed trees shows that stain columns do not extend very far up into the trunk but that the root collar and roots are completely colonized.

On a more cheerful note, this disease rarely kills a large number of trees at one time. Single trees or small groups of trees – and only those that have been wounded – will die from time to time. Although not identified until 1935, sapstreak is a native disease and one that, so far, does not seem to have spread to other countries.

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Northern Woodlands

By Robert Kimber

Silent Nights

Winter is, m os t o f the time, a q uie t time; the deeper the acoustic blanket of snow gets, the quieter the world becomes. As the snowbanks grow higher and higher along the Intervale Road here in Temple, they muffle the sound of a passing car to a mere whisper. But the epitome of blissful silence comes with a snowfall of soft, fluffy flakes on a wind-still night. Rita curls up in her armchair; I settle in my favorite corner of the couch; we pick up our books. Clunker – our burly tiger cat who played tackle for the Green Bay Packers in his youth – joins me and rolls over on his back to have his belly scratched. We tuck the silence in around us. We hear nothing but Clunker purring, the turning of a page.

As a rule, however, we can't count on this reign of sweet silence continuing through the night. Often, after we climb the stairs and crawl in under our down comforter, we hear the creatures of the night just getting underway. We hear in the walls and ceiling gnawing and thumping so loud we wonder if beavers have moved in. We hear rustling and scuttling. We hear the patter of what seem to be dozens of little feet – maybe the latest litter of mice romping about? Red squirrels playing soccer with an acorn?

I've done my best, without success, to halt or at least stem the fall rodent invasion. This old farmhouse sits on a loose-rock foundation. Try as I will to stuff all those endless cracks and crevices with mortar, it isn't long after the first cool night or two that we hear our returning tenants whipping their nests into shape, putting up storm windows, and stocking the shelves for winter. Soon they're ready to begin the nocturnal parties and track meets they'll enjoy for the next few months.

But this past winter, for the first time we can remember, all that changed. Nobody took up quarters in the fall. We kept waiting for shoes to drop all November and December, but none did. And then not a sound for the rest of the winter. We reveled in the peace and quiet but couldn't help wondering to whom or what we owed this respite.

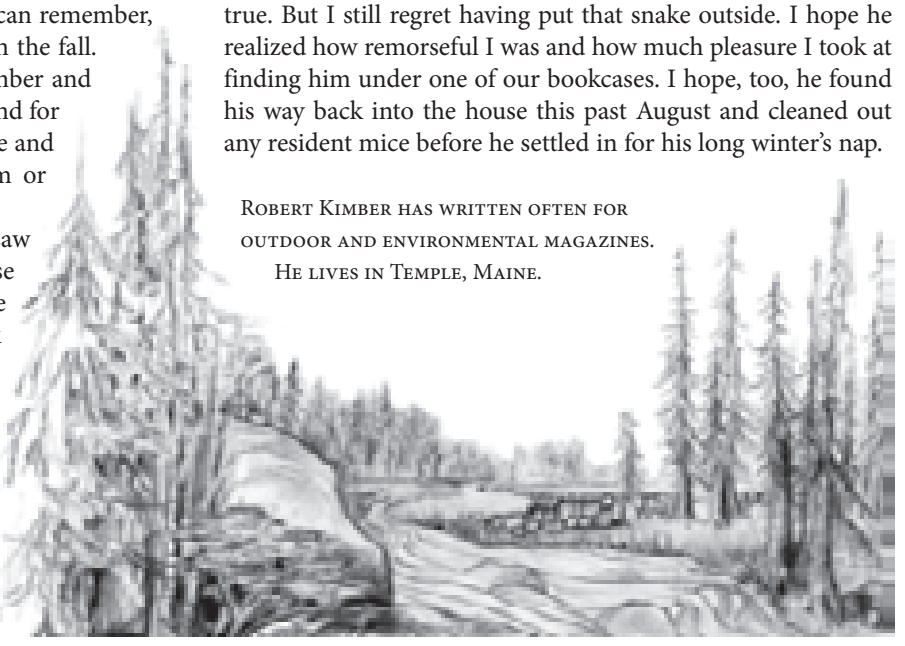
Then, on a sunny afternoon in May, I saw Clunker crouched in front of a bookcase whose lowest shelf was just a couple of inches off the floor. He was peering intently into that dark crevice and hissing occasionally. A flashlight showed me a handsome milk snake close to three feet long. I shut Clunker up in the next room, and thinking I was doing the snake a favor, I carried him outside into the sun and warmth of that spring day. But a little later I had second thoughts. Maybe we hadn't had any racket all winter because that milk snake, before he went into hibernation, had gobbled up rodents by the dozen and scared off any he hadn't eaten? Or maybe, in the relative warmth of our dirt-floored, rock-walled cellar, he hadn't hibernated at all but had just dozed, ready to leap into action the minute a mouse showed its face? In short, maybe I had been an idiot: instead of taking that snake outside, I should have given him our guest room on a permanent basis.

Realizing I'd been anthropomorphizing enough about rodents and snakes, I decided to talk with someone who could rescue me from my fantasies. Jonathan Mays, a snake expert in Maine's Department of Inland Fisheries and Wildlife, said, yes, February encounters with milk snakes do occur in cellars, but the snakes' feeding behavior doesn't extend beyond mid-September, and they remain inactive all winter, though they sometimes do start feeding again in the spring while there is still snow on the ground.

So the answers are, no, our snake hadn't been knocking off mice as they made their way through our permeable foundation; and no, he hadn't interrupted his winter's rest to patrol the house for food. Jonathan speculated, but speculated only, that the presence of a milk snake or two might have discouraged the fall in-migration. And he allowed that the snake (or snakes) might have made a dent in the rodent population over the previous summer and so reduced the number available to rattle around in our house over the winter. Then, too, our winter's silence may have been the work of a weasel or of a cyclical downturn in the mice population.

So my lovely story about an altruistic milk snake who had decided to stay awake all winter so that we could get a good night's sleep? Well, that was just a fairy tale that hadn't come true. But I still regret having put that snake outside. I hope he realized how remorseful I was and how much pleasure I took at finding him under one of our bookcases. I hope, too, he found his way back into the house this past August and cleaned out any resident mice before he settled in for his long winter's nap.

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



WoodLit

Fearsome Creatures of the Lumberwoods (With a Few Desert and Mountain Beasts)

By William T. Cox and Coert DuBois
Originally published by Press of Judd & Detweiler, Inc., 1910
Re-printed by Kessinger Publishing, 2007

Amongst the multitudes of wildlife field guides, *Fearsome C reatures of the L umberwoods (With a F ew D esert and M ountain B easts)* is unique in that it deals exclusively with animals that do not exist. Given the bizarre and often bloodthirsty nature of the fauna depicted within, it can only be a comfort that they reside purely within the rich folklore of early lumberjacks. Twenty such oddities are showcased in this 50-page volume, with their appearance and behavior described in detail. While the book's creators could have hardly predicted it, *Fearsome Creatures* has become a definitive resource of American mythology nearly a hundred years after it was first published.

In the author's introduction, forester and conservationist William Cox expresses a great affection for lumberjack adventure yarns and the surreal brutes featured in them.The tales were transmitted from logging camp to logging camp, growing more incredible with each retelling, like today's viral internet memes. Yet each forest region maintained its own distinct flavor of folklore, informed by the culture of the area and the ethnic traditions of the loggers who operated there. With this book, Cox offers a broad sampling of tales from across North America, extending from Canada and New England to the Great Lakes Region, the Southwest, and even Florida. It is this comprehensive nature that has afforded *Fearsome C reatures* its cultural and historic significance.

The subjects of *Fearsome Creatures* are notably freakish. Among the abnormalities that supposedly call New England their home are the Argopelter, a fiendish primate with ropy arms for flinging rocks with deadly accuracy at unlucky travelers, and Billdad, a duck-billed rodent whose meat compels those who eat it to drown themselves. Not all of the creatures, however, are necessarily belligerent. The ponderous Tote-Road Shagamaw is a hoofed humanoid with a penchant for marching through the forests of Maine in a continuous loop. The miserable Squonk, known to melt into a puddle of tears at the sight of its own ugly reflection, is particularly harmless.

All of these fantasy animals are examined as if they truly dwelled in their respective forests. Each entry is written in a deadpan naturalist manner and is accompanied by pen-and-ink illustrations by forester Coert DuBois. There are even Latin classifications, provided by George Sudworth, chief dendrologist of the U.S. Forest Service. Clearly this book is a labor of love, and the devotion of Cox and DuBois comes through on every page. At the time of its publication, America was becoming increasingly urban and industrialized. Cox writes of vanishing wilderness and a changing logging industry. His book attempted to preserve the unique lumberjack culture before that way of life faded away forever.

The book has long since entered the public domain, and there are several versions available to read online. Still, despite being repeatedly referenced by folklorists and mythology enthusiasts (even by renowned Argentinean surrealist Jorge Luis Borges, in his book *Manual de Z oología F antástica*), *Fearsome Creatures of the Lumberwoods* has received only sporadic reprinting. In 2007, Kessinger Publishing released a Legacy Reprint of the book, and while this version contains some uncorrected pagination errors, it is both widely available and comparatively inexpensive. Until a better edition comes along, this is the best way to enjoy this classic. *Fearsome C reatures o f t he L umberwoods* will make a charming and unusual gift to all who love the forest and the stories it has inspired.

Benjamin Peberdy

Shop Class as Soulcraft, An Inquiry Into the Value of Work

By Matthew Crawford
Penguin Press, 2009

One morning I followed a link sent to me by a friend and found that I had been quoted in *The New York Times*. That's not a thing that happens often to woodshop teachers.

The article cited my blog in its discussion of Matthew Crawford's best selling book, *Shop Class as S oulcraft, An Inquiry Into t he Value o f Work*. Crawford's book opens by quoting me:

"In schools we create artificial learning environments for our children that they know to be contrived and undeserving of their full attention and engagement… Without the opportunity to learn through the hands, the world remains abstract, and distant, and the passions for learning will not be engaged."

Such a statement could have been made by any of the remaining woodshop teachers in America. We all know in our hearts, through our own soulcraft, that our students learn best when their hands are engaged in real problem solving.

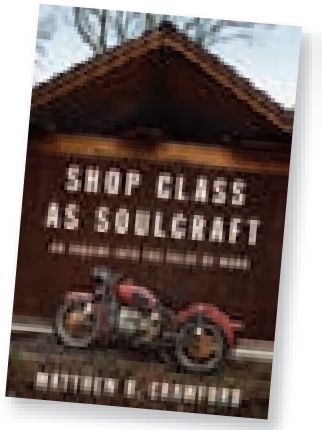
Certainly, Crawford's book isn't the first to look at the values of work and the absurdities of the blue collar/white collar divide, though all of us hand-guys

and shop teachers revel in its success. As a woodshop teacher and hands-on learning enthusiast, I welcome all the help I can get in explaining the value of my program. Crawford's well-written exploration is a much-valued addition to others on the subject. Mike Rose's *Mind at Work* and Richard Sennett's *The Craftsman* are recent books that come to mind that inquire intelligently about the values of work.

Soulcraft's great appeal is that it is an engaging story well told from personal experience by someone measured successful on both sides of the white collar/blue collar divide, someone who chose the blue and provides eloquent defense of his decision. It illuminates our misperceptions of the values of each and presents a strong case for rethinking the educational goals we might reasonably demand of our children. I was one of those whose parental aspirations were that I might become a lawyer before my own hands and heart got in the way of their ambitions for me. So I am particularly pleased to see anyone make the case that a craftsman or tradesman can find in his work not only pleasure but also success and meaning.

Crawford is a Ph.D. philosopher turned motorcycle mechanic. His tale shows that our ideal of university education for all may for some be a waste of time and for some a great disservice. Many reluctant students might find greater pleasure and deeper meaning in the direct hands-on problem solving that a life in the trades can provide. As suggested by another book, *The Millionaire Next Door,* by Thomas J. Stanley and William D. Danko, a life in the trades might even end up making more money.

Perhaps most pleasing is that Crawford demonstrates his chops as both a mechanic and philosopher, through thoughtful and coherent discourse. Motorcycle mechanics and philosophy? That is not necessarily a surprise, since years ago we had Robert Pirsig's *Zen a nd t he A rt o f*



Motorcycle Maintenance, and readers may sense a connection. But long before that, Jean Jacques Rousseau had said in *Emelius and Sophia,* 1763: "If instead of making a child stick to his books I employ him in a workshop, his hands labor to the profit of his mind, he becomes a philosopher but fancies he is only a workman."

Doug Stowe

Notes on a Lost Flute: A Field Guide to the Wabanaki

By Kerry Hardy
Down East Books, 2009

N. Scott Momaday writes, in *The Man Made o f W ords,* "The storyteller's place, within the context of his language, must include both geographical and mythic frame of reference. Within that frame of reference is the freedom of infinite possibility."

In *Notes on a Lost Flute,* Kerry Hardy's first book, infinite possibility abounds. A fine storyteller and ardent researcher, his essays incorporate philological scholarship and linguistics that are evidenced in the current language and place names of New England's – and especially Maine's – once primary inhabitants, the native Wabanaki tribes. The esoteric and the mundane become, on every gloriously illustrated page, fertile fodder for him. He is eager to share his fascination with language, forestry, gardening, environmental science, and old Native American

Ice Storm

Along our narrow road the row of giant oaks,
parade of sassafras that turned so richly red last fall,
the slender hickory, redbud, dogwood—
all have bent their heads nearly to the ground.
And half our poles have snapped in half, collapsed
across fence rails, crushed bushes,
bringing with them electrical and phone wire,
now stretched and split, some of it
tangled in the branches of fallen trees
or caught in briar and lying dangerously alive
across the roadway and footpath.

But when the sun comes out to survey
the destruction, moving in close enough
to inspect the broken forest we call home
and thereby warms everything in sight—
crystal sheaths around each branch
of each tree, each glazed shrub,
each stalk of spent weed, the forgotten
leash beside the plastic trash can,

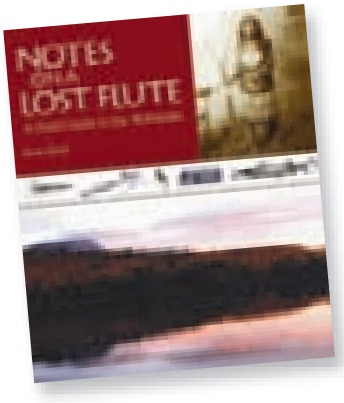
we'll watch from our kitchen window
as ice begins to crack, loosen, unsheathe itself,
slip from limbs, shatter to the ground
sounding like a series of small explosions
as it collapses beneath hunched trunks
and bent branches into piles
of shiny crystal splinters
that cover the forest floor.

And as the afternoon wanes, the thinned ice
will recede, thaw, melt. We've seen it all
before. Water will drip from branches
and roof edge, stream beneath the crust
still masking the footpath.
It will pool, settle, seep,

until the whole forest
that all day drooped as if forsaken
in the ruined December light
nevertheless begins its resurrection.

Andrea Hollander Budy

This poem initially appeared in Sou'wester magazine.



customs and knowledge that can be relevant to our lives today.

Hardy challenges the reader in enjoyable ways. Instead of footnotes, Hardy enriches the text with sidebars, photos, and drawings that enchant: a subtle urge to readers to flip the pages slowly. The book contains elements of language, cultural history, and vital information, such as how to build a mobile home (a wigwam), the names for the moons of each month, a Hardy-imagined chart showing the Wabanaki food for each month depending on availability, plant medicines, the fur trade, and how to fish for that now-too-rare delicacy, the sturgeon. There are numerous notings on different trees and their uses and on edible plants.

His prose is inventive: "If I had to choose just one place to tell the story of Maine's human history, I'd take Damariscotta. That very name is enough to send archaeologists into raptures… Damariscotta, along with the rest of mid-coast Maine is the landform equivalent of ribbon candy."

Where does the title come from? "I wanted something cryptic," Hardy says. "Something that left an unanswered question." Hardy includes a sidebar about what many consider the world's oldest musical instrument. A recent *Wall Street Journal* article describes the discovery of what is believed to be a 35,000-year-old flute made from a wing bone – highlighting "a prehistoric moment when the mind learned to soar on flights of melody and rhythm."

Notes on a Lost Flute is filled with Hardy's irrepressible sense of wonder, with the challenge of life once lived in ways that have brought us to the present moment. "What fun," he writes, "to wander through time each night, filling notebooks with nuggets of history as easily as one might forage mushrooms while rambling in his own woodlot. In the pages that follow, I will collect, jiggle, sort . . . share glimpses of a vanished people and their landscape."

Hannah Merker

Ad Index

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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 cost 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.

Negotiating a fair price requires an understanding of markets and job conditions. It's recommended that landowners without this knowledge use a forester as an agent. A forester's fee will add to the cost, but their representation will often result in a higher payment for the timber.

These data are compiled from interviews with suppliers and buyers, and from the most recent print and on-line versions of the *Sawlog Bulletin* and 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.

DOLLARS PER THOUSAND BOARD FEET	NY	VT	NH	ME
White Ash	280	242	263	230
White Birch	286	237	198	222
Yellow Birch	318	438	444	475
Black Cherry	446	400	542	N/A
Sugar Maple	400	450	475	427
Red Maple	268	262	313	263
Red Oak	339	313	444	382

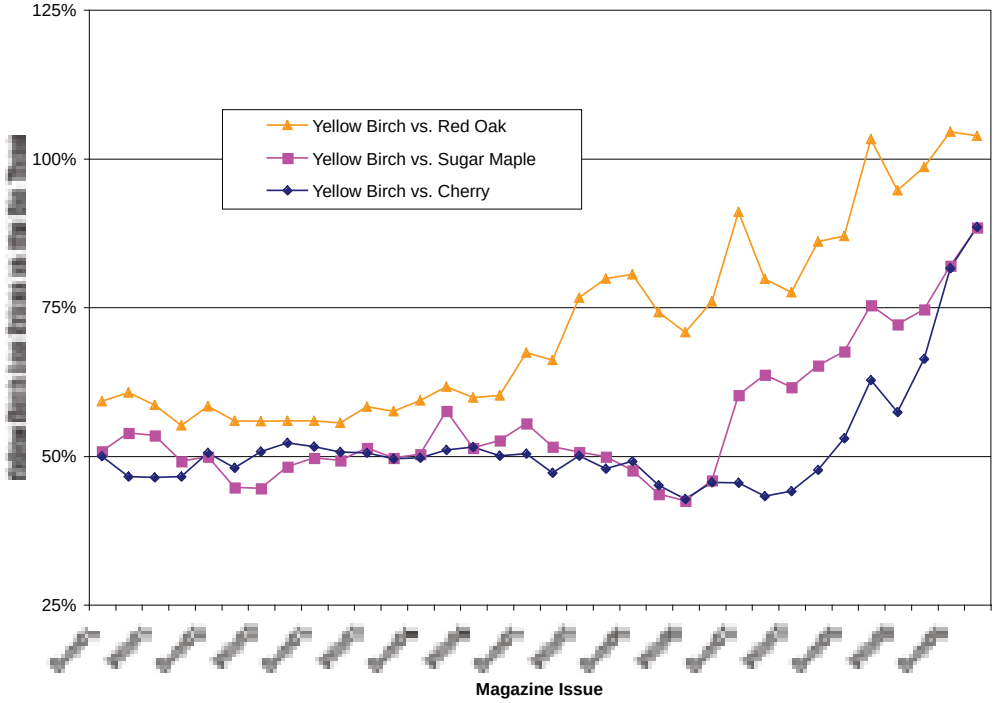
Prices compiled November 1, 2009

For decades, the most valuable Northeastern hardwood logs have been cherry, sugar maple, and red oak, with the order shifting among the "big three." But now there's a new kid on the block: yellow birch.

As recently as 2006, yellow birch logs were fetching prices less than 50 percent of either cherry or sugar maple logs. By this past autumn, they were up to 88 percent of both cherry and maple. Even more spectacular has been yellow birch's progress against red oak: 60 percent in 2005 to 104 percent today. You may have missed it in the market turmoil, but yellow birch has knocked off red oak to join the "big three."

Or perhaps more accurately, it's the "medium four," since all four species are bunched closely together in price and because that price is a pale reflection of what cherry and sugar maple were earning earlier in the decade. It isn't that yellow birch has become more valuable; it's that the other three have become so much less so.

Which isn't to knock yellow birch at all: it's the only hardwood we track that is worth more today (in constant dollars) than it was back in 2001, despite the recent recession.



Yellow Birch Bests Red Oak

With Special Thanks

The Center for Northern Woodlands Education, its board of directors, and its staff gratefully acknowledge the contributions and commitments of each of our supporters. These generous gifts & grants help us in our work of encouraging a culture of forest stewardship in the Northeast. Listed below are all those individuals, businesses, organizations, & foundations whose gifts were received between October 1, 2008 and September 30, 2009. Thank you all for your generous support.

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James Fannin, Jr.
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Halsey & Nancy Griswold
Elliott Gruner
G. Henry Hagar
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Diana Hayes
Nan Heminway
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Darren Higgins
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Doris O. Honig
Janet & David R. Houston
Sen. Samuel T. Hudson, Jr.
Phil, Audrey, & Alden Huffman
Carl & Linda Hughes
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Fred & Kathleen Jacques
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Patricia Jedlicka
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Norbert & Jane Kuk
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John B Messina
Dr. Stanley & Ann Miller
Sue Anne Hahn & Gregory Miller
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Fred Munk
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Russell Nord
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Lorna Chang Post
Carl Powden
Paul Ralston
Don Randall
Eric Rasmussen
Warren Richardson
Lise & John N. Richardson
George F. Ritz
J. M. Roberts
Jean F. Roberts
Diane & Mike Roche
Robert Reiber & Mary Ann Rogers
Judy Rosovsky
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Richard Sirola
Nelson Carter & Barbara Slaiby
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S. Wells Smith
Richard Snellgrove
Bruce Spencer
Kate Seeger & Dean Spencer
Raymond Spink
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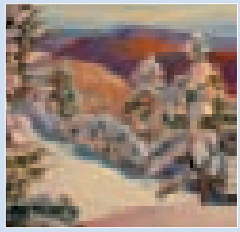
Dan Viola
Alane Vogel
Bill & Robbie Walker
Dee O'Donnell Ward
Tom Warner
Laura Waterman
Henry & Linda Webster
Beverly D. West
Ruth B. Whipple
Stu & Tilda White
Roy A. Whitmore, Jr.
Donald R. Wilson
Clemens R. Wingert
Kate N. Winslow
A. J. Wise
Amy Wise
Joseph N. Wood

Susan Abbott, Mountain Element, *12" x 48", oil on linen panels, 2009*

The artist: solitary tortured soul or joyous participant in life? Of course these two stereotypes are caricatures, but in considering the work of Susan Abbott, one can't help but enthusiastically think of the latter. Abbott is a prolific painter who seems to stop and take visual notes on everything she sees. Many of these notes evolve into formal paintings, often multi-paneled pieces; others remain as small visual records of her experiences as she travels.

Abbott's visual journal-keeping is a discipline born of her longstanding drive to observe, investigate, and artistically translate her world, often on a daily basis. For her, and for thousands of artists worldwide, the Internet has provided a new avenue to share these visual expressions with a potentially enormous global audience. Through her blogs, Abbott is able to share her artistic ideas and comments, explain projects, and engage in a dialog with her viewers. The two small images shown here were blog entries while Abbott was formulating her four-paneled polyptych, "Mountain Element" – part of a large project completed this year entitled "Elements of Place." Abbott was able to post these paintings at various stages of completion on her blog and receive comments and critiques from fellow artists, collectors, and others who follow her site. "The small paintings here in my visual journal are improvised daily entries, a chance to look again at familiar subjects, experiment with new approaches, to quickly record impressions. And since I live in a rural area, my blog has provided me a way to communicate with people all over the world."—*Adelaide Tyrol*



Susan Abbott graduated summa cum laude with a BFA and MFA in painting from the Maryland Institute College of Art. Since that time, she has worked as a professional artist, exhibiting in galleries and museums around the country. She is one of ten artists in the Art of Action collection that is touring Vermont through July 2010. She is also the featured cover artist in the October 2009 issue of Watercolor Artist. Susan has been the recipient of Creation Grants from the Vermont Arts Council and the Maryland Arts Council. You can see more of Susan Abbott's work, link to her blogs, and contact the artist through her website: www.susanabbott.com.

Call for entries: The deadline for Spring Outdoor Palette submissions is January 1, 2010. We will return all materials by March 1, 2010. Call or email Adelaide Tyrol at (802) 454-7841 or atyrol@ostudio.com for details.

By Castle Freeman, Jr.

More than most locations, Central Park is a place in mind. Not surprising: the park was created to be exactly that, by planners who believed New Yorkers stood in particular need of Nature in their lives. Central Park was to be something new, at least in part: not a common, not a garden, but a forest in the city. There, walking beneath the park's carefully selected and tended trees, the beleaguered city dweller, normally cut off by his hurried, overcrowded existence from the profound and enduring consolations of the natural world, could find a version of them ready to hand. He could find a forest, not for lumbermen, not for hunters, not for campers or hikers – but for philosophers.

Central Park is a small green hole in the large gray doughnut that is Manhattan Island. Planned and laid out by landscape architects beginning before 1857, it covers over a square mile of the 22-square-mile island. This is a piece of real estate that, transformed into office towers, shops, restaurants, apartment buildings, and townhouses, would have a value approximately equal to the value of the planet Neptune, if Neptune were made of solid gold. Instead, for 150 years, the park has been reserved, set apart as a kind of zoo for trees. Its trees are valued, scrutinized, enjoyed. They are known in a way that their wild counterparts are not, cannot be. The latter are *part of* Nature. The trees in Central Park *represent* Nature. In the park, Nature is acknowledged, upheld, and protected from itself.

But not always.

On the night of August 19, 2009, a very strong and very fast-moving storm blew over New York City from the west, with wind speeds reaching 70 m.p.h. (Hurricane-force winds start at 74 m.p.h.) The storm was of the kind weathermen call a "downburst." The same storms come to the Vermont foothills, where I live, every few years. They're sudden, capricious, highly localized events, and they are no joke. In the woods here, following the passage of one of these storms, big oaks and maples seem to have been seized by their upper branches and violently twisted, ripping their crowns off and flinging them aside, splitting and shattering. Other trees are simply plucked up by the roots and thrown down.

That's the kind of calamity that visited Central Park this past summer. The morning after the storm, New Yorkers were stunned by the devastation. *The New York Times* ran the story on Page 1, with a photograph that showed bewildered Manhattanites picking their way through the leafy wreckage like refugees fleeing a bombed-out village. It took a couple of days for park authorities to understand the magnitude of the disaster. Early estimates were 100 trees destroyed in Central Park, but that figure soon doubled as it was extended to include trees still standing but damaged beyond saving. About ten percent of the park's mature trees were destroyed.

As in greater and lesser storms, the worst destruction on August 19 was among the oldest, tallest trees. In Central Park, that meant oaks and tulip poplars. Most of the biggest of those trees were thought to date from the turn of the last century, though a couple were certainly much older and might have been planted at the park's creation before the Civil War.

I lived in New York for a while many years ago, though not near Central Park. My time in the city was a dark period in its long history. Street crime was epidemic. In those days, you didn't venture into Central Park without a military escort. Not having a military escort at the time, I didn't go to the park a lot. I did occasionally, however, of course, and I well remember the splendid trees, particularly the London plane trees. Akin to sycamores, they weren't among the oldest trees in the park, but they *looked* old. With their odd piebald bark and massive trunks, they looked like they belonged in Sherwood Forest, spreading their heavy, low branches over the heads of Robin Hood and Little John.

Many of those plane trees are gone now. They couldn't take the wind. According to one report on the park's killed plane trees, "it seems they just exploded."

To be sure, an event like the August 19 storm in Central Park would be a misfortune in any forest, but in a forest where every tree is appreciated and celebrated, in a pet forest, a forest for philosophers, the hit is somehow – not worse, but different. More complex, harder to measure. It has a collective aspect, a historic aspect. Overnight, trees that have formed the setting for some part of the daily lives of, quite literally, millions of people are gone forever. Change the setting, change the life. In Central Park, the storm's debris has been cleaned up. New trees have been planted and more will be, no doubt many more. Our grandchildren will have their philosophical hours assisted by trees like the ones lost this summer in the park. For us, though, it's still a place in mind, but it's a different one now.

Castle Freeman, Jr., is a writer living in Newfane, Vermont. His novel *All That I Have* was published in March, 2009, by Steerforth Press.