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Sydney Lea, and much more



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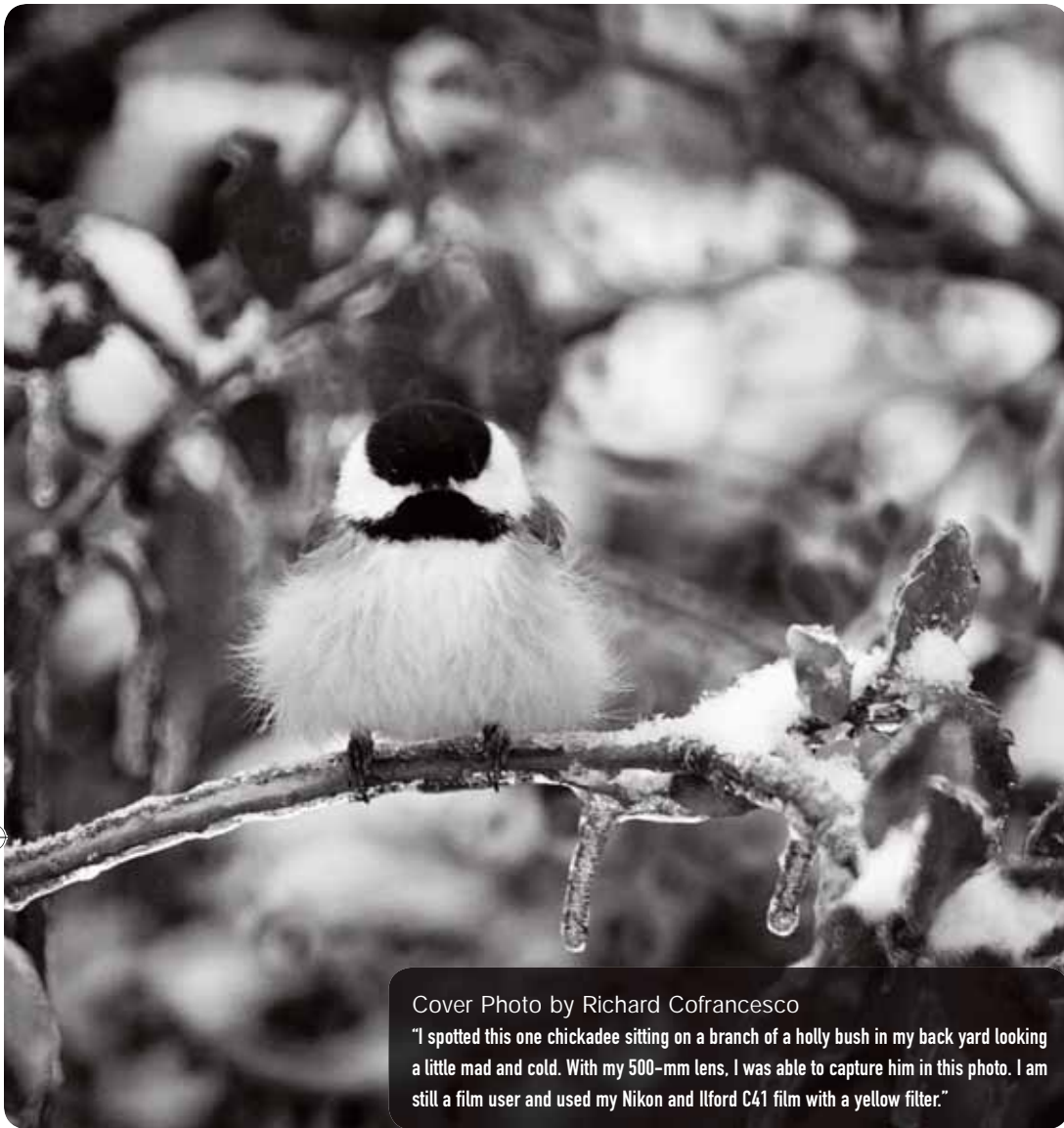
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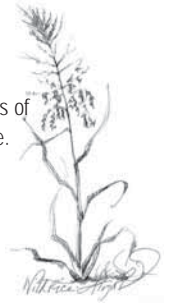


Cover Photo by Richard Cofrancesco
"I spotted this one chickadee sitting on a branch of a holly bush in my back yard looking a little mad and cold. With my 500-mm lens, I was able to capture him in this photo. I am still a film user and used my Nikon and Ilford C41 film with a yellow filter."



THE OUTSIDE STORY

Each week we publish a new nature story on topics ranging from the lives of paper wasps to foraging for wild rice.



EDITOR'S BLOG

In different company I'll refer to the same land as a "tree farm," as I think it's important to stress and re-stress this idea that we're growing a crop – whether it's logs or syrup – and depending on the sale of this crop to keep the land intact and a part of the working landscape.



WHAT IN THE WOODS IS THAT?

We show you a photo; if you guess what it is, you'll be eligible to win a prize. This recent photo showed an elm sawfly larva.

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magazine

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from the Center



Approximately eight years ago, my dogs, husband, and I held a meeting. By unanimous showing of hands and paws, we agreed it was time to end our pattern of bouncing around cities and find somewhere more permanent to live. In March 2005, we bought an old farmhouse in Thetford, Vermont, complete with a hundred acres.

Soon after, I got a subscription to this magazine, and I've been a loyal reader ever since. For me, finding a new issue in my mailbox has always felt like getting a present. It's a "stop everything" event, prompting me to curl up in my favorite chair and pore through the pages, cover to cover.

As the new Executive Director of the Center for Northern Woodlands Education, I now have a close up view of the hard work that goes into creating that reader experience, as well as other educational efforts to promote appreciation of our woodlands heritage. We couldn't do this without the ongoing support of individuals and institutions.

A critical part of that support is financial. As in previous winters, a roster of names appears at the back of this issue, recognizing everyone who donated to the nonprofit in the past fiscal year.

There are other important contributions deserving ink space here. Like-minded groups across the region have shared this magazine with their members. Advertisers have been remarkably loyal, despite the economic hard times. A number of our writers and illustrators have donated time or provided their services at discounted rates.

On an ongoing basis, Northern Woodlands' Board of Directors provides dedicated and thoughtful leadership. This fall, two board members completed their time on the board. Tom Colgan, President and CEO of Wagner Forest Management, Ltd., served for seven years, acting as board treasurer for the past two. Henry Whittemore, Director of Timber Investments and Acquisitions for Four Winds Capital Management, served eight years, most recently leading the Board's nominating committee. Northern Woodlands owes them both profound thanks.

There is yet another important way that individuals have helped Northern Woodlands pursue its educational work this past year: by sharing their love of this magazine with others. It is always gratifying to hear of a new woodlot owner who talks to one of our readers and decides to obtain a forest management plan, or a teacher who uses the magazine to encourage a child's interest in the natural world. Over time, person by person, such efforts make a big difference. Thank you.

Elise Tillinghast, Executive Director, Publisher



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



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A Look at the Season's Main Events

By Virginia Barlow

December

January

February

FIRST WEEK

Snowy owls sometimes venture south to our area. They're often seen on fence posts in open fields / The fertile fronds of sensitive fern stay upright through the winter and will release spores in the warmth of spring / The evergreen leaves of goldthread can form a large, dark green carpet, though each plant is quite tiny / The white-crowned sparrows stopping at your feeder may remember it and stop again in spring. These hardy birds breed in the far north

Jan. 3-4: Peak of the Quadrantids meteor shower, with up to 40 meteors per hour / The seeds of Jerusalem artichokes, a small yellow sunflower that has nothing to do with Jerusalem or artichokes, are eaten by birds when birdfeeders are not nearby / Black bears may leave their dens during a winter thaw / The long claws of porcupines – four in the front paws and five in the back ones – fit into cracks in bark, enabling the animal to climb almost any tree

The metabolic rate of hibernating black bears is half their normal rate, even though their body temperature drops by only about 12° F / A woodchuck may have a skunk for a housemate through the winter. Skunks are able to dig dens, but they sometimes choose to have someone else do that for them / Turtlehead, a flower of wet ground, keeps its stalks through the winter. Curiously, both the flowers and the opened seedpods look very much like a turtle's head

SECOND WEEK

Dec. 13-14: Geminids meteor shower. This is one of the best showers and this year a new moon means that the sky will be dark / Wild bog cranberries are sweetened by frost and are delicious right off the stem / Most birds do not seek out larch seeds but red crossbills and white-winged crossbills may now be eating the last of this season's crop / The spore-bearing underside of the fungus called artist's conk is snow white in summer, but now has aged to tan

Honeybees especially appreciate the January thaw if it gets above about 45°F, the temperature at which they can fly from their hive and void accumulated excrement / A pile of ruffed grouse feathers on the snow may be the work of a northern goshawk / Pipsissewa keeps its shiny green leaves all winter. Also called prince's pine, it is in the genus Chimaphila, from the Greek "to love winter" / Moose won't drag their bellies until snow is about 38 inches deep

Sometimes crows gather in large groups, called murders, at this time of year / Red foxes begin courting; listen for their yips and barks late at night / Northern flying squirrels prefer evergreen woods; southern flying squirrels are more often found in hardwoods / The four sections of evening primrose seedpods have curled back; the fruits look like small wooden flowers / Look for common goldeneyes and common mergansers on ice-free sections of our larger rivers

THIRD WEEK

Common redpolls specialize in alder and birch seeds, but they also come to birdfeeders / Willow pine cone galls are formed by a small gnat that stimulates the plant to form a gall. Next spring an adult gnat will emerge / Hulls of ash seeds on the snow may be the work of pine grosbeaks. Listen for their loud, constant calls: chee-chip or chee-chip-chip / The seeds of the common plantains that didn't get weed-whacked are now being eaten by birds and mice

Freshly fallen snow absorbs sound with great efficiency; on a still winter night it is said to be quiet enough "to hear a deer mouse snore" / A shrew's brain accounts for 10 percent of its body weight, the highest percentage of any animal, including you know who. Now they are in tunnels beneath the snow / Try non-medicated chick feed, a cracked corn and wheat mix, at your birdfeeder. It costs less and produces less waste than the typical birdseed mix

Feb. 19: The Moon reaches apogee, the farthest point from Earth: 251,329 miles away / Eastern coyotes are more vocal now as their breeding season peaks / Notice the stiff tail feathers of downy and hairy woodpeckers. They are used to support the birds as they pound at trees / White-breasted nuthatches eat a broader range of foods than the red-breasted ones; they specialize in conifer seeds / Great horned owls are laying eggs, often in hawks' old nests

FOURTH WEEK

Bobcats are slowed down by as little as 6 inches of soft snow. Plus, their prey can hide beneath the snow. When snow is deep they travel along logs and on snowmobile trails or snowshoe trails / An insect's fat reserves last longer at low temperatures. If winter is warm, the resting metabolic rate is higher and stored calories are soon exhausted / White-breasted nuthatch pairs stay together through the winter and defend a territory of 25 acres or more

The wood frog, gray tree frog, and spring peeper use glucose as antifreeze and isolate freezing to the spaces between cells to prevent cell damage. In these species, circulation and heartbeat stop entirely all winter / The flexible branches of hemlocks droop to shed snow after a big snowstorm / Fisher prefer overhead cover, rarely leaving the security of the forest / A squashed bud of balsam poplar will release an incense-like scent, even on the coldest day

Stoneflies may now be basking on rocks or tree trunks near streams / Just after molting in late summer, male cardinals appear rather gray, but only the tips of their feathers are gray and, as these wear off over the winter, the birds get redder and redder / Willows can be identified now because their buds have a single bud scale, shaped into a tiny, pointed cap / Chickadees begin the songs that help establish their breeding territories. Spring is in the air

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



By Dave Mance III



Of the billions of trees in the Northeast, I've known maybe 50 well, maybe 10 with a draw-from-memory intimacy. The apple trees I prune each year in the yard, for instance, or the sugar maple outside the sugarhouse that I've tapped since I could stand.

Two of the 10 are beech trees. One's a wolf tree in a patch of small woods I used to frequent as a kid. We – the neighborhood kids and I – had a series of army bases here, and headquarters lay beneath a fairytale tree straight out of Sherwood Forest. I knew all of the initials carved into the bark, even though I didn't know half of the people who carved them. I knew this tree so well I knew its roots – an intimacy born of spending more than one night sprawled out on the lumpy earth beneath its crown.

The other beech I know is in the big woods up behind camp. This one only has one name carved in it – mine – an act of vandalism that I wish I hadn't committed (though when you're 16 it's hard to resist the temptation to literally leave your mark on the world). I still seek this tree out each fall during hunting season, where I sit cradled in a concave section of its bole. There's a view to the south and east where we've watched generations of geese migrating down the valley. After our visit, I'll usually head to the top of the mountain, where a pure grove of beech dominates the ridgeline and the only names you'll find carved in the bark are those of the resident bears.

In light of these memories, I especially enjoyed Patrick Hackley's sympathetic look at beech on page 46. In reading his story, I was struck by how my relationship with beech has changed over the years – something I suspect is nearly universal amongst our tribe. When you're young, you love beech trees, right? If an 11-year-old was given the power to create a forest, there would be fruit trees to eat from and white pines to climb, but then flaky paper birches and elephant skin beeches as far as the eye can see.

As we age, this enthusiasm is tempered. Beech bark disease becomes a lesson in dog-eat-dog ecology, and we begin to subconsciously favor the forest stands where the boles are true, not the stands that look like a smallpox ward. As we come to understand the economics of forestland ownership, beech can become something to dread. It's the invasive that's taking over the understory of your sugarbush, the bane that's smothered your red oak regen.

It would be easy to make the clichéd point here that we should all remember, from time to time, to look at things like we did when we were kids. But there's a more adult point to be made, too: that forestry *had better be* about improving forest health and creating better wildlife habitat and not just about growing sawlogs and veneer. And I'm using that phrase not as a father might tell a child to brush his teeth but as a preacher might tell a parishioner to open his heart. You'd better do it for your own sanity; if you don't, you're just setting yourself up for years of disappointment and misery.

We've invested who knows how much time and gasoline and diesel fuel and glyphosate in the war against beech brush on our woodlot. And when you're at war with something, your defeats are always bitter and your victories always hollow in light of the cost. When I look at the areas we've treated and the mixed success we've had, I often feel overwhelmed and overmatched, knowing full well that this war will probably never end.

And yet, after reading Patrick's piece, I looked at a diseased beech stand with fresh eyes, and for the first time in a long time I liked what I saw. There was bear sign on a lot of the ugly trees. And while they were hard to see at first, there were potential crop trees that seemed tolerant or resistant. I could see a future where, with a little work, I could steer these woods towards health.

When I marked the first beech tree with an L for leave, it felt like a peace offering. In the context of the nectria-complex, it could have just as well been an L for life; if someday a kid claims this tree as his own, an L for love.

This was an act of vandalism I could be proud of. ^{Nw}





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Corrections Department

In the Autumn 2012 issue of Northern Woodlands, we regretfully left out credit for Joseph Smith's three illustrations on page 57.

Tamarack Talk

To the Editors:

Virginia Barlow's otherwise wonderfully informative description of Tamarack [Overstory, Autumn 2012] omitted a key word in her opening statement. It should have read, "...larches are the only northern conifers to shed all their leaves each autumn." In fact, all of our northern conifers shed leaves each autumn. The difference is that those other conifers retain each year's crop of new leaves for up to several years, and then each year shed the oldest batch.

ARTHUR H. WESTING, PUTNEY, VT

To the Editors:

I always read with interest and profit Virginia Barlow's articles on natural history. After having read her article on tamarack, it occurred to me to share this photograph of my potted tamarack. Here,



Hubert Lechevalier's nine-year-old potted tamarack.

you can see the result of nine years of my tender care. The plant was kept outdoors all the time on the same stone wall. In winter, I pile snow on it and every winter some damage is done to the plant by melting snow and ice; this helps the process of giving it a bonsai look.

HUBERT LECHEVALIER, MORRISVILLE, VT

Taking in the Towers

To the Editors:

The article on fire towers ("On the Lookout: A History of Fire Towers in the Northeast," Autumn 2012) brings to mind the first steel tower in Connecticut, which stood on the Bluff Head trap

rock ridge in North Guilford from 1927 until the late 1950s. Manufactured by the Aermotor Company of Chicago (best known for windmills for rural water supply), the \$510 tower stood 47 feet above the Bluff's elevation of 720 feet. Hartford and New Haven were visible from this perch, as was Long Island on the other side of the Sound. Many visitors climbed to the site, although with perseverance, one could drive up the difficult fire tower road. Over time, the guest register often showed the individual names of a couple, later "Mr. and Mrs.," and eventually their children's names would appear. During World War II, the Army used the tower to keep an eye out for enemy planes. In a reversal of fortune, observation by airplanes made the tower obsolete, and the state dismantled it.

OLIVER "BUSTER" SCRANTON, NORTH GUILFORD, CT

'Leave it to Nature'

From NorthernWoodlands.org

To The Editors:

Five pages devoted to trapping? It takes at least that many words to try to explain why anyone would be doing this today. There is nothing noble about killing our wildlife in the cruelest ways and peddling the skins to Russia and China.

In time, trapping will be outlawed. Some species may become endangered and others will thrive. Let it be left up to Nature.

M. LISY MEYERS, NORTH HAVERHILL, NH

To the Editors:

I was impressed with Bob Kimber's patience with beavers (Upcountry, Autumn 2012). I am now more patient than I used to be. Decades of struggle do lead to accommodation. After reading Mike Freeman's well-written and compelling article ("Bar Bar: Why Regulated Trapping Still has a Place in the 21st Century," Autumn 2012) it's good to know I can feel better about trapping beavers because the new traps kill instantly, but I don't need that option anymore. Chalk it up to the dry Summer of 2012.

My shiitake mushroom harvest from hardwood logs was failing. The logs I inoculated for three straight years were all dangerously dehydrated, despite my strategic placement of them in the shade of the north side of the sugarhouse, catching concentrated rainwater from the roof when

we did get a shower. Below 30 percent moisture content they become worthless for fruiting mushrooms. In desperation, I threw a few in the beaver pond to soak them. Pulling them out a couple days later, I noticed one was missing. I suspected the big beaver my wife once mistook for a black bear. I was overdue for a paddle, so I headed for the woodshed to dust off the Old Town Discovery, hoping to recover my shiitake log from the dam.

One of the things I always appreciated about *Castor canadensis* was the esthetic blessing their industriousness creates. They've built a series of three ponds on the small wetland on our woodlot, the largest of which is bigger than any beaver pond I've ever seen. I'm glad for these ponds, even though their builders constantly threaten to flood the woods road, which is the only access to our maple orchard, and also take maple saplings not meant for harvesting in my management plan. Still, you can't compare what they do to what a bulldozer could do for \$10,000. Beavers build beautiful ponds for free, like Jesus gives away love for free. All I must do to accommodate them is to hoe out a couple of their dams every day and unclog the PVC pipe baffles, like a dairy farmer hoes out his gutters every day.

I rescued the shiitake log with my canoe freighter and thanked God for the beavers. I now soak six or eight logs a week in the pond, and I'm finally getting a nice, consistent shiitake mushroom harvest.

MICHAEL CALDWELL, NORTH WOLCOTT, VT

Wages of War

To the Editors:

Dick Strifert's letter (Letters to the Editors, Autumn 2012) about Allen Koop's Stark Decency, which I haven't yet read, states that German prisoners provided free labor at the Brown Paper Company during World War II. If so, they were breaking rules set by the 1929 Geneva Convention, which stipulated that workers must be paid for their labor. In her book *Stalag Wisconsin: Inside WWII Prisoner of War Camps*, author Betty Cowley writes:, "strong union opposition to Prisoner of War labor ... led the government to pay civilian employees the prevailing wage for whatever the prisoners did. Prisoners were then paid 80 cents per day plus 10 cents per day for personal needs."

SAM JOHNSON, MADISON, WI



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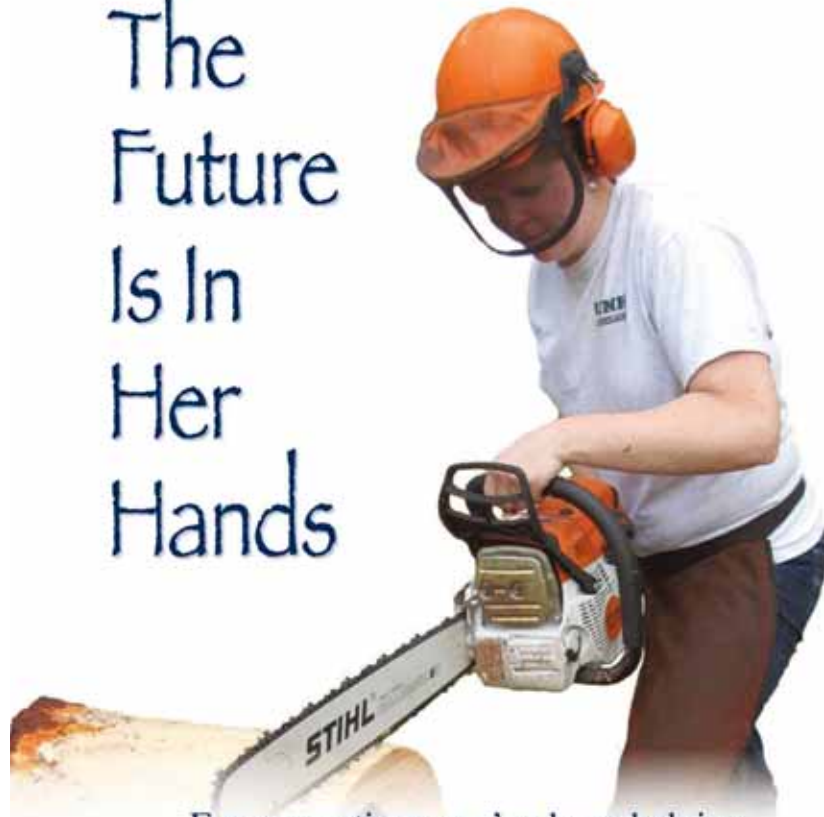
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Story and photo by Bryan Pfeiffer

Harlequin Romance and Other Winter Fantasies

In winter at Halibut Point, a rocky headland on the Massachusetts coast, the drama begins at dawn. A stout gust rips the white from whitecaps and sprays the shore with ice that tinkles like glass. A faint orange glow greets the horizon. And in the frigid waters offshore, harlequin ducks are getting hot.

These perky ducks bob and dive, lunge and flutter, cavort and compete. Nearly a half-year before our woods erupt in a rainbow of spring songbirds, harlequin ducks are courting, feathered evidence that cold water doesn't necessarily put the chill to carnal desire.

Watching harlequin ducks, besides being a cheap thrill, is among many reasons to leave the comfort of your home and head out for short birdwatching excursions. The coldest months offer the bundled-up birdwatcher hawks, owls, gulls, and a rabble of Arctic birds, some of which shatter our notions of winter.

The male harlequin's signature courtship move is "head-nodding." On the water, he extends his neck forward toward the female and flips his bill upward. It is a nippy turn-on. Then there's a maneuver called "the rush." A male, holding his head low and outstretched, scoots across the water at an established harlequin pair. In this winter dance of courtship, it is an aggressive form of "may I cut in?" If the female prefers her chosen partner, she'll sometimes repel the intrusion with a rush of her own.

In addition to Halibut Point, harlequin ducks winter in good numbers along Perkins Cove in Ogunquit, Maine, and at Sachuest Point in Rhode Island. From these vantages, you will encounter more species that nest in the Arctic or other northern places but winter offshore: common eider and the rare king eider, long-tailed duck, red-throated loon, red-necked grebe, northern gannet, and purple sandpiper.

Inland destinations offer their own rewards. A day-trip to the open farmland of Vermont's Champlain Valley, for example, presents a birder with visiting rough-legged hawks. Sharply marked in black and white, "rough-legs" leave their tundra and taiga breeding grounds in fall, but only migrate as far as the frozen fields of southern Canada and the northern United States. Joining them in daily patrols for voles, mice, and other treats are red-tailed hawks and northern harriers.

If owl watching is your idea of a winter getaway, pack your bags for Ontario. Northern owls regard the province in the same we consider Florida. Great gray owls and northern hawk owls,

which only rarely reach the northeastern U.S., regularly winter in the Ottawa Valley, a welcome transition zone between the boreal forest (where some of these owls breed) and temperate forests to the south.

No winter owl fix is complete without a ferry ride off the north shore of Lake Ontario near Kingston to Amherst Island, a quiet community of farms and forests where up to 10 owl species might land for the winter, including boreal owl, long-eared owl, and short-eared owl. They come for the island's mix of meadow voles and roosting trees, such as red cedar, white cedar, and jack pine.

And finally, you need not get married to consider the honeymoon destination of Niagara Falls; the gulls alone are worth a visit. In November and December, the open waters of the Niagara River host one of the greatest gatherings of gulls in the world. Gull-watchers have recorded 19 gull species here (about 60 percent of the gull diversity found in this hemisphere) and up to 14 species in a single day (a feat that makes my heart pound). Most of us would do well to see six gull species in a day.

Back in the unfolding harlequin romance at Halibut Point, there are winners and losers. Although they are courting in the icy surf, harlequin ducks won't nest here. Instead, from this rocky shore and other ocean points around the world, they'll fly north to Labrador, Newfoundland, Iceland, Greenland, eastern Siberia, the Bering Sea, the Sea of Japan, Alaska, and south into the American Pacific Northwest and northern Rocky Mountains.

Before they leave, visit the ducks this winter. Drop in on the hawks and owls and gulls. Out there in the cold you will find fresh diversity – even a little romance.

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



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By Michael Snyder

Why is There a Tree Growing Out of This Tree?

Let's begin with the original lower tree, which appears to be one of several similar-looking dwarf cultivars of white spruce. These are very common in the nursery trade, prized for their slow growth and highly symmetrical, densely compact form. This is a far cry from a typical white spruce, to be sure. And to understand why such a distinctive cultivar would appear to have yet another, entirely different-looking tree growing from it, we need to first know how the dwarf cultivar came to be.

Many such cultivars originated when some keen woods-walking observer noticed a “witch’s broom” in a spruce tree. This is a general term for a dense proliferation of stems and foliage originating from a single point on a stem or branch. These witch’s brooms, or “sports” as they are also called, have a distorted growth pattern that can look like a big squirrel’s nest or a dense shrub growing among the host tree’s branches. A variety of different agents can induce the formation of witch’s brooms in trees, but in northeastern spruces they are most often caused by rust fungi, such as spruce broom rust, or by parasitic plants, such as eastern dwarf mistletoe. Rusts are very hard on the host plant, reducing growth and leading to dieback, and mistletoes – despite their cheerful Christmas connotations – are ultimately a kiss of death to the host tree.

But witch’s brooms can also be caused by a genetic mutation within a single bud, which then grows into a shoot with a genetic makeup – and growth form – different from the rest of the tree. Such genetic brooms are less common than disease-induced brooms, but are also more likely to succeed. That is, if a particular witch’s broom is caused by a genetic change, it may not lead to the tree’s demise, and cuttings can be taken from it and grafted onto rootstocks. If it reproduces true to form, a cultivar is born. Indeed, this is how many dwarf spruces are propagated for sale as ornamentals.

So what gives with this tree? There it was, living its dwarfish life as intended by its horticulturist creator, who capitalized on an odd genetic fluke to create this unusual, slow-growing form. Then along came this new, odd offshoot of growth that looks nothing like the cultivar. It is not stunted, or particularly dense, or conical. It looks more like a regular white spruce tree.

Could it really be another tree growing in your dwarf spruce? In a way, yes, it could be. But not because a spruce seed landed and germinated there. Rather, it is genetically separate.

This “other tree” growing in the dwarf spruce cultivar is known as a genetic reversion. This branch on the cultivar has reverted back to the genetics and appearance of its parents. Just as a genetic mutation created the original witch’s broom from whence the dwarf cultivar came, sometimes a reverse mutation



DAVID ZSIDO

can occur and portions of the plant then revert to the original species’ form. As it happens, this is common in dwarf spruce cultivars. For unknown reasons, a bud will revert and the normal white spruce growth rate and shape will emerge in the new shoot, contrasting with the stunted form and growth of the rest of the cultivar. It sticks out like a whole new tree.

As seen here, the reverted portion will generally be more vigorous than the rest of the plant and, if allowed to remain, the reversion will eventually outgrow and overtake the cultivar. If you want to maintain the cultivar’s original form, you should prune out the reverted portion – back to a portion of the plant displaying the characteristics of the cultivar – before the reversion gets so big as to leave a gaping hole when you do remove it.

Or, just enjoy the bizarre look of your double-tree spruce and marvel at how the original form managed to outwit the horticulturist.

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





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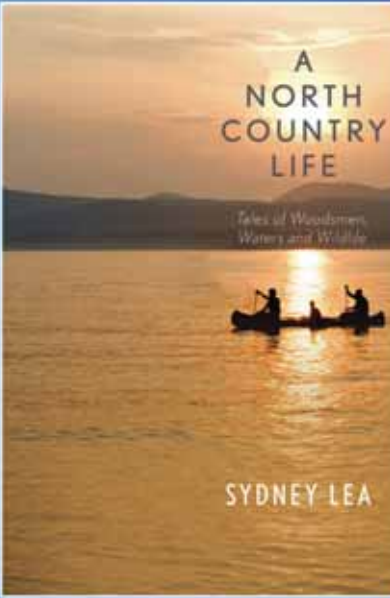



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Story and photos by Susan C. Morse

Nip Twigs

The feeding habits of porcupines are far more diverse than many people realize. Cambium, phloem, foliage, buds, flowers, fruits, and nuts comprise the mainstay of *Erethizon dorsatum's* diet. Spring and summer offer a much-relished salad of greens, including the flowers and new growth of a large variety of herbaceous plants

One summer day I sat in a tree stand overlooking a small meadow and was delighted to watch a porcupine and a doe peacefully feeding within 15 yards of one another; they were eagerly consuming clover flowers and leaves. Violets, alfalfa, and milkweed flowers are known to be porcupine favorites and swimming porcupines are regularly observed harvesting water lilies and pond weed. These aquatic plants provide porcupines with sodium, calcium, and other important minerals, as do shed antlers.

The porcupine is neither nimble nor speedy, yet this big rodent is a capable climber. Stout curved claws effectively grasp bark crevices, while the porcupine's broad naked feet, pebbled with fleshy tubercles, provide traction. The animal's muscular tail serves as a kind of climbing prop, sometimes even as a fifth leg, and this undoubtedly enhances the ponderous porcupine's success at defying gravity. The hallux, or big toe equivalent on the hind foot, is modified with an elongated flexible pad that enables the porcupine to grasp and even manipulate branches.

"Nip twigs" are evidence of porcupines' nocturnal feeding within hemlocks during winter. These ¼- to 1½-inch-diameter branchlets are cut from reachable places throughout the tree. Most fall to the ground, but some (called "hangers") conspicuously dangle from branches in the understory. Angled cut surfaces show that the branches were cleanly bitten by an animal with sharp upper and lower incisors, and not broken by black bears or storms. Remaining branches in the tree's crown will develop a "broomed" look, exhibiting a proliferation of lateral branches that seek to compensate for the loss of terminal stems. Hemlocks that have been heavily fed upon will have dense clusters of branches in some places, and look oddly open and devoid of branches in other places. Selective removal of all accessible branches sometimes leaves only the thin-stemmed topmost branches free from herbivory. These delicate branchlets cannot possibly support the weight of a porcupine, hence they remain intact.



Clockwise from left: Porcupine; extreme feeding sign; branch showing cut lines

Beneath the hemlock, you can find nip twigs and feces. Porcupines will have consumed the new growth of needles and stems, and you can sometimes find gnawing signs on the bark of larger branches. Finally, look for this diagnostic sign that can be recognized on all rodent-chewed branches, including squirrel and beaver: The flat surface of the cut stem will be grooved with a series of incised "cut lines." If the stem is fresh enough, you can gently insert a knife blade into each cut line to verify that you are, in fact, looking at a surface through which incisors sliced to sever the branch from the tree.

After eating all night there is resting by day, and the porcupine must descend the hemlock and retire to its den nearby. Brief and respectful investigation of the den entrance will reveal copious piles of bean-shaped pellets and a very soiled trail showing the winter's history of porcupine comings and goings. In addition to the pungent rodent urine odor there is also another oracular essence which in my experience is totally unique to porcupines. I suspect that this "*odeur-de-porcupine*" is the result of scent marking. In the spirit of wine tasters I will describe the scent as waxy, with a hint of evergreen, and with a nasty, ratty billy goat finish.

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

[UPGRADING]

Repairing Culverts in a Post-Irene World

All too often, discussions about culverts center around two different objectives. There's the practical side: designing and sizing a structure that will protect roads. And then there's the ecological side: what role this obstruction plays in the lives of fish and other wildlife seeking passage up- or downstream. As environmental consciousness has developed over the decades, these goals have come to overlap, but few towns can afford to replace functional culverts with more expensive animal-friendly ones.

Things changed, though, in the wake of Tropical Storm Irene, when massive culvert failure forced towns throughout New England and New York to pay a lot more attention to the pipes under the roads. As towns pick up the pieces, an opportunity to reconsider culvert design has arisen, and people are realizing what's in the best interest of fish may also be in the best interest of towns.

The rub is still, of course, money. The Federal Emergency Management Agency (FEMA) has funds available to applicants affected by the storm for in-kind replacements (replacing culverts to their pre-storm status), which makes sense from a penny-pinching perspective, but is sort of like replacing a bald tire that blew out on your car with another bald tire. Bigger, better culverts that allow fish to move as needed and can handle high-water events cost a great deal more and can strain towns' already thin budgets.

The town of Rochester, Vermont, is working around the funding challenges by teaming up with the White River Partnership (WRP) – a non-profit organization formed to improve the health of the White River watershed – and the U.S. Fish and Wildlife Department, which has access to additional federal funding. (Most notable is the National Fish Passage Program, a federal program

with a \$126 million annual budget that's designed to chip away at the estimated eight million barriers to fish that exist nationwide.)

Prior to the storm, WRP had identified three top-priority culverts that were barriers to brook trout and in need of redesign. Over the years, spring floodwaters had rushed through undersized pipes like a fire hose, eroding the riverbed and causing the water level to drop until the culverts perched several feet above the surface, preventing fish from getting upstream to spawn.

Project manager Greg Russ walked me through the process, using a culvert on Rochester's Marsh Brook as an example. The pre-flood structure consisted of two 36-inch culverts, installed side by side, crossing under North Hollow Road. They blew out during Irene, damaging both the surrounding roads and the brook. As Russ explained, the town had three options (see below left):

Option 1

THE STATUS QUO: FEMA replaces like with like.

DESCRIPTION: Replace two damaged 36-inch, 50-foot-long culverts with two new 36-inch, 50-foot-long culverts.

CULVERT COST: \$8,000

TOTAL PROJECT COST: \$18,000

COST TO TOWN: \$900*

PRO: Lowest cost option.

CON: Barrier to fish; doesn't allow sediment or debris to pass; undersized structure at risk of failure during future high-water events.

Option 2

THE PARTIAL RESILIENT UPGRADE:

FEMA uses 406 Hazard Mitigation** to upgrade culvert to meet Vermont codes and standards.

DESCRIPTION: Replace two damaged 36-inch, 50-foot-long culverts with one 60 inch, 50-foot-long culvert.

CULVERT COST: \$11,000

TOTAL PROJECT COST: \$21,000

COST TO TOWN: \$1,050*

PRO: Increase hydraulic capacity to the maximum flow expected in the next 25 years.

CON: Barrier to fish; doesn't allow sediment or debris to pass; undersized structure at risk for failure during future high-water events.

Option 3

THE FLOOD RESILIENT UPGRADE:

Project partners use outside funds to upgrade culvert to the Vermont Agency of Natural Resources General Stream Alteration Permit guidelines.

DESCRIPTION: Replace two damaged 36-inch, 50-foot-long culverts with a 15-foot, 4-inch-wide, 50-foot-long pipe arch (a "squashed pipe," where the bottom buried portion is flatter) buried 3 feet; rebuild stream bed through the new culvert using US Forest Service Stream Simulation protocols.

CULVERT COST: \$19,000 (\$11,000 of the culvert cost will be paid by FEMA; project partners pay the balance of \$8,000.)

TOTAL PROJECT COST: \$65,000 (including a \$19,000 culvert + \$46,000 for construction, road rebuild, and inlet/outlet riprap costs; \$26,000 of the total cost will be paid by project partners).

COST TO TOWN: \$1,950 (5% of the \$39,000 balance; FEMA pays rest of balance)

PRO: No longer a barrier to fish; culvert sized to handle sediment, debris, and future flood events.

CON: Expense. Takes longer to design and implement than Options 1 and 2.

*Town cost = 5% of FEMA project worksheet, which includes the cost of the culvert and installation.

**406 Mitigation occurs when a federal disaster is declared and FEMA provides additional funds to improve the facility's ability to resist similar damage in the future.



Rochester decided on Option 3. Before the project began, U.S. Fish & Wildlife Service fisheries biologists electroshocked fish downstream of the project site. They marked 100 stunned brook trout by clipping the back fin. About two weeks after the project was completed, the biologists went back to the site and shocked fish both in the culvert and upstream about 100 feet. The group found three brook trout in the culvert, and another 15 upstream. Of the 18 fish, 10 had the clipped fin, meaning that fish passage through this culvert has been restored.

So how does this culvert work stack up to other such projects in the Northeast?

"Other towns are replacing [culverts] to the FEMA project worksheet standards," Mary Russ, WRP's executive director, said. "We've gotten calls from at least three other towns that want to be part of our program. Many have experienced two floods in the past four years and are replacing the same roads and culverts that have washed out before. They understand that culverts built to the town's codes are not big enough to handle high water events."

Not every town has the extra money, or political will, to pursue such upgrades, but the Rochester project serves as a good example of the costs involved and the potential benefits of larger, more fish-friendly culvert design.

"Rivers and streams are systems that move more than water; they're not just ditches," said Greg Russ. "We have national infrastructure problems, but if we're smarter about how we replace things, we'll be better off."

MEGHAN OLIVER

Top: The North Hollow Road culvert was damaged during Tropical Storm Irene. Bottom: This newly installed culvert is a 50-foot-long pipe arch that is over 15 feet wide, allowing for fish passage and deemed large enough to handle high-water events.



GREG RUSS



GREG RUSS



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

The first graduating class of The Ranger School.

[HISTORY]

The Ranger School Celebrates 100

For many, fond memories of college might include football games, Homecoming, and perhaps a keg party or three. For the alumni of The Ranger School, nostalgic reveries conjure images of hard hats, tents, and teetotalism. And by all accounts, the school's 4,200 graduates to date wouldn't have had it any other way.

The Ranger School of the State University of New York (SUNY) School of Environmental Science and Forestry – the oldest forest technology school in North America – is celebrating its 100th year during the 2012-2013 school year. The school was founded in the tiny logging village of Wanakena, New York, on the shores of Cranberry Lake. A nearby, cutover 1,800-acre forest – originally donated to Syracuse University by the logging company that had harvested it – became the demonstration forest for the Ranger School.

In *A Century in the Forest*, a book published by the school to commemorate the centennial, one of the school's earliest directors, James F. Dubuar, said the school had been an experiment when it was founded, and its mission was "to train students to fill the gap between the less educated woodsman and the professional forester." James Coufal, who graduated from the Ranger School in 1957, calls the place "the school the students built" – and that's not hyperbolic. An essay in the book written by one of the school's first students, Harold E. Colburn (class of 1913), described his arrival by boat at Wanakena in 1912. "Observance revealed nothing to indicate that anybody had EVER been there," he wrote. He then spotted "three small army tents hiding in the trees and brush.... Our first job was to clear a site and put up a shack.... When it was finished, we felt that we were living in luxury. Surely all things in life are comparative!"

Over most of the next two decades, students worked mornings from seven to nine (for wages) on building construction before classes began. Classes were sometimes held in tents, sometimes outdoors, and sometimes in spaces rented in town. Dropout rates reflected the grueling program, but as noted in *A Century in the Forest*, many of the students who stuck it out said the experience was life-changing.

Today, hard work and long days are traditions that continue at the school, although modern buildings and conveniences have eliminated most of the physical discomforts. Students come to The Ranger School with their first year of college already under their belts. They then complete 45 credits in Wanakena in two semesters. Classes include all the staples: silviculture, wildlife conservation, and firefighting, as well as more high-tech studies, such as advanced techniques for taking forest inventories.

Coufal said that the centennial barbecue, held August 4, hosted 550 people, including families of alumni and several who traveled from other continents to share in the celebration.

LIZ MARSDEN

Survival of the Fittest

Last January, taking advantage of the lack of snow, I was out hiking with a friend along a steep hillside not far from my house. Usually this hillside is too slippery for wintertime travel, but on this day, conditions were optimal. A few inches of crunchy, Styrofoam-like snow provided excellent traction.

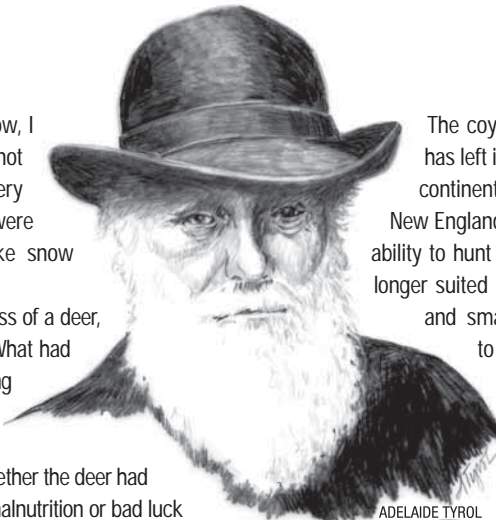
Not long into the hike, we came across the carcass of a deer, wedged against the uphill side of a red oak trunk. What had killed the deer was impossible to say. Coyotes, judging by the canine tracks that converged on the scene from several directions, were in the final stages of dismembering the limbs and tearing up the hide. Whether the deer had initially succumbed to a coyote's teeth or rather to malnutrition or bad luck was beside the point.

As we nudged around the bones with the toes of our boots, my friend said, "looks like 'survival of the fittest.'" And indeed, at first glance, that's what we were seeing. The deer, clearly unfit for the environment in some important way, was dead and in the process of being dismantled. The coyotes, gnawing on the bones and having performed some sort of end-zone victory dance around the carcass the night before, were the victors.

But there's another interpretation of the dismembered deer carcass we found that day, one that casts "survival of the fittest" in a very different light. While Charles Darwin is often credited with coining the phrase, it was actually the English philosopher Herbert Spencer, a contemporary of Darwin, who came up with "survival of the fittest" in an effort to frame Darwin's observations within the religious and economic culture of the day. What Darwin actually wrote in *The Origin of Species* was the far less quotable observation that species are adapting over time to changes in their environment. "There is a struggle for existence leading to the preservation of each profitable deviation of structure or instinct," he wrote.

While my friend and I were focused on the deer carcass and the coyote tracks in front of us, Darwin was writing about deer and coyotes in general. Where we had the individual animals in mind, Darwin was thinking about the group. This puts the deer carcass we found in a somewhat different light.

Far from having a winner (coyote) and a loser (deer), we have two winners.



ADELAIDE TYROL

The coyote, in the wake of only a few short generations, has left its desert habitat in the American West, crossed the continent, doubled in size, and become a top predator in the New England woods, replacing the Eastern timber wolf, whose ability to hunt deer in packs across many square miles was no longer suited to a landscape of patchwork farms, subdivisions, and small lots. The wolves haven't been able to adapt to human hunting and habitation and have, for the moment at least, gone extinct in the Northeast.

But the deer also come out on top in this story. Not the particular deer lying in the snow up against the red oak, but white-tailed deer in general – one of the most widely adapted species on the continent and among the world's fastest, an animal so finely tuned that it can seemingly appear and disappear in the woods without a sound, and a species whose numbers today in the Northeast are far greater than they were back in the days of the unbroken forest and wolves hunting in packs.

"As natural selection acts by competition, it adapts the inhabitants of each country only in relation to the degree of perfection of their associates," Darwin wrote. The coyote and the deer are both succeeding, in other words, through their mutual association. By preying upon deer, coyotes are constantly improving the deer herd overall. By becoming ever-more elusive, the deer are constantly forcing coyotes to improve their game and causing the least adapted coyotes to go hungry and starve. Coyotes kill deer, and deer (indirectly) kill coyotes. Both species are thriving not in spite of, but because of, one another.

In the world of ideas, as opposed to the world of carcasses and coyotes, "survival of the fittest" has triumphed while the more nuanced "natural selection" occupies a minor niche. Clearly, "survival of the fittest" is better adapted to the human culture in which it was coined. When we hear Darwin's name mentioned, most of us picture the lion at the throat of the zebra and not lions and zebras flourishing over time to mutual advantage. Why that is the case would make a fascinating study of natural selection all by itself.

CHUCK WOOSTER

Writing Contest for Vermont High Schoolers

The Vermont Woodlands Association (VWA) is partnering with the Vermont Department of Forests, Parks and Recreation, the French Foundation, and Northern Woodlands to sponsor an essay contest for Vermont high school students.

The challenge: As a member of the next generation of forest stewards, write an essay in 600 words or less about why working forests in Vermont are important and how they contribute to the quality of life of all Vermonters. Cash prizes will be awarded to the top three essays, and the winning essay will appear in the spring 2013 issue of *Northern Woodlands*.

Send entries to info@vermontwoodlands.org or Vermont Woodlands Association, P.O. Box 6004, Rutland, VT 05702, and include a daytime phone number. All entries must be received by January 1, 2013. For more information, call VWA at (802) 747-7900.



PHOTO PROVIDED

Meredith Cowart, as a child, on her family's Christmas tree farm.

Visions of Christmas Trees

Walking through our old Christmas tree plantation, the fragrance of balsam fir evokes memories of dragging freshly cut trees to the baler, riding on the top of a wagon full of trees, and sharing a pot of chili with a crew of exhausted, laughing workers while the snow comes down outside. Growing up on a Christmas tree farm taught my sister and me just what our dad hoped: that nature is not something you just look at from behind a window, but also something you cut, drag, shear, mow, fertilize, bale, burn, and plant.

But while the smell reminds me of crisp rows of trimmed balsam firs, today our plantation feels more like a cross between a hellish jungle and a magical Narnia. Doing his best to push his way through the 30-foot high balsam thicket, my dad reminds me how this happened. "When you and your sister went to college, we lost our cheap labor," he said. Lacking anyone to inflict character development upon, our parents gradually abandoned the 15-acre operation. Today, we are left with this overgrown 10 acres and another 5 acres of sparse trees, ranging wildly in height from 4 to 25 feet.

Within the next few years, I plan to return home to maintain at least a small Christmas tree plantation. But can I, and should I, return these trees to their former state? Or, now that the trees have escaped our control, would it be more practical to let them grow into timber?

To investigate the details of this trees-or-timber question, I consulted our family's longtime forester, Wilmer Brandt. Surveying the overgrown 10-acre section, Brandt didn't hesitate to answer. "The land is growing sawlogs," he said. "Why would you waste all that accrued value?"

The trees are too large to be sold as Christmas trees, yet too small to sell for timber. If we clearcut and replant before the trees are sawlog size, we won't make any profit on the value that has accumulated over the past 10 years. Brandt estimates that in another 20 years, many of the trees will be sawlog size: 8 inches in diameter at the large end, or about 3 inches larger than they are now. At that point, we could conduct a merchantable thinning by cutting out every third row or so.

I asked Brandt if we could speed up growth by conducting a nonmerchantable thinning now. Here, again, he said to let nature takes its course. While the lower branches are beginning to overlap, the crowns are far from it. In forester terms, the "live crown ratio" is still about 80 percent; that is, about 80 percent of the trunk still has branches with live green needles. This is a clear sign that the trees are still receiving enough light to grow both up and out. We won't thin these trees until the live crown ratio is about 30 percent.

The competition will indeed slow growth, but Brandt told me this will improve the value of our future sawlogs. As they grow larger and begin to

shade one another, the trees will begin to self-prune: the lower limbs will be shaded out and fall off. Having fewer branches means the logger will spend less time limbing the tree and the sawlogs will have fewer knots.

The overgrown trees do represent one opportunity for a small, immediate financial return: balsam brush. This November, we'll sell the fragrant lower branches of some trees to a local buyer, who will in turn sell them to producers of wreaths, garlands, and coffin blankets.

Brandt convinced me that good things come to people who wait. The only problem is that I won't have a field ready to replant until I'm almost 60. So if I want to cut, drag, shear, mow, fertilize, bale, burn, and plant in the near future, the remaining five acres are my best hope. Fortunately, the trees here are small enough and widely-spaced enough that by culling the largest trees and shearing the rest, the 6-to-10-footers will be ready for sale this winter. I can't put in the time this year, and we can't let the management lapse for another five, so we found a local grower willing to lease this section for the next five years, cutting out some of the largest trees and maintaining the rest for wholesale harvest. In the meantime, we can plant young balsam firs, so that when I move back home I'll be riding on top of wagon-loads of baled trees once again.

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Photographer Roger Irwin took this photo of his friend Phil Stearns on a small beaver pond in Groveton, New Hampshire, on a brittle, early-winter day.





MBC DESIGN





For Donald and John

By Sydney Lea



My friend John the blacksmith lent me an old book, *A Natural History of Trees*, by Donald Culross Peattie, which is both quaint and authoritative. Maybe it's this combination of qualities that made the farrier beam as he handed it to me, saying, "It's perfect."

When I got home, I first turned to the chapter on the hophornbeam, a tree I've always treasured, although I've never really figured out why. After all, it's a killing wood to chop or work, as I've often proved to myself. No wonder its folk names are *ironwood* and *lever-wood*. Mr. Peattie muses that "everything about this little tree is at once serviceable and self-effacing. Such members of any society are easily overlooked, but well worth knowing."

I looked up from that passage and thought of John himself; he's a bright man, but reticent, self-effacing – and tough as ironwood. And I thought *through* John, so to speak, to a long-gone friend, Don Chambers, who once told me how he'd cut hornbeam all through one winter. Back in his time, before the arrival of synthetics in any quantity, the rigid and tight-grained wood was used for stretcher handles and coffin-grips. I recall his telling me, "By God, you didn't want *them* loads to tumble."

Illness and death called on the lever-wood's strengths, so it may be odd for me to make of this scurfy tree a token of life and health. But who's going to notice, really? And can't I anyhow forge some symbol from the tree's fruit, which stands on the branch right on through winter, a mast for deer and grouse and whatever else may seek it? Perhaps searching for another sort of nurture, I've now and then plucked some florets to lay on my desk, for however brief a time, as if in the bitter-coldest months, putting them there might also help to sustain a household.

I once used five cord of hophornbeam to heat our house through the winter months, having left the logs unsplit. The maul couldn't crack them, and when I tried a wedge, I buried it down in the heartwood. There was no way to fetch that metal back but to burn the log and fetch it out of the fire, as John does a shoe.

I smile as I picture him when he handed me his book. He was dressed as always in greens, his beard swept sideways to his face from laying a cheek against the flank of a horse, I suspect. Though he owns a small herd of Suffolk Punch for his own pleasure, he

doesn't make a living putting shoes on working stock these days. In my mind's eye, he has shaped the shoe on his forge and plunged it deep into the bucket of hissing water, and now is nailing it fast.

I've lived my life by words alone for the most part and somehow been more recognized for that than I'd ever have imagined. I've been talking and talking and talking, writing and writing and writing, more than ever, and I've been doing both for 40 years at that. So as I imagine two terse men who found entirely different ways through the world, steady ones who've made more palpable gestures than any I ever have, I get an odd feeling, or perhaps – no definitely – a mixture of feelings. I'd surely be wrong to name it simple envy. It's better than that. Is it love or admiration – or both? Doubtless. And others, less easy to name.

I dream John whispering not to a saddle horse but to a great blond Belgian gelding. He holds the nails in his teeth, the hoof as wide as an old-time privy seat-cover.

And, under a sky so blue it's really some other color, also beyond description, Don still drives his saw through ironwood, his wire spectacles glinting in the January sun. Even through his plaid mackinaw, I can see those cannonball biceps in his short arms. If he took off his chopper's mitts to greet me, I'd feel the calluses of decades in the north woods.

It would be a good thing, I surmise, to let these good and honest men direct me at least for the rest of the day. In another era, this might be the point at which the author addressed his "gentle reader," tacking on a moral of some sort. And since I am, precisely, summoning two figures from another era, I'll go ahead and do it, minus the moral, because I can't say what my moral would be:

Gentle reader, perhaps you will tell me that these things and people and labors that so obsess me are worth nobody's notice in our time, that I'm only sentimental, that the best thing I might do would be to write a poem, a not untypical elegy, or even a book of poems about all such matter. Even if I did, of course, it would scarcely be what John calls a perfect book. That's beyond the reach of a wordsmith, even if perfection might be possible for a blacksmith, or for a dear old lumberjack, the one who – along with a horseman – started me thinking this way in the first place.

Sydney Lea is Poet Laureate of Vermont.





Christmas on the Farm: A How-to for Christmas Tree Growers

By Patrick White

A few years back, we had some family friends over for a cookout. One of them looked up at the long, straight rows of Christmas trees growing on our hillside in the distance. “It looks just like a vineyard,” he said admiringly. I had to chuckle because if those were indeed grapes, the glass of wine I had just

poured him would probably have been much higher quality.

While far from the glamorous perfection of Napa Valley, I had to concede there was a certain country elegance to the field of trees. At that point, they had been sheared for the year and I had just brushhogged between the rows, so everything looked pretty manicured and put together.



Maybe it's this postcard image that tempts so many people to want to get into Christmas tree farming. For a few large growers, it's an honest occupation; for others, like me, it's a rewarding sideline. The reality for all of us in this business, though, is that there are few chances to just stand and admire the trees. Working in those rows can feel like trench warfare: a battle against heat, frost, disease, insects, weeds, drought, wet soils, and occasionally (I say this with some recent experience) ground hornets. And that's just the growing end of the business; there's also the all-important marketing and sales work that some tend to overlook when contemplating the start of a Christmas tree farm.

There are many reasons to get into Christmas tree farming – the chance to get outside, the satisfaction of keeping agricultural land productive, and the possibility of a small income stream eventually, perhaps chief among them – but, like most things in life, there's more to it than meets the eye. Though I'd be reluctant to call growing Christmas trees “farming” in front of a dairy farmer who rises at 4 a.m. to milk his cows, there's plenty of work involved.

“People tend to think they can just stick some trees in the ground and they will miraculously pay for their property taxes,” observed Nigel Manley, manager of The Rocks Estate in Bethlehem, New Hampshire., which is an education center for the Society for the Protection of New Hampshire Forests, as well as a working Christmas tree farm with more than 45,000 trees

in the field.

Manley said that when he gets inquiries from people “looking for a crop where they haven't got to do anything,” or “hoping to make a quick buck by planting Christmas trees,” he tries to provide a bit of a reality check. “Many are horrified to learn that they'll have to be out planting trees in the cold in April and shearing them in the heat of summer, and that they may have to spray for bugs and apply weed control.” Most prospective growers don't realize that, even starting with a five-year-old seedling, it takes about 8 to 10 years to produce a Christmas tree. That's 10 years of work and worry before you get paid. (And that's if everything goes right.)

I went into Christmas tree farming with my eyes wide open, having grown up the son of a Vermont county forester who also grew Christmas trees. I planted my first trees in elementary school. My summers during junior high and high school were spent shearing Christmas trees on larger farms nearby. So, years later, when my wife, Tami, and I purchased a 60-acre property that was mostly wooded but included an eight-acre field, I knew what I wanted to do with it.

Even so, there was a learning curve. Over the course of 10 years we planted 8,000 trees, and we now plant and sell about 500 trees per year. We've made plenty of mistakes along the way, but none that we couldn't recover from. I'm sure we would have made more if we hadn't been able to learn from others.

Fortunately, every state in the Northeast has an association of Christmas tree growers, and I've found fellow farmers almost universally willing to share their expertise. The modest annual dues and meeting fees are an investment that can save thousands of dollars in mistakes. “Everything that I learned came from going to other people's farms and joining the New Hampshire-Vermont Christmas Tree Association,” said Manley.

Getting started

For those who already own open land, or who are considering such a purchase, there are a few basic factors to consider before planting Christmas trees. The first is that trees simply will not grow well on wet sites. There are some species and varieties touted by nurseries to “tolerate” wetter conditions, but the

Loading trees into trucks at the Weir Tree Farm in Colebrook, New Hampshire.



WEIR TREE FARM

reality is that every tree does best on well-drained soils. If you have ground that's wet for long stretches of the year, consider the cost of installing drainage before planting or look for other land. Soil pH is another factor that should be considered. As a general rule, balsam and Fraser fir do best in a pH range of 5.0 to 6.0.

If you've got a good site and are ready to take the plunge, the next hurdle is planning the layout of the field: For better or worse, you'll be stuck with your decision for years, maybe decades, to come. I've seen many farms where tree spacing (the distance between rows and between the trees in the rows) was clearly done with an eye toward growing as many trees as possible. That's an understandable but shortsighted approach.

Spacing trees at 5-by-5 feet will allow for more than 1,700 trees per acre, while 6-by-6 spacing yields about 1,200. It's hard to imagine when the young transplants are first put in the ground, but even 6-by-6 spacing will be pretty tight by the time the trees are fully grown. As a general rule, allowing a little extra space may result in fewer trees to sell, but it will make it easier to work in the trees, mow between the rows, and provide for more air circulation, which can reduce disease pressure.

Once a layout is settled upon, tree species must be determined. When I sheared trees in high school in the 1980s, Scotch pine, white pine, and Douglas fir were commonly planted varieties. Those are mostly gone now in this part of the country, replaced in large part by balsam and Fraser fir. Some farms are experimenting with "exotics" like Korean fir, Turkish fir, Meyers spruce, and the like, with the hope that they not only offer options to buyers, but also some resistance to pests and diseases that are affecting other species on their farms.

One trait many growers look for is late-breaking buds. Any new growth that's emerged from the bud can be quickly killed

by a hard frost, stunting that year's growth. When a crop takes up to 10 years to mature, lost growing seasons are hard to take. Most years, trees such as Fraser and Canaan fir (a variety of balsam) will break bud after the danger of frost has passed.

Of course, some of these start-up decisions and dilemmas can be bypassed by purchasing an existing Christmas tree farm. It's not uncommon to see established tree farms come on the real estate market, and this may offer an easier route into the business than starting a farm from scratch. In Sanbornton, New Hampshire, the Fox family recently purchased a thriving

Christmas tree farm with 3,000-plus trees as part of a lifestyle change when they moved from California. "We really just wanted to buy a farm. The fact that it was a Christmas tree farm sounded a little more fun than farming, say, wheat," said Denise Fox, who does much of the work on the farm, while her husband Nick works a fulltime marketing job (unrelated to the farm).

She said she's been fortunate to have ongoing guidance from the farm's previous owner. "It would be very difficult to jump into an existing Christmas tree farm without training," said Fox.

Maintenance matters

While the long rotation period for Christmas trees might seem to take some pressure off, there's little time to be wasted during the decade it takes to grow a Christmas tree. Nigel Manley said he regularly gets calls from people who planted Christmas trees a few years earlier and suddenly wondered what's next. "I usually hear from them when the trees have gotten to be about four feet tall, and they think it's probably time to start shearing them," he said, with a chuckle.

The truth is that even newly planted trees require some attention. At the very least, it's important to cut out double tops: leave a double top for four years and you'll have two complete trees, neither of which will be salable.

"You mean you have to shear every tree every year?" is a question I hear over and over from my tree customers. The answer is yes. The work is done by hand (I use a 16-inch shearing knife) and it takes me pretty much all summer and into the early fall on our farm. I've found shearing to be the most time-consuming, but also most rewarding aspect of growing Christmas trees. Transforming the wild new growth into a cone shape provides instant gratification.

In Warwick, New York, Kurt Emmerich has been planting Christmas trees since 2005 and is just getting ready to open for selling this year. He, too, has been struck by the amount of work it takes to maintain trees. "I had planted thousands of trees in the past with a hoe dag in Oregon, so the planting was the least of my problems. But I had never dealt with the mowing and the shearing and the equipment and everything that goes into maintaining the trees. Getting all of that figured out has been a lot of work," said Emmerich. The biggest challenge? "Weeds."

He's not alone in that sentiment. Over the years, I've developed what can only be described as an adversarial relationship with field bindweed, bedstraw, vetch, and goldenrod. It's not a matter of aesthetics. The species grown as Christmas trees generally don't regenerate naturally in open fields, and are at a disadvantage when it comes to competing with grass and weeds for sunlight, water, and nutrients. It's essential to limit this competition, especially when the trees are younger/small.

Emmerich said he now has his weeds under control, but his next challenge is bugs. "At first the pressure isn't too bad, but once the trees start to have some economic value, the bugs decide it's time to move in and destroy them," he said with a halting laugh.



Cheryl Smith, a plant health specialist at the University of New Hampshire Cooperative Extension, explains Phytophthora root rot – a disease caused by a fungus that can destroy crops of Fraser firs. It can lie dormant in soil for years, becoming active when environmental conditions, such as warm, water-saturated soil, meet a host.



Tamara and Aidan White working on Meadow Ridge Farm.

Those are the challenges that make me wonder if I should have invested in the stock market instead. Despite the uncertain performance of mutual funds in recent years, there's no threat of them being infested by the gall midge or balsam twig aphid.

Money doesn't grow on trees

When considering the cost of running a Christmas tree farm, be liberal with your projections. Figure out what you think you'll spend, then double it. "The amount of

equipment you need to purchase is pretty insane," said Fox after just a couple years in the business. "You need an auger. You need a tractor. You need a bucket and a plow and a trailer and, it seems, you need the most expensive chainsaw that money can buy. And that's just the stuff we had to buy. The farm already came with bow saws and netters. Netters work by pulling trees through a cone-shaped funnel, temporarily flattening branches against the trunk, then wrapping trees in nets to make them easier for customers to handle and transport.

Between equipment, supplies, and planting stock, Kurt Emmerich figures he's spent tens of thousands of dollars getting his tree farm established – and that's not counting the initial costs of the land, property taxes, and insurance. "But I don't mind putting the money into it because it is an investment and I have something to show for it," he said.

I've found that some expenses are minor and incurred over the years, without inflicting too much financial pain. Some, though, sting a little more. I vividly recall taking delivery of a used Kubota the week before our son was born, the wrong time, it turns out, to tell your spouse that you bought a tractor. (In my defense, the tractor is still with us and Aidan is now nearly old enough to drive it.)

Of all the money invested in our Christmas tree farm, Tami is convinced that the best is the \$90 we hand over each year to rent a Porta-Potty during our sales season. It's fine to have hundreds of people at our house, she says, but not in our house.

Sales strategies

It's a stereotype, but I think it's true: farmers are often very good at growing things, but they have a much harder time when it comes to selling things. The problem is often compounded by poor decision-making years earlier. I've heard many stories of people getting started in Christmas tree farming by planting 5,000 or 6,000 trees their first year. I wonder if any such undertaking has ever been successful.

When learning the ropes, it's much easier (and cheaper) to make mistakes on 100, or even 500, trees than it is on 5,000. Besides, selling Christmas trees depends on repeat business, so it makes no sense to put in a huge one-time planting without continuing year after year. And even if a new farmer were diligent and lucky enough to get such a massive initial planting to maturity, the challenge of selling that many trees without an established name would likely prove impossible. There are very few choose-and-cut farms in the Northeast selling thousands of trees each year, and the wholesale market might be even more difficult for a new farm to break into.

Planting fewer trees initially makes it easier to ease into sales once the trees mature. In fact, Nigel Manley recommends that new growers begin marketing and selling almost from the beginning. "I tell people who have four-foot trees to start buying in trees [from other growers] and selling those. Get your signage up, start talking about your farm, get a mention in the local paper," he stresses. "That way you'll be known by the time your own trees are ready."

Drive around the Northeast and you'll see plenty of former Christmas tree farms that now are forests. These are often testaments to over-eager planting or poor sales planning, or both. Whether it's Christmas trees or widgets, you need to have a plan for marketing and selling your product.

When you do get people to your farm, you'll find that Christmas tree customers are a curious and unpredictable bunch. Despite your best efforts to put up signage, posts, and cones, they will drive where you don't want them to and do things you never imagined they could do. Last year, I had a fellow who insisted on tying his tree to the roof of his SUV with the top pointing forward. Having seen plenty of umbrellas turn inside out in the wind, I politely suggested that, given the direction the branches naturally grow, it would probably be better to flip the tree in the other direction. "Nope. It's more aerodynamic this way," he counseled me. "And I've got a long way to go." I thanked him for his business and walked away wondering how many needles (or branches) would be left on the tree when he reached his destination.

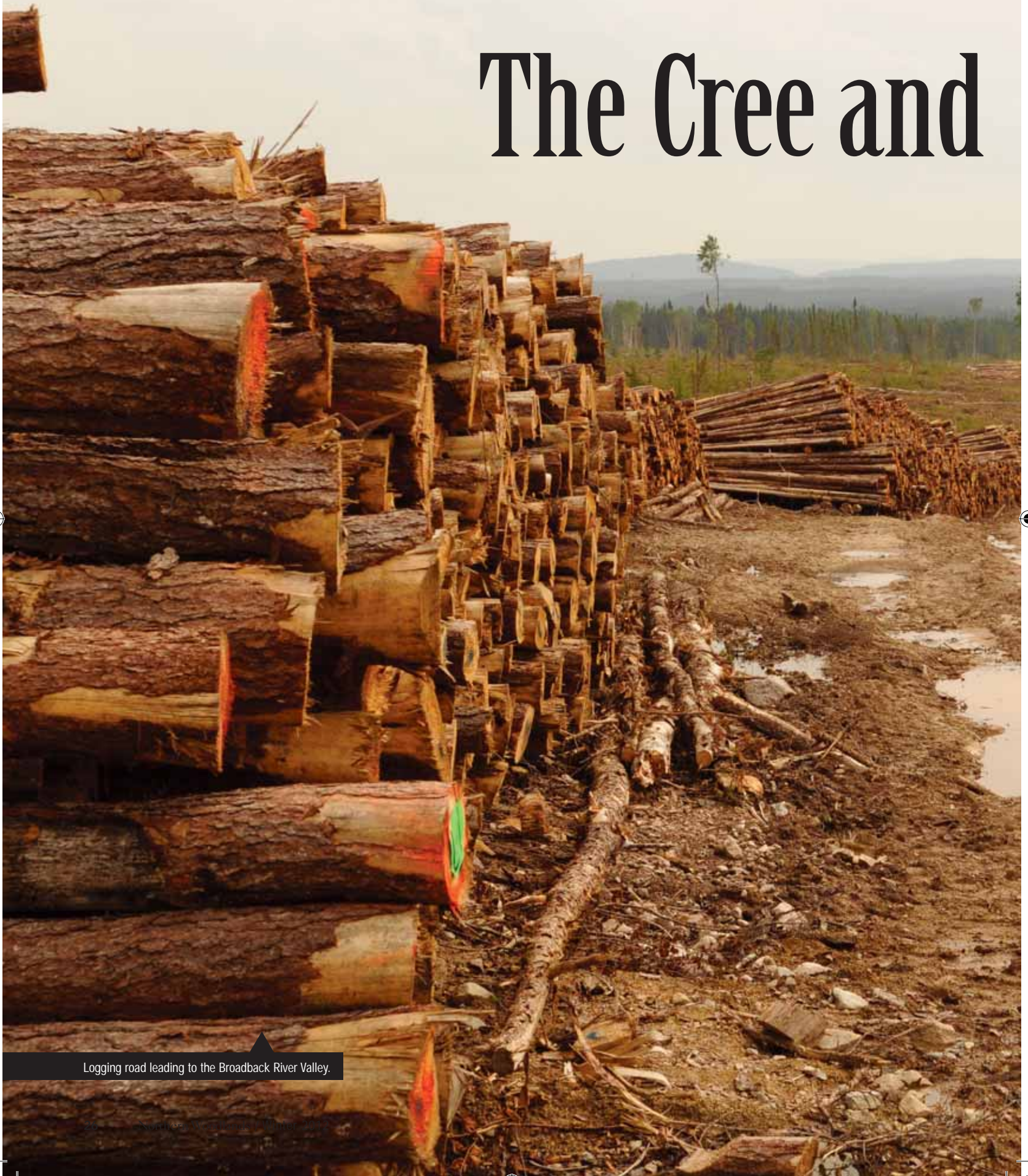
But selling Christmas trees is almost always a feel-good experience and it's rewarding to be a part of that. Nobody is unhappy when they come to get a tree. Unlike shopping for life insurance or a car battery, Christmas trees are a purchase that people are excited about. Fox marveled at the loyalty she's already experienced from local residents. "When people found out we had bought the farm and were going to keep the Christmas tree sales going, they were so grateful. They were thanking us profusely."

It's true. I can't count the number of customers who approach me throughout the year to tell me they can't wait to come again to buy a tree. For many, going out to cut a Christmas tree is a family tradition, and now our farm is part of it.

Patrick White, along with his wife, Tamara, and son, Aidan, operate Meadow Ridge Farm in Middlesex, Vermont. Working in the Christmas trees gives him the chance to take a break from his "real" job as a writer/editor and get outside.



The Cree and



Logging road leading to the Broadback River Valley.





the Crown



Management Stories from North America's *Northern* Northern Woodlands

By Naomi Heindel

When I say “northern Quebec” to most people, I either get blank looks or they say something vague about how European it is – they think I’m talking about Quebec City. Even to many Quebecers, anything north of touristy Lac Saint-Jean is a bit of a mystery. Most maps end there. The one major road north points towards Chibougamau, a sort of last outpost before the frontier.

If I keep pushing, “No, north. James Bay. The boreal forest,” the looks may change from blank to whimsical. I’ll have conjured the mythic north: a vast, uninhabited terra nullius, a place of freedom and emptiness that feels, perhaps, like the western U.S. felt 150 years ago. Sometimes, when I’m talking to a person who remembers the activism over hydroelectric dams in the 1980s, I’ll get a furrowed brow – an acknowledgement that settlement has come at the expense of the indigenous people.

Leave the Lac Saint-Jean valley, and dairy farms that would look at home in New England immediately give way to vast forests of black spruce, balsam fir, jack pine, white birch, and poplar, the road dipping and rising over glacial deposits. On the three-hour drive from Lac Saint-Jean to Chibougamau, the feeling of isolation, the dense, green presence of the forest, is inescapable. Yet, equally obvious is the presence of natural resource development. The logging trucks loaded with skinny black spruce and the high-tension power lines supported by steel towers come from even farther north, proving that, despite what the maps might show, Chibougamau is only the start of northern Quebec. Beyond lies a huge expanse of forest, rivers, lakes, First Nations communities, mining towns, sawmills, logging roads, hydroelectric dams, mountains, bugs, moose, and caribou. At some point the trees thin out, signaling entry into the taiga, and then the tundra, where far northern Quebec begins.

ALLAN SACAWASH



Eeyou Istchee

It takes about 12 hours to drive from northern New England to Chibougamau, but we need not leave our homes to feel a connection to this region. Northern Quebec is known as the wood belt, and for good reason. Twenty-five percent of the world's natural forest is in Canada, and the country is the world's leading lumber, pulp, and paper exporter. As such, there's a good chance there's a two-by-four in the building you're sitting in that's stamped "Fabriqué au Québec." The same origin holds true for the roll of paper towels on your kitchen counter.

If you live in New York or New England, there's also a chance that the power for the light you're reading by is generated in northern Quebec. From Hydro-Quebec's generating stations and reservoirs in the far north, high-voltage power lines, supported by some 14,000 towers, run south over 3,600 miles. Half of Hydro-Quebec's exports come to New England, and another quarter go to New York. Twenty-eight percent of Vermont's electricity – every fourth light switch you flip – comes from Hydro-Quebec. Currently, new lines are planned to Deerfield, New Hampshire, which will bring electricity to one million more customers. As a carbon-neutral energy source, experts say that these new lines will help New England meet one-third of its greenhouse gas emissions goals.

But there's a lot more to this region than the natural resources we use in our houses. Quebec hosts one of the world's largest concentrations of woodland caribou, along with other at-risk species such as wolverine, lynx, and golden eagle. Thirty percent of the world's boreal forest grows there – forests that clean and recycle much of the earth's fresh water, that act as the lungs of the world, driving the seasonal changes in atmospheric carbon dioxide levels. We don't have to consume two-by-fours or electricity to be connected to this region. All we need to do is breathe.

I spent six weeks in the James Bay region of northern Quebec this summer, researching the environmental and cultural effects of the forest management in the region. I wanted to see first-hand how the 10-year-old Paix des Braves agreement – a plan meant to phase out large clearcuts in favor of smaller, patch cuts – is affecting the landscape. I wanted to see the spidery system of roads built by the logging companies to access these blocks. I wanted to talk to Cree hunters about the changes to their lands, to forestry company representatives about the silvicultural strategies they use, and to workers from the Quebec Ministry of Natural Resources about their mission to both manage the region's complex forest system and supply wood to the forest products industry.

More than anything, I wanted to observe the meetings of the Forestry Joint Working Groups in the Cree First Nations communities affected by logging. These meetings bring all of the players together around one planning table; they're usually trilingual and generally quite tense. Forestry issues can be contentious enough in the Northeast, where protocol is pretty much established and everyone speaks the same language. How are land use decisions made concerning Canada's boreal forest, a place that the Cree see as hunting and trapping grounds and a source of cultural identity, that industry sees as the world's wood basket, and that environmentalists see as the Amazon of the North?

The James Bay region – the vast boreal region around the southern tip of Hudson Bay – is roughly the size of Germany. It's a land of powerful rivers that fall off the granite plateau of the Canadian Shield, of wide muskegs and shallow, reedy lakes whipped into white caps by afternoon winds. Despite its ancient bedrock, it's a young landscape, freshly emerged from glaciers that left round kettle ponds, winding esker ridges, boulder fields, and fine sandy banks and beaches. The forest is predominantly black spruce: tall, straight, densely packed trees, often with a thick mop of needles and cones at the very top, bending heavily with the wind. The black spruce skyline – with



Forestry Joint Working Group.

a backdrop of gray clouds ready to drizzle for five days, or the pale green of a late night in June, or the vivid blue after a March snowstorm – is the quintessential James Bay view.

This is a landscape that has developed in the presence of wildfire. Fire is the largest natural disturbance in James Bay, returning nutrients to the soil and opening up space for the new growth of sun-loving species. Areas that have been burned turn quickly to brilliant pink fireweed, lowbush blueberries, birch, and poplar. Even the ubiquitous mat of sphagnum moss that covers the forest floor is burned in the hottest fires, the once ever-wet and squishy ground becoming dry and crumbly underfoot. The fires can be so extensive that when the wind drifts south, smoke can cloud the skies all the way to southern New England.

Nine James Bay Cree communities call this landscape home and have done so since time immemorial, if you ask them, and for the past 2,500 to 3,000 years, if you ask archeologists. Waswanipi, Oujé-Bougoumou, Nemaska, and Mistissini are located inland, and Waskaganish, Eastmain, Wemindji, Chisasibi, and Whapmagoostui are along the coast. There are roughly 18,000 James Bay Cree today, and the population is steadily growing.





Traveling in what the Cree call *Eeyou Istchee*, The People's Land, one can't help but be amazed at the resilience of this culture. There are trilingual stop signs; Cree is spoken at every street corner, at every meeting, by every generation; there are meals of goose, beaver, moose, bannock, blueberries, and fish; cooking tents behind many of the houses; and ceremonies to celebrate a child's first steps outside. But there are also hockey arenas, television sets, hot dog stands, and all the other trappings of a 21st century society.

The balance between tradition and modernity in Cree culture is constantly shifting, which complicates an already complicated land-management system involving multiple governments, cultures, and languages, political agreements,

council and a chief who oversee almost all aspects of community life, from education to cultural activities to road construction, and each has a different feel: the tree-lined streets and quiet isolation of Nemaska, the government housing and political activism of Waswanipi, the ever-expanding modernization of Mistissini.

All of these communities have representation in the Grand Council of the Cree, based in Montreal and Quebec City. The Grand Council is currently led by Grand Chief Matthew Coon-Come, from Mistissini, who has been involved in Cree politics for decades.

In 1975, the Grand Council signed the James Bay and Northern Quebec Agreement, a comprehensive treaty with the Cree and the Inuit. Besides allocating specific land to these communities, it covered economic development across the territory, defined land use rights, established governmental, social, and cultural institutions, and set up a fiduciary relationship between the native communities and the provincial and federal governments.

This agreement reduced Cree territory by 93 percent – from 400,000 square miles to 27,140 (an area larger than Texas down to an area smaller than Maine) – and brought significant change to the region: permanent Cree communities, a Cree governance structure, an inflow of funds from Quebec and Canada, and a land management system that divides historical Cree territory into three categories. Category I land (2,140 square miles) is federally owned but Cree controlled; this is the land surrounding the Cree communities, similar to US reservations. Category II (25,000 square miles) is Crown land, where the Cree have exclusive hunting and fishing rights, but where development such as logging may also take place. Category III (350,500 square miles – nearly 60 percent of the province) is managed like the rest of Quebec, with only a few specific hunting and harvesting laws differentiating native and nonnative uses. There are signs as you enter or exit these land categories, and they are well understood in the region, an example of how life and land are defined by political agreements.

Even though we might call James Bay “Cree land,” or *Eeyou Istchee*, and even though land management is a multiplayer issue, this land is legally owned by the province of Quebec and the country of Canada. In fact, 90 percent of all Canadian forestland is owned by the government. These public holdings are called Crown Land, and to be technically correct, they're owned by Queen Elizabeth II (though she's not allowed to sell any of it). Logging companies, mining companies, and hydroelectric companies – as well as individuals looking to build a house or camp – rent from the government. Needless to say, these Crown Lands generate significant treasure; forest sector revenues alone produced \$57.1 billion for Canada in 2011.

The conflict

Before the James Bay and Northern Quebec Agreement, the Cree lived largely as they had for hundreds, if not thousands, of years. They spent most of the year out on their traplines, hunt-



PHOTOS BY NAOMI HEINDEL

Trilingual stop sign in Mistissini.

and players with widely differing values and ways of thinking about the world.

In Cree society, no one owns property, per se, but the land base is broken up into family hunting territories, called traplines. Each trapline is large enough to support the needs of the extended family, which means that the territories further north, where productivity is lower, are significantly larger than those in the south. On average, traplines where there are forestry operations are 280 square miles each, about a quarter of the size of the White Mountain National Forest.

Each trapline is managed by the senior hunter of the family, the tallyman, a much-respected position in Cree society, with considerable responsibility. Tallymen are land stewards, ensuring that areas are not over-hunted, that meat is shared among family members, and, today, that forestry operations or other development do not disrupt the Cree way of life. Traplines are passed from generation to generation, from tallyman to the most promising son or nephew, and thus education is also an important tallyman responsibility.

Each trapline, and thus each family, is associated with the nearest Cree community. All nine communities have a band



ing, fishing, and trapping, moving camp often, traveling long distances by canoe, dogsled, snowshoes, and later four-wheeler and snowmobile. The longest journeys came at the start of the summer, when the Cree gathered to visit and trade in the places that would become today's nine communities. In the fall, the families would part ways, heading back out to their territories before freeze up.

Things have changed.

I try to keep up with tallyman Paul Dixon, as he charges across bare ground, rutted by a recent timber harvest. Ponytail flapping, he navigates between stumps and branches, toward a buffer of black spruce surrounding a small lake. This used to be a canoe portage, and Dixon finds small signs to guide him – signs that I can barely detect through the more obvious marks of logging.

Dixon and I spent the morning driving from cut to cut on his land, finding new logging roads, watching a feller-buncher harvest mature trees, and narrowly avoiding flats of tree seedlings laid out for watering. Between stories of past harvests gone awry, rants against Barrette-Chapais – the largest sawmill in Quebec, located just 30 miles north – and reflections on what this land used to look like, Dixon's real focus of the day emerged: moose. Hunting season was just around the corner, and he noticed tracks – from which he deduced age, sex, size, direction of travel, foraging ground – everywhere we went.

When we reached the lake, Dixon scanned the far shore with binoculars, looking for moose, but also for a camp on the far point, the last place where he and his father slept outside together. He told me that he will always remember his dad as the greatest hunter in the world. And he wonders if his son will remember him – a lifelong hunter with a fulltime office job – this way, too.

Back in his black pick-up, he waves his hand at the barren landscape and says, in a way that's both a question and a statement of fact: "As a Cree from a hunting society, am I in a dilemma?"

There are a whole host of issues complicating the management of this boreal forest, but at core you have Cree, who are still, despite the trappings of modern life, a hunting society, and Quebecers, who are part of a capitalist society. One cares about game, one cares about monetizing a resource. When these two desires align, there's relative peace. Where they conflict, there's tension.

Hydroelectricity and mining are both big industries in the James Bay region, but the environmental impacts of the first are mostly past and of the second are mostly yet to come. In both environmental and economic terms, wood is king. The logging industry that has been a part of life in southern Canada since the nineteenth century didn't make its way to James Bay until the 1950s, when mining opened roads to the north. Hand felling and stripping gave way to feller-bunchers and grapple skidders in the 1980s and 1990s.

Increased mechanization, increased demand for wood, and lenient or nonexistent environmental protection led to widespread clearcuts. Typically, loggers would clearcut 1,000 acres and only leave the requisite 660-foot buffer before the next

1,000-acre clearcut, over and over.

"It was cut, cut, cut," explained forest manager Jean-Pierre Boudreault of the sawmill Chantiers Chibougamau. He used a French idiom meaning "to roll out the carpet" to explain how the companies moved their operations steadily north. As an experienced manager and planner at Chantiers, Boudreault is in charge of planning the company's harvesting locations and schedule, transferring the plans on the map to the men and machines on the ground, and communicating with the Ministry of Natural Resources and the affected Cree tallymen. Chantiers, established in 1961 in the rough copper-mining town of Chibougamau, went from an annual yield of two million board feet its first year to 200 million in 2001. To put this in perspec-



Tallyman Paul Dixon.

tive, the recent annual sawlog and veneer harvest in the entire state of Vermont was 180 million board feet.

"For industry, the nineties were good years because of the financial situation," explained Patrick Garneau, Boudreault's counterpart at the Tembec sawmill in the industrial outskirts of Senneterre. "We had good prices for lumber (two-by-four), wood supply was okay, and we had a good (low) cost for our wood supply (forest to mill)." These were the good old days.

To get a sense of the scale of the landscape alteration firsthand, you can go to Google Earth and type in Lac Mistassini, Quebec, Canada. Scroll to the east and the landscape looks less like a forest in any broad sense of the word, and more like a network of farm fields. To many in the logging industry, this was precisely the point. Proponents of this agricultural model of forest management pointed out that The James Bay area is largely unpopulated and grows a lot of trees; as such, it makes sense for Canada to use this resource.

But, of course, the Cree saw it differently as clearcuts, logging roads, and nonnative hunting cabins spread into Eeyou Istchee. Development was piecemeal, with some tallymen trading land rights for boats, snowmobiles, or access roads.



The electricity, sewer systems, and paved roads promised by the James Bay and Northern Quebec Agreement were slow to materialize. Even those within the logging industry remember those days as a time of environmental indifference. “It was terrible,” Boudreault told me. He recalled equipment abandoned on every cutting block and garbage everywhere, to the point where he could fill up his pick-up each time he went to the forest. Waswanipi’s forestry administrator, Allan Saganash, showed me binders filled with photos he took during this time of hunting cabins surrounded by nothing but stubble, eroding gravel pits, contaminated streams, and poor or entirely absent regeneration, each photo a story of mismanagement and environmental disregard.



PHOTOS BY NAOMI HEINDEL

Chantiers Chibougamau sawmill.

The Paix des Braves

As Category II and III lands were steadily clearcut, Cree leaders, especially in Dixon and Saganash’s southern community of Waswanipi, became outspoken with their frustration towards what they saw as a lack of forest protection in the agreement. “In the 1990s, they had no obligation at all to consult the Cree,” Saganash said. Born and raised in the bush, he has been involved in forestry issues from the beginning, even before there was a formal process in place. Geoffrey Quail, senior environmental advisor to the Grand Council, remembers days “when a guy in a logging truck would pull up and say to a trapper, ‘Hey, we’re going to be logging here this winter, you should probably get your traps out.’”

In 2002, Cree frustration and public pressure to improve forestry practices led to a new agreement between Quebec and the Cree. In the Paix des Braves, the Cree gained a voice at the planning table in exchange for surrendering the Rupert River, at the time a major thoroughfare from the inland Cree communities to the James Bay coast that was subsequently partially diverted into the La Grande hydroelectric complex. The treaty

was a chance to rethink management of the region.

The Paix des Braves included an adapted forestry regime that addressed the mounting ecological concerns. This new regime, which I saw firsthand on Dixon’s trapline, is known as mosaic cutting. The cuts still resemble clearcuts – picture a big clearing with a few standing, unmarketable poplar trees scattered about – though the soil is not always intentionally scarified. And the mosaic openings are substantially smaller than the 1,000-acre clearcuts of the past. Forty percent of cutting blocks must be less than 125 acres, and none can be more than 250 acres, a substantial change from past practices. And rather than having skinny little buffer strips, cuts are arranged more like a checkerboard, the uncut blocks as large as those that are cut. Larger buffers along shorelines and riverbanks are also required. The rationale is that multiple small cuts would affect each tallyman and his family to the same extent at the same time, but no one’s land would be hit too hard.

In addition to mosaic cutting, the Paix des Braves established the forestry Joint Working Groups, which put Cree forestry administrators and Quebec Ministry of Natural Resources representatives together as one team in negotiation with logging companies and tallymen. The Joint Working Groups put Cree concerns and economic concerns on the same table, quite literally, with all of these players leaning over each other to see and alter and discuss the same set of forestry planning maps. These meetings bring the operations of a province down to the details: Cree and their goose camps, the Ministry representatives and their satellite images, the loggers and their feller-bunchers.

The Paix des Braves requires protective measures that ensure the continuity of Cree land use and management. To start, the productive area of each trapline is calculated, and disturbance that is less than 20 years old – whether logging or wildfire – may not exceed 40 percent. When it reaches 40 percent, the area is closed to further activity to allow for regeneration, opening only when it meets the requirements for regrowth. Tallymen may set aside 1 percent of the trapline’s productive area for sites of cultural interest (hunting camps, bear dens, burial sites, canoe routes), 25 percent as important wildlife areas (usually moose yards and corridors, waterway buffers, or goose-hunting lakes), and an additional 185 acres for firewood harvesting. The Ministry of Natural Resources also designates biological refuges, old growth stands, and other areas of special ecological interest where harvesting is limited.

Industry reaction to the Paix des Braves was mixed, as might be expected in an area so dependent on natural resources. “In Quebec, people want to respect environmental issues, but they live from the forest in the region, and they are aware that if there is an impact maybe I will lose my job, maybe my dad will lose his job,” said one ministry official.

From his office at Chantiers Chibougamau, Boudreault tells me, his explanation peppered with Quebecois expletives, that mosaic cutting is expensive. “The biggest financial impact is the road construction,” Garneau confirmed, for logging companies must build and maintain new roads and bridges to reach all of these forest patches. This also means greater hauling





Willow ptarmigan.

SUSAN C. MORSE



NAOMI HENDEL



Tallyman Willie Gunner, Lake Temiscamie.

NAOMI HENDEL



Mosaic cut north of Waswanipi.

Anna Bosum and grandson Jorum, Waposite.



Tallyman Willie Gunner with caribou lunch.

NAOMI HENDEL



NAOMI HENDEL





Black spruce.

SUSAN C. MORSE



NAOMI HENDEL

Woodland caribou cow.

La Grande River Hydroelectric complex.

Logging truck north of Mistissini.



NAOMI HENDEL

distances to the sawmills. It means establishing summer-long field camps to house and feed crews of tree planters in remote corners of the territory. For companies driven by volume, and whose subsequent leases rely on maintaining their harvesting level, having to go farther afield not just once, but time and time again, to cut a reduced volume of wood, was not a welcome change.

And yet, over the past 10 years, most in the industry have come to accept mosaic cutting and the other stipulations of the Paix des Braves. While the regulations are strict, that strictness allows the companies to avoid the political backlash that they experienced in the nineties. As Garneau told me, "It's easier to plan with clear rules."

Many sawmills and timber companies found that the agreement dovetailed nicely with the forest certification standards being pushed by environmentalists. A few years ago, Chantiers Chibougamau went through the process of Forest Stewardship Council (FSC) certification, a stamp of approval that tells consumers that the wood is harvested sustainably. Gaining FSC certification is a process that usually takes a company several years, yet Boudreault told me with pride that it only took Chantiers eight months. "FSC, it's a copy of Paix des Braves," he said, putting out both hands as if to weigh one against the other. "One of the biggest principles in FSC is to take care of the native people, and we were already doing this." Today, FSC, the Sustainable Forestry Initiative, and the Canadian Standards Association certify most of the wood coming out of the James Bay region.

The catch

This doesn't mean that the forest products industry embraces every aspect of the Paix des Braves. For example, loggers have a practical problem with the requirement to leave the forest floor undisturbed. A thick mat of sphagnum moss covers much of the forest floor in James Bay. Naturally, this mat burns in forest fires, exposing the mineral soil that black spruce seeds need to germinate. Loggers mimic the effects of wildfire by scarifying the soil with large machinery, as a farmer might plow a field. But the Cutting with Protection of Regeneration and Soils (known as CPRS) that is part of the Paix des Braves requires that the organic mat be left intact. The idea is to not harm young seedlings, but this method can actually inhibit growth, as it is hard for trees to contend with that much organic material. It can also exacerbate paludification, the process by which moss retains so much water that a forest gradually transforms into a bog.

And it doesn't mean that those in the environmental community see the agreement as peak evolution either. From the perspective of many ecologists, there's still too much harvesting going on in James Bay. Daniel Kneeshaw, a professor of biology at the University of Québec at Montréal, is an expert on natural disturbance dynamics of the boreal forest, as well as on First Nations forestry and alternative forest management. He, along with other forest ecologists, argues that mosaic cutting was always more about meeting the social needs of the Cree and

the political needs of Quebec than about addressing ecological concerns.

There is mounting concern about the unintended ecological ramifications of mosaic cutting, as mosaic management puts the forest on a short rotation. Rather than using large cuts to reach the annual allowable cut, a number set by Quebec's chief forester, and then leaving those areas to grow for 90 or 100 years, the companies cut less but more often under a mosaic regime, harvesting all across the territory every year. This requires a more extensive network of roads than clearcuts did, and in the end means a larger disturbance of the forest.

According to biologist Nicole Fenton, a specialist in boreal forest dynamics, mosaic cutting does not reflect the ecological



reality of the boreal forest, a reality driven by wildfire cycles that can vary from 50 to 400 years. "The natural dynamic is not to burn every 90 years systematically," Fenton said.

Ecologists worry that the mosaic cutting is significantly changing boreal forest structure, especially when it comes to old growth and uneven-aged forest. They also worry that it's altering the composition of the boreal forest, allowing balsam fir to take over where black spruce once grew, due to differences in how those species regenerate, a shift that may be amplified by climate change.

As if the issue wasn't complicated enough, there's one more player that the ecologists are worried about – caribou. The shift from vast clearcuts to mosaic patches has led to significant landscape fragmentation. Since 2002, between 12,000 and 18,000 miles of new roads have been built through forests, across bogs, over creeks, and around mountains.

James Bay is home to three of the last remaining herds of woodland caribou in Quebec, and this nonmigratory species, considered threatened in Canada and vulnerable in Quebec, needs vast stretches (about 150 square miles) of mature conifer forest to thrive. Not only is James Bay's mature forest declining



due to mosaic harvesting, but the caribou's dislike of roads leads to what ecologists call functional habitat loss. And then there are the increased hunting cabins, poaching, and predation that the roads bring.

"Once you build a road, it opens up the territory," explained Saganash, who, as forestry administrator, finds road and cabin disputes filling his time. On the table in front of him is a map of all the nonnative hunting cabins on Waswanipi territory. There are more than 700, making the map so hard to read that it seems like it was produced almost as a joke: a very political, uncomfortable joke. "We need to prevent access. That's what is important," said Saganash, speaking for both the Cree and, unintentionally, the caribou.



NAOMI HENDEL

The bridge over the Maicasagi River.

A recent study by researchers at the University of Québec found that the threatened caribou herds in James Bay are still declining. Part of the population loss results from native use, for the Cree hunt caribou year round and have for centuries, but the researchers conclude that "the ultimate cause is attributed to landscape transformation." Too much land has been disturbed, they argue, and current rates of harvesting and road building need to be curtailed.

The friction

So what do the Cree think of the current state of forest management? Well, it depends on who you talk to, what generation they belong to, whether they hunt on foot or by truck, how inaccessible or far north their trapline is, whether their son's road construction company has seen steady work on logging roads, how involved they are in local and Cree Nation politics.

Sometimes the divide between the Cree and those in the forest products industry cleaves along predictable lines. Tallyman Edward Ottereyes, for example, expressed vehement opposition to the

construction of a bridge over the Maicasagi River because it would disrupt a sturgeon spawning ground and because he knew that every native and nonnative with a pick-up truck would be up on his trapline hunting moose come fall, shooting geese come spring.

Boudreault, in charge of planning this road for the Chantiers sawmill, saw Ottereyes' point, saying, "It's terrible, because everyone can go there, and it's so close to Waswanipi." But, Boudreault told me, "If we want to be economically stable ... for us, it's [75 miles] less" to cross the Maicasagi than to go around. And so the bridge was built.

But to say that the Cree are against roads and logging is too simplistic. Ottereyes' son, in fact, wanted the Maicasagi bridge that his father opposed. He argued that his father didn't hunt anymore, but that he and his brothers did – by truck. He wanted access to the land north of the river, even if that meant sharing it with Chantiers' logging operations.

In my six weeks in James Bay, many of the requests I heard made at the forestry consultation tables were from tallymen who wanted more access roads to lakes, road improvements, grading, pick-up truck turnarounds, or washout repairs. In a strange twist that I struggled to understand despite seeing it play out over and over, tallymen often wished for logging on their land, not far from places they hunt the most. When asked to weigh in on two different road options at a forestry consultation meeting, one tallyman said, "I don't care, as long as it is a good road for me."

It's also too simplistic to assume that the Cree and the ecologists agree about forest health matters. A case in point would be the region's burgeoning moose population. As is often the case in nature, one species' loss is another's gain. The mosaic forest that stresses the caribou turns out to be favorable for moose. And, as ecologist Fenton pointed out, "Everyone wants good moose habitat on their trapline." By pairing small cuts and residual forest, mosaic cutting provides just the combination of food and shelter that moose need. This is wonderful if you're a moose hunter and awful if you're concerned about caribou.

To be clear, the Cree are concerned about caribou, too, and have proposed large areas – some of the last unlogged forests in the region – for their protection. But there is a fundamental difference in worldview at play here, such that the Cree and ecologists disagree over issues like sufficient regeneration height, the definition of high-value forest, or the appropriate time to harvest. "A biologist and a Cree with knowledge of the land – one person studies it in school, one person knows it from being on the land. So who do I believe?" asked Saganash, the forestry administrator.

The friction between the Cree and the Quebecers on both sides of the resource management divide plays out in meeting after meeting, in community after community. Cree tallymen might agree to the harvesting of a certain patch of trees, but unlike those in the timber industry, they have no need or desire to ensure that the forest produces at a certain rate. They may stand with the environmentalists on the need for a lower annual cut, but balk at the idea of regulated hunting quotas.

While many Cree have joking, teasing, laughter-filled demeanors, when it comes to the politics of the region, there is palpable resentment toward the extractive use of James Bay's



resources. “This is Cree land. These are Cree people here,” an exasperated Saganash reminds the Ministry and logging company representatives at almost every meeting, lest they think that the allowed 1 percent total protection and 25 percent partial protection are enough.

And there’s a keen understanding of the broader system of consumption that drives this extraction, the consumption by all of us “down south” across the border. “All the trees go down south, all the electricity goes down south,” said Joseph Neeposh from his front porch on the Waswanipi River. “All that doesn’t do anything for us Cree,” he said, waving his hand toward broken tent frames and flapping tarps. He expressed the sentiments of many older Cree, the ones who have seen this entire process unfold in their lifetimes.

But simultaneously, most Cree view the natural resource-based economy of the region very practically. You don’t find many Cree wishing the James Bay and Northern Quebec Agreement had never been signed, despite the logging and mining and hydro-related flooding that came along with it. Without the treaty, Cree rights wouldn’t be protected under the Canadian constitution. There would be no secondary education, health board, income security program, or trappers’ association. No college educations. No dialysis machines. The Cree are a twenty-first century people. The balance they are striving for today – between village life and bush life, between cultural, ecological, and economic sustainability, between modernity and tradition – is different from the years before the agreement.

“The Cree way of life is not something that is fixed in time,” said one Cree official. “The old way of life – hunting, fishing, trapping full time – is the way of life for very few people. So now the Cree way of life includes forestry roads, driving everywhere in trucks. Things evolve.”

Tallyman Murray Neeposh pragmatically summed up the balancing act by telling me, with a twinkle in his eye, that he was fundamentally opposed to a logging company building a road on his trapline. But if they did, he’d probably open a gas station.

The future

In light of the ecological concerns about mosaic cutting, the Quebec government is now considering a new approach to ecosystem management that would attempt to strike a better balance between economic stability and ecological integrity. Currently, the Cree and Quebec are deadlocked in negotiations.

Ministry representatives in charge of promoting the new system explained that the main goal is to reduce the gap between the managed and the natural forest by mimicking the natural disturbance of wildfire. Given the scale of natural wildfire, this could mean harvesting blocks as large as 25,000 acres, bigger even than the largest cuts of the 1990s. Each large cut would leave 125- to 500-acre tree islands connected by 1,640-foot corridors, which together would make up 20 percent of each cut, or even more, if the Cree negotiate for increased protection. After cutting, harvested areas would be left alone for many, many decades, allowing

for the regeneration and succession that would naturally follow a forest fire. In addition, thirty percent of the territory would be kept as forest. Ecosystem management echoes the larger conservation movement’s commitment to a more holistic approach to forestry – to managing the whole system. The Cree have yet to accept the Ministry’s plan. Quaile, representing the Grand Council in these negotiations, is skeptical. “Is this really based on the ecosystem needs of the forest? Or is this based on capturing more wood for the companies?” he wondered aloud. Quaile isn’t even sure if ecosystem management is possible. “The system of ecosystem management that they wanted to use would’ve worked well in an undisturbed landscape,” he argued. “But it is very difficult to mimic nature in a landscape that’s so drastically fragmented by decades of industrial logging.”

Many of the Cree’s arguments against the proposed regime are cultural. They fear that ecosystem management would strip tallymen of their stewardship rights, undo the progress of the past decade, and bring back the exact problems that the Paix des Braves was set up to remediate. “They’re stepping back, going back to 2002,” said Saganash, afraid that everything he’s worked for in Waswanipi is about to be undone.

What’s not part of the negotiation is the annual allowable cut and that, according to many of the players, is a huge mistake. Ecologists point out that mosaic cutting can be done well. If you don’t harvest too much, you can keep old growth, you can keep the equilibrium between coniferous, deciduous, and mixed forests, you can have uneven-aged stands. This only works, though, if the harvest rate is not too high.

Cree representatives agree. “You can never make forestry compatible with the Cree way of life,” said Saganash, but less cutting would certainly help. In fact, after running models with various forestry options for tallymen to evaluate, ecologist Kneeshaw is advocating that the annual cut be reduced by as much as half on native lands.

Those in industry point out, however, that the annual cut has already dropped significantly, as much as 20 to 30 percent in the last 30 years. On top of that decline, Quebec’s forest products industry is not booming; Fenton reports that “over the last five years, considerably less than the annual allowable cut has been harvested each year.”

These are no longer the days when there were mills at every lake. Today, Tembec Senneterre harvests half of what it did in 2000. A good part of this is because the housing market in the U.S. has tapered off; another part is due to increased environmental protection. Although Canada remains the world’s largest exporter of forest products, sales plummeted from \$88 billion in 2005 to less than \$54 billion in 2010.

Garneau predicts that the annual allowable cut will continue to decrease with time. “If we put in some other rules for caribou, we have to lower the annual cut. If the Crees negotiate bigger buffers, we have to lower the annual cut.” In addition, in the coming multiyear forestry plan, the annual cut will be reduced to account for the requirements of FSC certification, which is becoming common among sawmills across the territory. “I see a much reduced industry going forward,” said Quaile. The stacks

and stacks of lumber, processed but unshipped, lying in the yards of every sawmill I visited this summer seem to corroborate his prediction. Some perspective is important, though. Barrette-Chapais, the mill just north of Dixon's trapline, still processes 300 million board feet annually, leading to sales of over \$500 million each year.

The balancing act

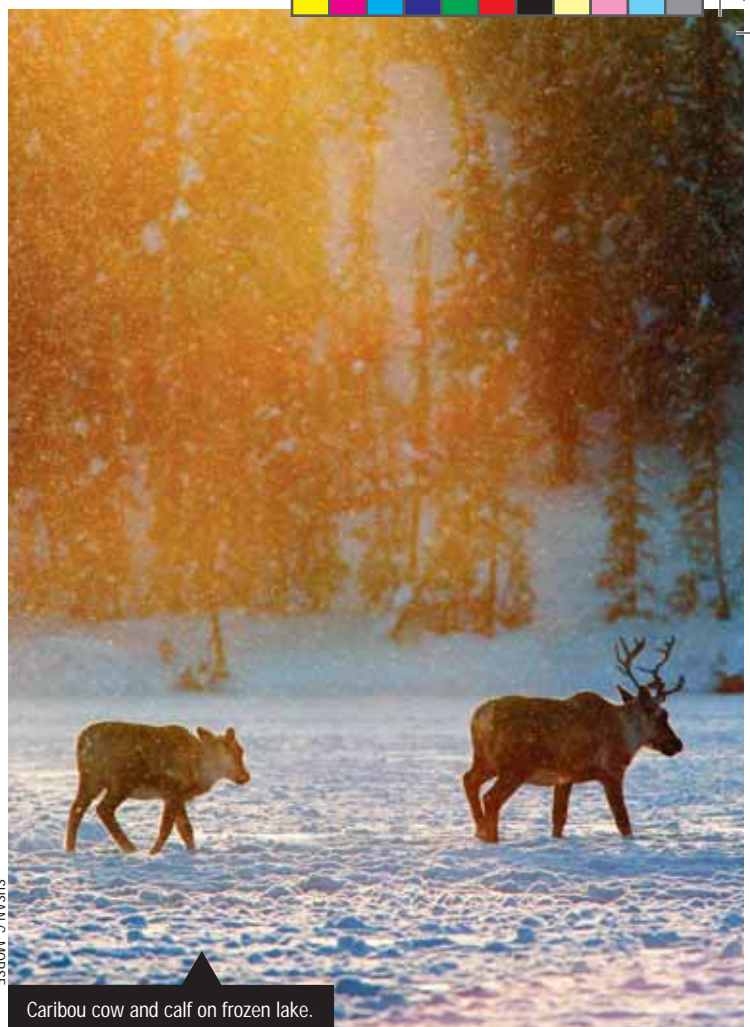
What all of this means for the boreal forest remains to be seen. In the big picture, Quebec's \$80 billion dollar Plan Nord – an economic, social, and environmental development plan that aims at creating 20,000 jobs per year for the next 25 years – will increase lumber, energy, and mineral sales from the region. This means cutting more trees, pushing vanadium and uranium exploration, and damming more rivers. (Hydro-Quebec's major focus at the moment is on the Romaine River, which flows off the Labrador plateau and into the St. Lawrence.) Part of the plan for the region is increased tourism, though it's hard to imagine wanting to vacation next to humming transfer stations or all-night harvesting operations. The campground where I stayed this summer was an embodiment of this tension between tourism and industry, as campers sought to enjoy the north woods while right next door helicopters transported racks of mineral cores to a large staging yard.

Down at ground level, the larch in the bogs have gone from green to gold to bare. The geese have flown south. The Cree hunters have opened their winter camps – strung fish nets under the ice, set traps for thick-furred fox and marten, begun the long process of tanning moose hides from the fall's hunt. The loggers have begun constructing their winter roads and hauling logs that were cut and stacked this summer. The caribou have moved to their winter grounds, wolves in tow.

Everywhere you look there's a balancing act, though blink your eyes and the balance point shifts. I don't know if the rabbits will thin the newly planted jack pines from under the snow – the logging companies that planted them think and hope they will, but the Cree say that the rabbits don't like their taste. I don't know if they'll make progress in the next round of forestry consultations, or if a strike by Waswanipi's tallymen will spread to other communities and stop the whole process. I don't know where the fulcrum point of this balance is. I'm not sure anybody does.

What I can predict is that come spring, the ice will go out, the sphagnum moss will reemerge in the forest, and natural and man-made disturbances and dynamics will continue to juxtapose in James Bay, revealingly, sometimes alarmingly. At least for now, that tension is as much a part of this region as the black spruce forest it's all based on.

Naomi Heindel, a Vermonter and environmental educator, is currently a Masters of Environmental Science student at the Yale School of Forestry and Environmental Studies. She is grateful to the Carpenter-Sperry and Williams Family funds for making her trip to James Bay possible. Northern Woodlands is grateful to our Research and Development Fund for supporting the research and development of this story.



SUSAN C. MORSE

Caribou cow and calf on frozen lake.



NAOMI HEINDEL

Wapachee family camp, Chibougamau.



NAOMI HEINDEL

Elders' tent, Waswanipi summer gathering.

Story by Virginia Barlow

Illustrations by Adelaide Tyrol

Northern White Cedar, *Thuja occidentalis*

Slow growing, and never a giant of a tree, white cedar is one of those species that, in nature, is relegated to the most miserably inhospitable places: cold swamps, for instance, and the faces of steep cliffs. In both habitats it will only succeed in neutral or alkaline situations. I was going to say “alkaline soils” – but soil is more or less absent on the face of a cliff, where the tree’s roots weave their way into crevices to extract what water and nutrients they can.

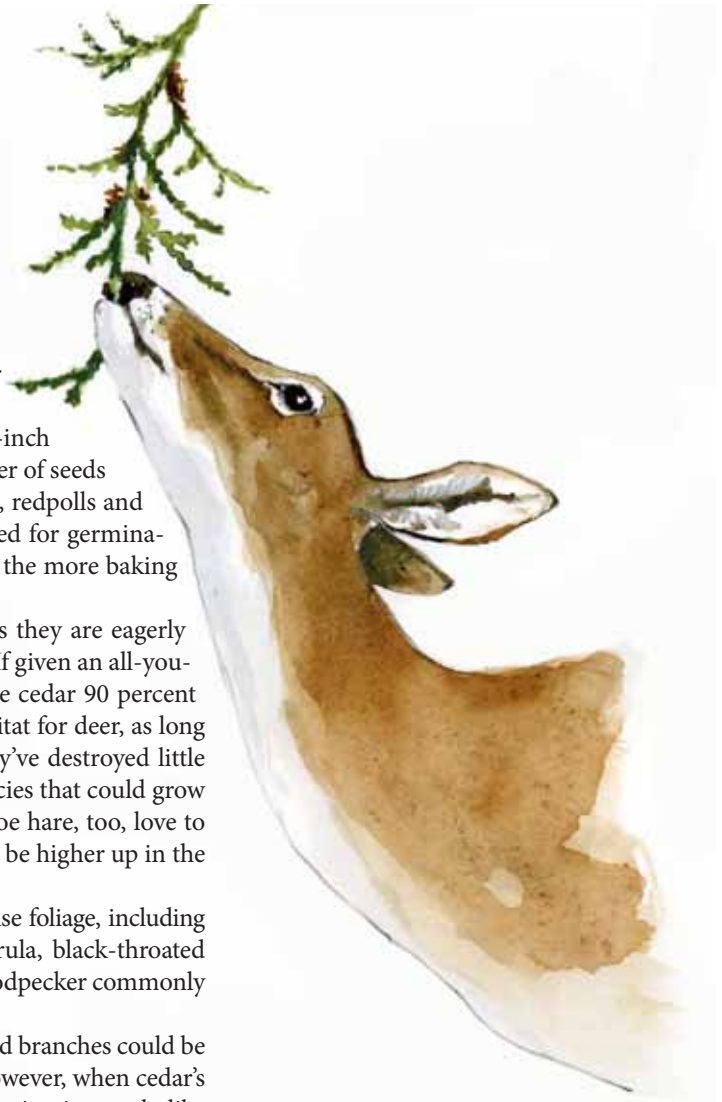
It’s surprising enough that a tree can survive at all on the face of a cliff, but it’s here that some truly ancient cedars cling to life, as well as to the rocks. In the late 1980s, Peter Kelley, a Canadian in search of a research project, rappelled down the face of the Niagara Escarpment and put an increment borer into some wimpy looking, gnarly, nearly upside down, half dead specimens and, with help from an expert and a microscope, found that some of these trees were over 1,000 years old: two and a half times the age of the previous record holder. Normally, life expectancy for a cedar is about 250 years.

With his colleague, Douglas Larsen, Kelley later found a dead tree that had been 1,653 years old when it died about 900 years earlier. Then, confirming cedar’s decay resistance in spades, at the base of a talus slope they discovered sound wood from a cedar that had died 3,550 years ago. They’ve also pulled up submerged cedar wood from the bottom of Georgian Bay that was over 8,500 years old. It was still in good condition.

The Niagara Escarpment stretches for 450 or so miles, from near Niagara Falls almost to Chicago, and is made of dead marine invertebrates and sediments deposited 400 million years ago when the land was covered by an inland sea. Cedar is among the many species that were pushed south by glacial advance. About 13,000 years ago, when the Wisconsin Glacier retreated, white cedar recolonized the escarpment. Now 10 living cedars over 1,000 years old have been documented growing in this vertical forest, but they are not large trees at all: the oldest is just over 27 inches in diameter and the longest less than 35 feet. You can’t really say “high” or “tall”, because ice, wind, falling rocks, and gravity have bent these ancient trees every direction but up. The trees they measured and dated showed that white cedar has an affinity for cold; their eon-spanning subjects grew faster during colder periods, contrary to the pattern of most other trees.

Although most stands of pure cedar are found on cliffs or in swamps, the tree is much happier in drier places – but, alas, that’s where a number of other trees are more likely to beat it out. When not in swamps or on cliffs, cedar grows more like a normal tree, though the tapering trunks look strangely large at the base and the crowns are so dense they appear to have been pruned. Many stems are divided or twisted and the lower branches often droop to the ground, sometimes rooting from the tips to form new trees. This ability to grow from branch tips is very useful for cedars that grow in wet places. There, roots are shallow and when trees tip over, as they often do, new trees





can spring up from the old. This strategy, called layering, accounts for more than half the stems in many cedar swamps.

Cedar trees flower early in May, and by autumn most of the half-inch seed cones have ripened and released their seeds, though a light shower of seeds may continue through the winter. Red squirrels and many songbirds, redpolls and pine siskins among them, eat the seeds. Paradoxically, heat is required for germination and though some seeds sprout in May or June, others wait until the more baking heat of summer.

A light cover of slash is helpful to the slow-growing seedlings, as they are eagerly sought out by snowshoe hare, red-backed voles, and, especially, deer. If given an all-you-can-eat buffet of 20 of their preferred browse species, deer will make cedar 90 percent of their diet. The dense crowns of cedars make superb wintering habitat for deer, as long as they aren't in swamps. I get annoyed by deer when I see that they've destroyed little hemlocks and cedars in infancy – their favorite foods are the two species that could grow up to provide them with the best winter blankets to be had. Snowshoe hare, too, love to eat little cedars or the drooping branches. Porcupine damage tends to be higher up in the tree, but it can be significant.

In summer, many birds are commonly found nesting in cedar's dense foliage, including white-throated sparrows, kinglets, and many warblers: northern parula, black-throated green, blackburnian, black-and-white, and magnolia. The pileated woodpecker commonly excavates cavities in mature white cedars to feed on carpenter ants.

Insects are not usually a serious problem for cedar, but brown-tipped branches could be the result of feeding by the arborvitae leaf miner. Don't be alarmed, however, when cedar's older branchlets turn reddish brown in autumn. Instead of shedding its tiny, scale-like leaves singly, it sheds them by the branchlet. (This is called cladoptosis.)

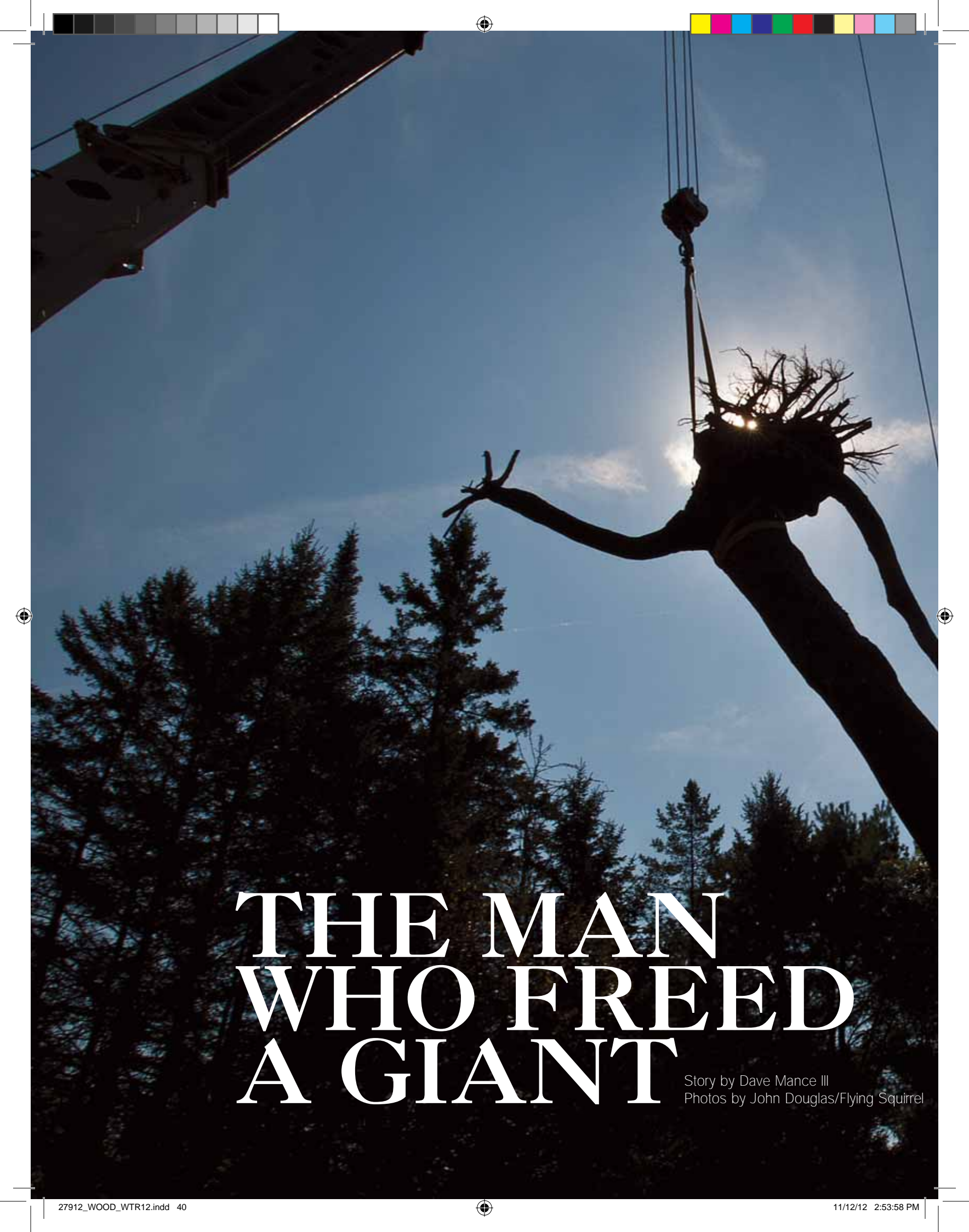
At 19 pounds per cubic foot, the wood of northern white cedar is the lightest of all northeastern woods, a virtue second to none when choosing material for a canoe. The lightweight, sturdy, and beautiful cedar canoe, with frames and ribs of cedar and sheathed with bark, was the perfect craft for Native Americans throughout the Northeast: light enough to carry and able to withstand abrasion. And, on land, the huge longhouses of the Iroquois were made almost entirely out of cedar.

For early settlers, the wood's resistance to decay quickly made it the tree of choice for making split rail fences. At 150 years old, some fences are still keeping livestock on the right side. It works well for planking small boats and for shingles and posts, and before pressure treating came along, it was widely used for railroad ties and telephone poles. It is ideal for outdoor furniture because, in addition to being rot-resistant, it absorbs and loses moisture at a moderate rate, which reduces its tendency to check. Resin glands in the leaves produce a pleasant aroma, which is also noticeable in the wood.

Some believe that the often-used name "arborvitae" was bestowed in 1536 when Iroquoians showed the scurvy-ridden men of Jacques Cartier's second Canadian expedition how to cure their ills with white cedar sap, which we now know to contain vitamin C. Cartier was so impressed by its curative power that he took cedars to France, where they were planted in the royal garden at Fontainebleau.

The trees, or their offspring, still mark many old cemeteries, where cedar was often planted as a symbol of eternity. For many native North Americans, cedar was the great medicine tree and its bark, sap, and leaves were used to treat dozens of ailments. Following instructions, I recently put some fragrant cedar shavings in the bottom of our wood duck box. Perhaps I should have saved some shavings to put in my wallet, as folklore holds that cedar shavings attract money.





THE MAN WHO FREED A GIANT

Story by Dave Mance III
Photos by John Douglas/Flying Squirrel



I HEARD ABOUT JOE WHEELWRIGHT BEFORE I KNEW HIM

– that’s the natural order of things in a small town.

“There’s this guy out in East Corinth who turns trees into men.”

“Carves them?”

“No. Plucks a bifurcated tree out of the ground. Flips it over. Turns the roots into wild, Medusa hair. Turns a split trunk into a pair of giant legs. Builds a giant head. Stands the whole thing up.”

“How big a tree?”

“Full size.”

“A full-grown tree?”

“Yeah.”

“How does he get it out of the ground in one piece?”

“I have no idea.”

When I called Wheelwright and told him I wanted to meet him and see some of his work, he told me I was in luck. He was about to start on *The Giant* – the biggest sculpture he’d ever done. It was going to be 40 feet tall and weigh around 8,000 pounds. It was going to touch the sky.



I met Joe over at his studio, a whimsical hilltop retreat. There’s a glade full of one-room cabins and a big workspace with a rock tumbler and a foundry and a custom-built 40-foot double-rig overhead bridge crane – like the kind they use to pull boats out of the water. There’s an uncovered clawfoot bathtub heated by a copper waterline strung through an antique chunk stove. A faucet coming out of a tree trunk, soap resting on a bronzed shelf-fungus. Walk through the woods and 30 years worth of tree men – action figure to totem-pole sized – stare up or down at you. Some are unnerving, some beautiful, all playful. Wheelwright creates serious work that doesn’t take itself too seriously. (One sculpture is veridically entitled *Walking Stick with Dick*.)

Joe gives the tour in a smooth, musical voice. He’s in his mid-sixties and tall and thin like the figures he creates, but fluid, with an animal’s grace of movement. As he speaks, he orchestrates with his hands and his shoulders. He’s been working with trees – which he calls “excited, and jumpy; all body” – and stone – “brainy, solemn, patient” – since his early twenties.

Business hasn’t been so good since the recession began, but he told me that instead of shrinking he was going all in with this latest piece, an epic sculpture that he hoped would be impossible for the art world to ignore. He’d front the production cost, and then someone would fall in love with *The Giant*, would buy him, would pay for him to be cast in bronze.



The Giant lived in a patch of ugly pasture pine a mile or so from the studio. To me he looked like a big weevil-damaged pine. To Wheelwright, he looked like a giant with his head and arms stuck in the earth. The first step was to hire an intern to dig out the roots. A young art student showed up in skinny jeans and flip flops. Wheelwright handed him a shovel. The kid lasted a couple days and never came back. Joe and friend Doug Perkins finished the job.

Now we were looking up at *The Giant* with Ron Rich and Josh LeBlanc, who were there to top the tree. “See the knee; the hip,” said Wheelwright, pointing up into the tree’s crown. “See how the legs end around that split?” Ron, an arborist who spends his days clearing power lines for a local utility, saw it. He’d topped trees for Joe before.

Ron scampered up the pine like a squirrel. Soon waist-thick limbs were raining to earth. The stem trembled with the vibrations, charges of animation coursing through the wood. The first stirrings of life.





The tree stood all that winter and all the next spring. In July, Scott Fisk, a logger from Bradford, came down with a log truck, a feller-buncher, and a two-man crew. They hooked onto the tree, its roots exposed, and pulled it to earth, setting The Giant free.

Once on the ground, Wheelwright and fellow artist Isaac Bingham went right to work. They trimmed the roots and collected bark that came off in the fall. Joe was still trying to figure out who The Giant was while he worked. The pose he'd strike. The expression he'd wear.

"Is it a man or a woman?"

"It's a man – look at the hips."

This whole idea that you can tell the gender of an upside-down tree may sound crazy, I know. But spend any amount of time with Wheelwright and you see that he really means it. And walk in the woods with him and you'll start to see things like he does, too. Faces in stones. Tiny figures in white spruce brooms. Curves and phalluses and rib bones and noses.

"When we were digging, some of the roots had thumbs and five little fingers."

This line of thinking works the other way, too. Look at the stretch marks on your lover's hips tonight and compare them to the ray cell patterns in quarter-sawn oak. Look at the palms of your own hands and see that, like wood, your skin has grain.



Using a feller-buncher and the loader on a log truck, the men lifted the giant onto a flatbed and drove it to the studio. The work began in earnest now.

"Creativity, art, it's all about creating a problem and coming up with a solution," said Isaac. "An artist's job is to push the boundary between what's possible and what's not." How to turn a tree into a man? To accentuate the knees they added shims, then reupholstered the bark skin. Joe carved a head out of three-inch laminated planks. The tree had lost about one third of its bark in the year since it was topped, so they found new bark and painstakingly glued and screwed it back into place using thousands of sheetrock screws and about 100 pounds of PC7 epoxy. Four straight months of work. "It's the only time I've spent an entire season working exclusively on one piece," said Wheelwright.

When the head and arms were affixed to the body they seemed practically seamless. Visitors would stare at the prone tree man, ponder for a moment, and then say: where'd you find a tree that grew like that?

From left: Josh LeBlanc, Ron Rich, Joe Wheelwright with topped tree.





The big day broke misty. Late September – the cold, heavy air in the valleys burning off to reveal a gloriously high sky. Wheelwright and Bingham had been at it since first light, preparing The Giant for takeoff. Rick Hutchins was there with a 167-foot crane. Ned Ordway came from Capitol Steel with a 6-by-6-by-½-inch steel plate with which to affix the monster to a four-foot-deep concrete slab. Neighbor Wayne Irwin. Doug Perkins. Wheelwright’s wife Susan. Photographer John Douglas and his wife Joan Waltermire.

“Get a few more people and we’ll be able to just pick it up,” Irwin deadpanned.

The idea was to lift it with the studio crane around the waist, then pull upward with the 167-foot crane attached around the armpits. The head was blocked and braced and strapped. Then the strapping undone and reconfigured, two, three, four times. “Everybody’s nervous,” said Isaac. “We don’t have the courage to start.”

Finally, they went for broke. Ned on the studio crane controls, Hutch in the big one, and Wheelwright giving crane signals. The cranes tugged slightly – the sound of an enormous fishing reel – and pulled the figure clear. Then they unhooked the bridge crane and gave Hutch the green light.

“Whoa,” said Wheelwright as the crane lifted his creation, like a little boy would say “whoa” when gazing up in awe at a roller coaster or a hot air balloon – that sense of wonder. The Giant came to life and stared down at us all – Hutch a puppeteer manipulating an 8,000-pound marionette. As it swung across the yard, The Giant momentarily blotted out the sun. It came to rest on the steel plate, where Lilliput Ned set to work on Gulliver’s feet.

Soon it was late afternoon and everyone was tired. The manlift they’d rented wasn’t working right, so Isaac ascended The Giant on an aluminum ladder. Up his tree trunk legs. Over a waist so big you couldn’t put your arms around it. He reached out and unhooked the crane’s skyhook and The Giant stood. Back on the ground there were high-fives and cheers. Isaac descended to get a screw gun, then climbed again to clear the blocking for photographs. They were going to run guidewires as an added measure of stability – they even had the eyebolts set – but it was late and they were anxious to be done and they didn’t. Isaac at the top of the ladder now – 40 feet high – feeling something subtle give. There was an electric silence – this pregnant moment where the whole glen seemed to catch its breath.

“Joe,” Isaac called down. “It’s moving.”

From the top: Isaac Bingham and Pete Chaloux prepping for transport. Scott Fisk, Pete Chaloux, Jeremy Flye loading The Giant. Joe Wheelwright and Isaac Bingham trimming roots.





Wheelwright
at work.





Wheelwright, Rick
Hutchins, the rising.

Isaac bolted down the ladder and instinctively leapt at around 25 feet. The fall ripped the soles off his logging boots, broke his left arm in two places and three bones in the left side of his face. Looking back, he feels lucky it wasn't worse. The Giant returned to earth with a sickening thud and died. The left side of his skull cracked irreparably. His left arm shattered.

Looking at where the wood failed, it seemed clear that the piece was never meant to stand in this fashion. But none of us saw this – at least I didn't. I couldn't see beyond Joe's moxie. How do you put bark back on a log? How do you make an 8,000-pound giant fly? But Joe did, and did. If he told me The Giant was going to walk, my first thought would not have been, "Oh, that's impossible." It would have been, "Oh, how cool."



A few weeks after the tragedy I asked Wheelwright to reflect. He was still a little shell-shocked, his answers practical. "Assume nothing," he said. "Don't work late in the day. Appreciate the process, not the result."

Isaac had a more philosophical bent. "Lots of people have big ideas but they don't take the risk to make them real," he said. "In my mind, this was all worth it. I have no regrets."

Just before Isaac fell, when it was high-fives all around, Hutch came out of his crane cab, gave me his business card, asked me to send him this article. "I collect things like this," he said, "so when I get old and can't get around anymore, I can look back on all the crazy things I used to do." And while it's probably too soon for Wheelwright to appreciate it, the fact is that stories passed around a small town have a way of looming larger than even an 8,000-pound sculpture in the end. I'm smiling as I write this, picturing Hutch telling his grandkids that he was once a puppeteer; Isaac sitting around a table sharing a scar story that'll beat just about any story out there.

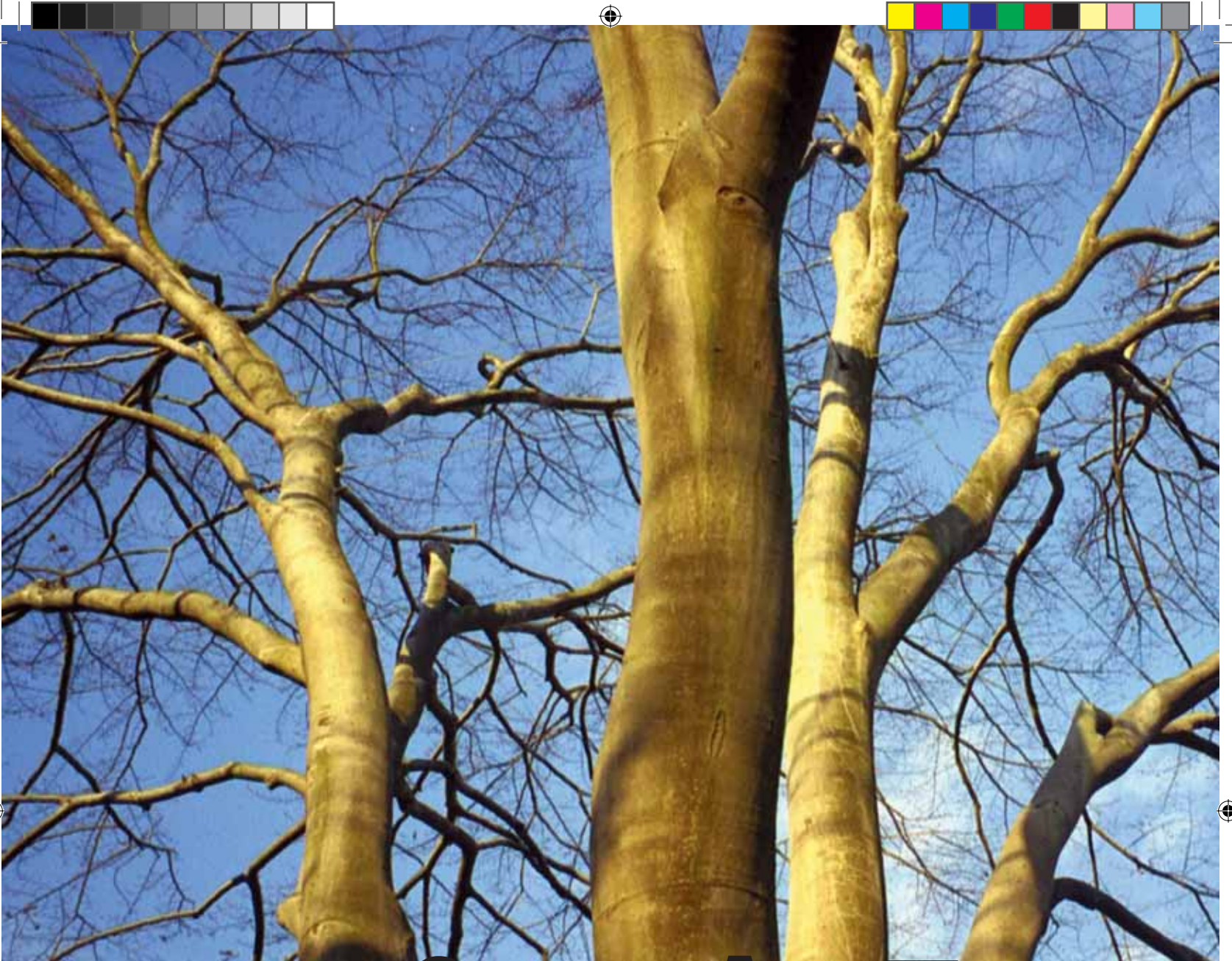
There once was a man who found a giant trapped upside down in a white pine. He ran to town and got help, called in artists and arborists and loggers and steel workers, and together they plucked the giant from the earth and freed him from the tree. The man strengthened his legs. Repaired his wounds. Built him a crown. It took a year-and-a-half, but he stood. For one hour he was king of all the North Woods.

Dave Mance III is the editor of Northern Woodlands.

To see many more photos of The Giant, go to www.northernwoodlands.org

The fall.





BEECH PARTY

How to Promote Beech (yes, promote) on your Woodlot

By Patrick Hackley

Ask a group of foresters, tree farmers, or loggers how to promote American beech, and there will likely be a pause, a few grins, perhaps a chuckle or two, and then, the faint sound of crickets. That was pretty much the response when I posed the question last fall at a workshop sponsored by the New Hampshire Timberland Owners Association, the University of New Hampshire Cooperative Extension, and Proctor Academy in Andover, New Hampshire. While the workshop was billed as an ecumenical overview of managing beech – both for and against – the presentations, field visits, and related discussions were decidedly focused on eliminating (or at least minimizing)

this pesky species. Nearly an hour-and-a-half was devoted to mechanical methods of beech removal and an in-depth discussion of several herbicides, including a demonstration of a backpack mounted power mist sprayer that can effectively rid the forest of any interlopers that might overshadow white pine seedlings. Finally, toward the end of the workshop, our host Dave Pilla, Woodland Manager for Proctor Academy, noted the wildlife values of beech, followed by UNH Extension Forester Tim Fleury's reference to silvicultural treatments that can promote beech. Alas, that discussion was relatively brief.

This collective response reveals a long-established prejudice



MELISSA CLARK

against beech, which arose primarily for two reasons: First, due to its tendency to check and warp and its susceptibility to beech bark disease, beech lumber commands a much lower price than its more favored hardwood brethren: sugar maple, white ash, and red oak. Secondly, beech is a fierce competitor wherever it occurs and has been the bane of many well-meaning foresters and landowners striving to manage for more commercially valuable species.

Nevertheless, this tenacious, native species is an important part of our New England forests and there are good reasons to appreciate and, yes, even promote, the presence of beech. As any wildlife biologist will tell you, beech nuts are something of a super food. Beech mast provides a considerable food source to a variety of animal species, most notably the black bear, but also white-tailed deer, marten, fisher, wild turkey, ruffed grouse, and many small mammals. Beech nuts have nearly the same protein content as corn and five times the fat. Compared to white oak acorns, beech nuts have nearly twice the crude protein and twice the fat. In addition to the wildlife benefits, sustaining beech in our northern forest maintains diversity, provides lower-valued hardwood for products such as tie logs and grade stakes, and,

carefully kiln-dried, offers an affordable alternative to hard maple for cabinetry, flooring, and furniture.

And so, landowners and foresters find themselves in a sometimes paradoxical situation. On one hand, diseased beech is often the bully on the block – outcompeting valuable hardwood species and altering forest composition in negative ways. (This negativity is not just anthropomorphic: when a maple stand becomes a beech stand, the reverberations echo through the entire ecosystem.) At the same time, the beech mast in many stands is declining – to the detriment of the animals that depend on the nuts. Reflecting the prevailing sentiment at the NHTOA workshop, a quick Google search reveals a wealth of clinical information on controlling beech. But promoting it? Here, the literature gets thin.

Hex on the beech

Before we explore the latest thinking on beech management, it's important to know more about this species' growth characteristics and its march through history, from keystone species to pariah.

There was a time when beech ruled the northern forest. "There's been a monumental shift in the amount of beech from pre-settlement days, when there was a huge amount of beech everywhere," said Charlie Cogbill, a plant ecologist with Hubbard Brook Experimental Forest. "In northern New England, it was 40 percent of the original forest throughout almost the entire area. Today, according to FIA data (Forest Inventory and Analysis, done by the USDA Forest Service), it's more like 15 percent."

According to Cogbill, beech was in decline throughout the region well before the notorious beech bark disease showed up in the late nineteenth century. The disease is actually a one-two punch: an insect attack pierces the tree's thin bark and is followed by a fungal infection that eventually kills the tree. The offending insect is a soft-bodied scale that was accidentally introduced to Nova Scotia in 1890. The primary fungus is another European import, *Neonectria faginata*, but there's also a native species (*Neonectria ditissima*) that's causing damage in some areas.

Since the early twentieth century, the scale-Nectria complex has spread throughout the region, making it difficult to find a disease-free stand of beech today. Researchers estimate that between 1960 and 1980, Vermont lost 30 percent of its beech to the disease. Maine and New Hampshire, being closer to the outbreak in the Canadian Maritimes, were infected a decade or so earlier with similarly devastating results. In one nonmanaged stand in the Adirondacks, mast production declined by 37 percent between 1948 and 1992.

But unlike the American chestnut – a formerly abundant species that was nearly eliminated by an imported disease over 100 years ago – there's still beech everywhere. The tree's range stretches from Cape Breton Island, Nova Scotia, west to New England, southern Quebec and Ontario, down through the Midwest, all the way to northern Florida. Its favorite soil types are the gray-brown podzolic and granitic soils abundant





throughout New England and upper New York State, though the research is replete with reports of beech's ability to adapt to varying soil types, elevations, temperatures, and growing seasons. Create a small opening (less than half an acre) in a northern hardwood or oak/pine forest where beech is present in the overstory and, inevitably, beech will make itself known within the first growing season. How well known depends on a host of factors but, rest assured, beech will likely be competing for soil nutrients, moisture, and sunlight with more favored species.

"Beech is a phenomenal species whose reproductive ability allows it to persist in the face of a complex pathogen," explained Dr. David Houston, a former USDA Forest Service ecologist and plant pathologist known for his decades of research on beech bark disease. "In many cases, we have more stems of beech per acre today than we did prior to the heavy high-grading of the past several decades." Such harvesting practices focus on the more commercially valuable hardwoods and "trigger the root systems of the remaining beech, causing beech thickets to fill in the gaps," he said. Houston's impression is that while beech numbers are not in decline, the quality is, due in part to practices that promote disease-susceptible reproduction.

Managing as if beech mattered

In light of this, those looking to benefit wildlife by encouraging beech might be better off looking at the task as managing against the Nectria complex. In one 50-year study conducted at the US Forest Service's Bartlett Experimental Forest, Bill Leak achieved notable success in significantly reducing "and nearly eliminating" beech bark disease in some stands by favoring trees that show signs of resistance or tolerance and culling those that don't, a well-known silvicultural practice known as individual

tree selection, or crop tree selection. [Editor's note: See "How to Help your Best Trees Grow," Spring 2012, to learn more.]

Selection is the operative word here, as it's important not to over-cull a stand in an attempt to reestablish it. A key to judiciously applying the selection method to beech stands or individual beech trees in a mixed-wood stand is to recognize the difference between tolerant and resistant trees. Resistant trees are the big (over 10-inch DBH), beautiful specimens that show no signs of beech bark disease; such trees are immune to the scale attack, the vector necessary to introduce the Nectria fungi. Tolerants, on the other hand, are infected but still productive and can often live for many years with sublethal Nectria infections.

Although battle-weary tolerant trees may look unhealthy, it may not be necessary to remove them from the stand. One study showed that beechnut production dropped significantly only after an infected tree lost more than 25 percent of its crown. Another found a consistent, two-year masting cycle in a stand that had been infected for 40 years; in fact, in the eight-year study period, beechnut production actually increased. A third study found no significant relationship between bear feeding activity (freshly clawed and unclawed trees) and the severity of Nectria fungus and beech scale, suggesting that bears do not have a strong preference for climbing healthier trees. These studies show that infected beech stands can be productive, and that wholesale removal of diseased trees may be unwarranted.

In 2011, Paul Hamelin, a certified wildlife biologist with the Vermont Agency of Natural Resources, brought together a host of natural resource professionals, including Houston, to craft a set of silvicultural guidelines for beech. The goal was to promote better timber quality (for all tree species), to improve beech mast production, and to genetically select for resistance to beech bark disease.

This report suggests establishing a 200-foot wide, uneven-aged buffer around the area in which you want to encourage

From left: Aggressive beech regeneration; these nice looking beech crop trees stand out in an otherwise ugly beech stand. They show minor symptoms of beech bark disease, but their good form suggests that they're tolerant. Opposite page: Bear claw marks.



PATRICK HADKLEY





beech. This maintains shade to prevent winter injury on the thin-skinned beech trees. Then, identify resistant trees, the tolerant trees that are good mast producers, and the ones you're not quite sure of, and denote them as crop trees. As you're identifying crop trees, look for the telltale claw marks of black bears, as heavy nut-producing trees become favorites of certain bears and exhibit multigenerational scars from repeated use. These same trees can become host to "nests" created by bears climbing high into the crown, breaking off limbs, pulling them inward, and lodging them in the crotch of branches.

Once your crop trees are established, release them on three sides, keeping guard trees on the south side to minimize sunscald. Do your work in winter to minimize injury to roots and boles. (Wounds may provide sites for scale colonization.) Revisit the stand every 10 to 15 years to update your crop tree designations. This summary is simplified, but the complete set of guidelines is available on the Vermont Fish and Wildlife Department's website: vtfishandwildlife.com

If you're new to culling beech, beware: beech is well-known for root suckering – a highly successful vegetative reproduction method that has helped to give the species its bad reputation. Beech has an extensive root system with many roots in the top three to five inches of soil. Wounding or significant changes in light or temperature cause the roots to stimulate suckers (buds) that emerge as independent stems. Logging activity around the base of beech trees has been known to cause this. Research suggests that because of beech's shade tolerance, root suckers that emerge in early spring are more likely to survive and persist in the understory. Winter logging minimizes the degree of sprouting the following spring. Whether diseased trees send out more suckers than healthy ones as a stress response remains a challenging question. According to Houston, "Trees vary in their propensity to sprout" and the particular cause of sprouting is not always easy to determine.

The root suckers of infected beech have the same genes as their parents and will allow the disease to persist, while simul-

taneously crowding out the establishment of possibly healthy beech trees from seeds. To combat this, some private forestry consultants have resorted to selective herbicide application or a controlled burn to eliminate the disease-susceptible suckers and restart the beech stand with beechnuts falling from the healthy overstory. Mechanical treatment can also be effective, depending on the size of the stand.

My forester colleagues and logger and tree farmer friends can be forgiven for taking my question about favoring beech less than seriously. We've all been trained to discriminate against the tree since the first time we picked up an axe, chainsaw, or herbicide sprayer. And yet, despite our war on this species and a disease that has ravaged its numbers, the American beech endures, proving that it intends to remain a part of our forests into the foreseeable future. To be sure, its reproductive capacity warrants control, but beech offers benefits worthy of deeper appreciation. Considering the decades of research and emerging literature, perhaps it's time to bury the hatchet, or at least use it more sparingly, in our dealings with this misunderstood species.

Forester, land broker, and writer, Patrick Hackley lives in Gilmanton, New Hampshire.



PATRICK HACKLEY



FIELD work

Story by Katie Koerten
Photos by Kelly S. Allen

At Work Climbing Trees with Melissa and Bear LeVangie

“Dead wood coming down.”

“All clear, Bear.”

“Thanks!”

THUD. A dead oak branch crashes to the ground after a brief but thorough exchange between two arborists. One is wielding a hand saw in the canopy of the huge oak, the other is keeping an eye on the canopy from the ground and removing the fallen branches. The arborists are Bear and Melissa LeVangie, twin sisters from Barre, Massachusetts, and this back-and-forth communication is more than sisterly banter; it's how they work as a team.

“Not all companies work this way,” Melissa said. But the LeVangies, 41, know there's a lot of risk in their profession, and for them, safety is number one. Constant communication is one way they minimize accidents.

Each day, the sisters climb trees with other arborists in search of the Asian long-horned beetle (ALB), an invasive insect that has destroyed countless trees in the Worcester, Massachusetts, area. They work for the Animal and Plant Health Inspection Service (APHIS), a division of the United States Department of Agriculture, to try to control the pest. On any given weekday, they climb anywhere from two to thirty trees in the backyards and woodlots of Worcester County, scouring all branches that are wrist-thick and above.

More often than they spot the beetle itself, they will find signs of its presence in the tree. Perfectly round, dime-sized holes indicate the places where the adult beetle has chewed its way out of the wood. Another sign is the thumbnail-sized scrape where the female beetle has deposited her eggs. When the sisters discover these tiny pieces of evidence, steps can be taken to isolate the beetle and keep it from spreading to other trees.

“ALB is a huge landscape changer for us,” Bear said. “I felt like it was my ethical duty to be there. Moreover, I wanted to be a leader on it.”

But climbing trees is more than just a day job for Melissa and Bear. The sisters also climb competitively, participating in tree climbing competitions locally and worldwide, often earning titles.

Competitions are hosted by local chapters of the International Society of Arboricultural (ISA) and regional arborist associations throughout the United States and the world. All climbing competitions consist of the same five events: aerial rescue, work climb, belayed speed climb, throwline, and secured footlock. All the events are timed and worth different numbers of points.



Bear LeVangie works on a tree.

In aerial rescue, the climber is timed in a simulated emergency situation in which they retrieve a 120- to 180-pound dummy from the branches of the tree. In work climb, there are a series of bells placed in a tree's branches that a climber must ring by hand. The belayed speed climb is a set course through the tree; the climber ascends via the ropes and branches as quickly as possible and rings a bell about 60 feet up. In throwline, the climber has six minutes to throw a weighted bean bag with a line attached into targeted spots among the branches and then set up their climbing line. Secured footlock resembles your elementary school gym class rope climb, only with a thinner rope; the climber ascends as quickly as possible by “locking” the rope around her feet and hoisting her body up until she reaches a dangling flag. The top finishers in these categories then compete in a Master's Challenge for the win.

While competitions have men's and women's divisions, the LeVangies have often found themselves competing against men because not enough women have shown up to constitute a division. This hasn't stopped them from earning titles, however. In the May 2012 New England competition, Bear outcompeted all the men in the aerial rescue event and is currently ranked third in the world for the event. Melissa is a six-time New England champion, and has won the Connecticut competition four times.

In recent years, however, Melissa has moved from competition participant to volunteer organizer. Having been involved with

competitions since 2000, “my focus now is getting more people into it,” Melissa explained. She said it is tremendously satisfying to see the people she teaches now breaking the records she set.

The sisters’ roundabout paths to arboriculture began in childhood. Both were tomboys and athletes, always most happy outdoors. Both attended college on sports scholarships. While majoring in physical therapy, Melissa realized she was enjoying playing softball more than college itself, so she quit school. A

Tree-climbing twin sisters Bear (left) and Melissa LeVangie show Northern Woodlands writer Katie Koerten (center) the ropes.



Melissa LeVangie instructs writer Katie Koerten in tree climbing.

self-proclaimed motorhead, she started an auto reconditioning business, detailing and doing minor repairs. Eventually she reenrolled, this time at the University of Massachusetts, Amherst. During her fourth year in college, a friend turned her on to arboriculture. She began mentoring with arborists and attended the annual ISA conference in Baltimore. “It was life-changing for me,” she said, and she hasn’t looked back since. “The more I learned, the more I was hungry to learn.”

But as a woman applying for jobs in the male-dominated world of forestry, Melissa often met with resistance. Early on, she grew accustomed to the reaction, “Oh, you’re just a girl,” from potential employers. After some interviews, she never got a call back. Applying for a physical job, she learned she had to prove herself physically. “Just give me an hour,” I told them,” Melissa recalled. That was usually all it took to prove her skill and get hired for the job.

Meanwhile, Bear attended college on scholarship for javelin (she was top-ranked in the National Junior Olympics) and majored in sports biology. Before finishing her degree, she moved out West and worked seasonal jobs with the National Park Service. It was Melissa, an accomplished arborist by then, who introduced Bear to arboriculture. Bear moved back East, and they’ve been a team ever since.

“Working together was always our dream,” said Melissa. “We loved what we did, and we loved to do it together.” As sisters, the LeVangies have a healthy rivalry. “It’s automatically competitive because we’re twins. You can embrace it or reject it, and Bear and I embrace it.”

Now fully established experienced arborists, Melissa and Bear are doing more to spread the word about arboriculture as a career; getting others involved has become a priority. They are eager to share their skills with students in the field.

The sisters said they feel especially strongly about getting more women involved. They believe that when men and women arborists work together, a balance is created that you can’t get if one or the other is missing. “There are certain [tree] companies that have open arms,” Melissa explained. “People appreciate the harmony that comes about when both sexes contribute to the work. Not a lot of men in the industry get that, unfortunately. But it’s getting better.”

While women are reasonably well represented in New England ISA chapters and competitions, it is much rarer to see women participating in other chapters. The LeVangies hope to strengthen the cohort of women competitors. Each year they offer a Women’s Tree Climbing Workshop in Massachusetts, which has become increasingly popular. They’ve expanded it to two workshops: Level I for new climbers and Level II for women with some experience.

It is easy to see why their workshops fill so fast; their passion for what they do is contagious. “No matter where I am, trees speak to me,” said Melissa. “I can’t imagine not being an advocate for them. So many people only appreciate trees when they’re gone.”

Katie Koerten is a freelance writer and environmental educator at the Hitchcock Center for the Environment in Amherst, Massachusetts.



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By Todd McLeish

A Chemical Romance... Among Mosses

A common species of moss (*Ceratodon purpureus*) that lives in weedy and forested habitats has been found to use an unusual strategy to reproduce: it produces a chemical scent to recruit tiny arthropods like mites and springtails to transport sperm from male to female mosses. The process, somewhat like flowers being pollinated by bees, seems to work best in moist and rainy environments.

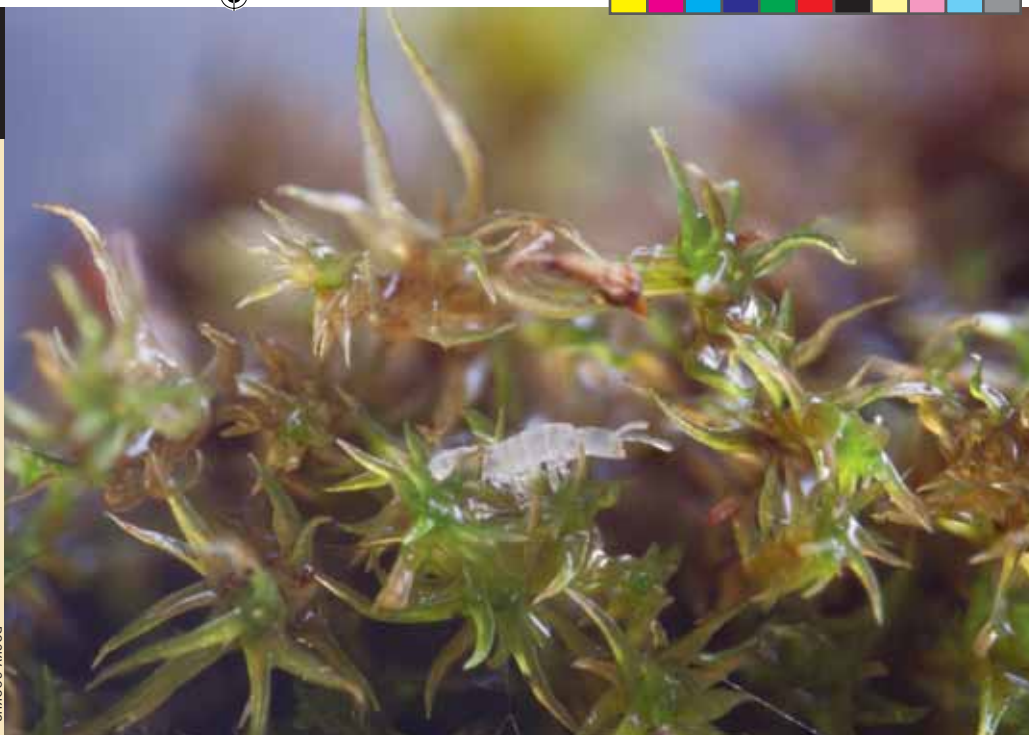
"Most mosses have plants of separate sexes, and it was assumed that the sperm would swim from male to female," explained Sarah Eppley, a researcher at Portland State University in Oregon and the lead author on a study published last summer in the journal *Nature*. "But because the plants can be meters away, we were pretty sure that they couldn't swim the whole way. Rainwater can probably wash it from one plant to another, but there must be some other mechanism because the sperm don't have the ability to swim very far."

In an initial laboratory study, Eppley found that sexual reproduction could occur by adding only rainwater to the moss or by adding only springtails, but fertilization occurred at twice the rate when both were added to the moss. "There appeared to be a synergistic effect," Eppley said. "Rainwater plus arthropods gives twice as much sexual reproduction."

The springtails, sometimes called snow fleas, live on the forest floor and consume rotting tree litter and fungi. Eppley said that in the Pacific Northwest, where her study was conducted, there are about 300,000 springtails per square meter of forest.

Using a highly sensitive olfactory meter, Eppley then found that the cue that was attracting the arthropods to the mosses was a chemical scent produced almost exclusively by female mosses. By placing male and female mosses in separate chambers in which the arthropods could smell but not see or touch them, the springtails were primarily attracted to the chambers holding female mosses.

"There is something about the females'



A springtail on moss.

scent that the springtails really like," Eppley said. "We believe that the sperm get released by the male and move all around the moss by swimming in the water film."

But how does that sperm make its way to female mosses?

"Our idea is that the arthropods dip their legs in the sperm and carry it with them, and the scent [of female mosses] draws them to those female reproductive structures."

What the springtails get from this relationship is uncertain. Perhaps there are sugars produced by the moss reproductive structures that it can feed upon. Or maybe the moss scent also recruits fungus that the springtails eat.

Eppley and her research team plan to continue this research to learn at what stage of development the mosses produce the scent and to examine other moss species to see how broadly this strategy is employed.

Acid Rain: Toil in the Soil

A new study led by a researcher at the U.S. Geological Survey suggests that there are early indications that soils are recovering – at least in red spruce forests – from the detrimental effects of acid rain, although not all the news is good.

Acid rain, the result of pollutants in the emissions from power plants and other industrial facilities, has been a cause for concern for the forests of the

Northeast for decades. Acidic deposition peaked in the 1970s, even before scientists recognized it was a problem. Little environmental data exist from the pre-acid-rain era against which to compare current conditions, making it difficult to determine whether the soils in the region have begun to recover.

"We've had 30 years of declining acidic deposition levels, but no one has been able to demonstrate that the soil has improved," said Gregory Lawrence, the USGS research hydrologist who led the study. "We've seen improvement in surface waters since the 1990s, though not as much as expected. But the limited soil data we have from resampling sites from the early 1980s indicated that soils weren't getting better and were in fact getting worse."

So Lawrence tested soil samples in six red spruce stands in New York, Vermont, New Hampshire, and Maine, and compared them to samples from the same stands collected in 1992 and 1993. His results were published this year in the *Soil Science Society of America Journal*.

According to Lawrence, the two important indicators of soil health as it relates to acid deposition are calcium and aluminum. Calcium is the primary element that buffers the soil against the effects of acidity. The more calcium the better, and results showed that calcium levels have not improved in either the mineral soil or the organic layer, although



calcium levels are no longer decreasing in the organic layer.

Naturally occurring aluminum in rocks is released by acid rain and converted to a toxic form in the soil, where it interferes with root function, and – when it leaches into water – can kill aquatic organisms.

The good news, he said, is that aluminum levels in the organic surface layer have declined 20 to 40 percent at all but one site. Unfortunately, he found no decline in aluminum in the mineral soil, and in some cases it may be increasing slightly.

“Vegetation processes seem to be taking control of things at the surface,” Lawrence explained. “Aluminum mobilization has decreased in the mineral soil as a result of lower acid rain levels, and this has led to decreased aluminum levels in the organic layer. But there just hasn’t been enough natural release of calcium from rocks to increase the availability of calcium in the soil.”

Lawrence focused on spruce forests because previous data were available from spruce stands for comparison. He speculates that stands of other tree species may not be faring as well.

“Some tree species with a high demand for calcium, like sugar maples, are still not doing well in some areas,” he said. “The soils under sugar maples are different – they don’t have as thick an organic layer – so they’ll be more dependent on the recovery of mineral soils.”



The soils of red spruce forests are recovering from acid rain damage.

Bears Bone Up on Leptin

Skeletal tissues of living animals are constantly being renewed and replaced as wear and tear creates stresses and microfractures. In order to know how much bone needs replacing, the skeleton must constantly know how much load it is bearing. If the skeleton detects that it has become “unloaded” due to hibernation or inactivity, it loses bone. This has happened to every animal that has been studied, with the most famous example occurring in astronauts, who lose bone while in space because they don’t need to support their weight in the gravity-free environment.

But a scientist at the University of Maine says that black bears don’t lose bone mass during hibernation, and she has identified a hormone that may help them avoid it.

“Small hibernators like bats and ground squirrels lose a profound amount of bone when they hibernate,” said Rita Seger, a medical doctor who studies bone pathology. “The physiology of small mammal hibernation is entirely different from bears, though. Small hibernators have brief periods of arousal during hibernation when they urinate and get rid of the calcium that builds up from their bone breaking down. Bears don’t urinate during hibernation, so if they were breaking down bone, their serum calcium would rise and wreak havoc physiologically.”

Seger hypothesized that bears either don’t break down bone during hibernation or they have a different mechanism for putting calcium back onto the skeleton. To find out, she collaborated with the Maine Department of Inland Fisheries and Wildlife, which has been monitoring bear populations in the state for 30 years. With their help, she collected data from active and hibernating female bears, including drawing blood and x-raying their paws to assess the thickness of the bones, a standard measure of bone density.

“We found that the bears were not experiencing unloading-induced bone loss,” Seger said. “It was as if the skeleton perceived it was loaded during hibernation when it wasn’t. Something was interrupting the signal telling them how much unloading was taking place.”



Rita Seger, a medical doctor and physiologist, holds a bear cub. Seger is studying the bone mass of hibernating bears.

That something, Seger hypothesizes, is the sympathetic nervous system, which is suppressed during hibernation and is influenced by leptin, a hormone that helps regulate body weight. The researchers found greater amounts of leptin in hibernating bears than in active bears. In hibernating bears, leptin correlated with blood tests that measured bone turnover, leading the researchers to believe that the hormone’s effect on the sympathetic nervous system may help to prevent bone loss.

“If the signal from the sympathetic nervous system is interrupted between the brain and the bone, then the skeleton may not know that it’s unloaded,” Seger said. “Bears are the first animal measured that doesn’t experience unloading-induced bone loss.”

That wasn’t the only surprise. The researchers also found a difference between young bears and older bears – not only were young bears not losing bone mass, they were gaining it. “I wasn’t expecting that,” said Seger. “I expected they all would have lost bone or not. That left us scratching our heads for a bit.”

One conclusion she drew was that the young bears – those not yet eight years old – were still growing, so even though they were hibernating, they were still adding bone to their growth plates.

Seger hopes that a greater understanding of the role of leptin and the sympathetic nervous system in bone biology can contribute to better treatments for skeleton-related diseases like osteoporosis.

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By Carl Demrow
Illustrations by Joseph Smith

Scribing a Saddle Notch

If you're considering building a log structure, you'll need to learn to scribe logs. In most cases, you'll be scribing for a saddle notch, used to join two logs perpendicularly, like at the corner of a cabin.

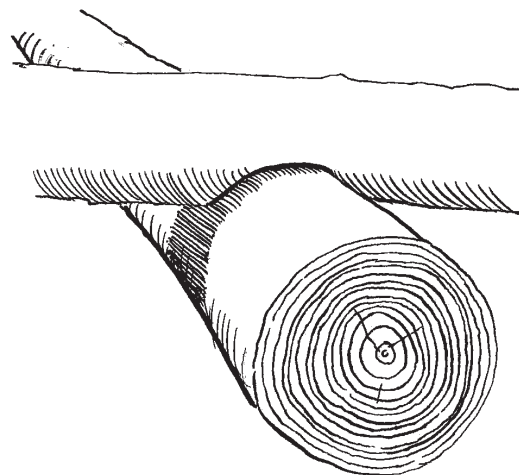
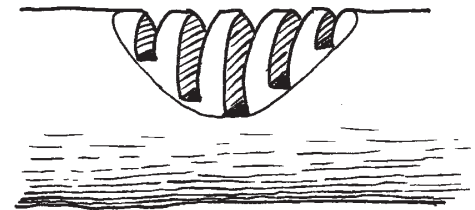
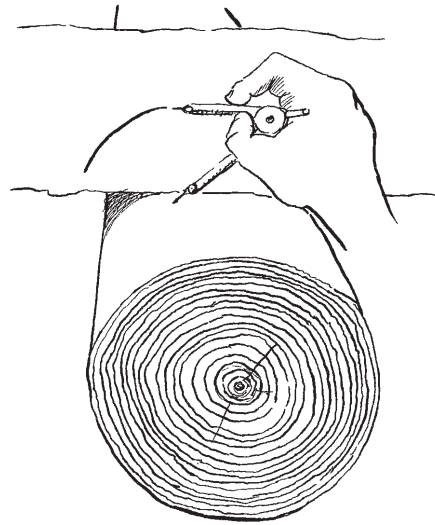
Fancy log scribes are available for \$100 and up. They have levels to make sure you keep them plumb in all directions. If you are going to build a log home, these would be a good investment, but if you are looking to build a rougher building, where the logs won't be prepped by sawing or hewing one or two faces flat, the expensive tools are overkill. Your not-really-straight and not-really-flat logs won't fit perfectly no matter how expensive your scribe is.

You can do your scribing with a carpenter's compass. It has all the requisite parts: namely, a point for tracing, a point for scribing, and an adjustable distance between the two so you can account for the desired depth of your cut, which is roughly half the diameter of the log you're notching. If you go any deeper than that, you'll have an unsightly gap at the top of the notch. Better to have the gaps between the logs and fill them with oakum or rope caulk.

Once you know the desired depth of the notch, set your compass at that distance. Place the log to be scribed exactly where you want it. If one end of the log will not be scribed, level it with blocks or shims to the height of your compass. Drive a Timberlock screw or two to keep the log in place as you scribe. Then, holding the compass as plumb as possible, follow the contours of the bottom log and scribe the top log, then go to the other side and repeat. Before you move the log, scribe the other end if you have another notch to cut there.

Once you've made all your scribing marks, unlock the log and flip it over. Carefully connect the scribe marks on each side so you know where to begin your cut. Then make vertical cuts with a chainsaw every half inch to the depth of the scribe marks and knock the wood out with a hammer. Clean the notch with a chisel or a chainsaw, flip it over again, and fit the log onto its new home.

Practice before you start with a real building – it takes a while to get the hang of scribing and cutting.





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By Robert Kimber

The Ice Cutter's Song

Until last winter, my only experience with an ice house was helping to empty it, not fill it. One of my summer chores at my father's sporting camp on Big Jim Pond was digging a couple of blocks out from their sawdust blanket in the camp ice house every few days to fill the ice compartment of the kitchen's big walk-in ice box. I was never there in the winter when Don Yeaton, the camp caretaker, would hire a friend to help him cut several hundred blocks and pack them away in the ice house.

But this past winter, I got a chance to catch up on what I had missed, all courtesy of our neighbor John – a man of many skills, whose first project on moving to Temple a few years ago was to build himself a compact, elegant house that he can heat with only two cords per year. Then, intent on meeting as many of his needs as possible with local resources that are carbon neutral and free for the taking, he decided to harvest ice, a reliable Maine crop that grows abundantly in Drury Pond, just a couple of hundred yards from John's dooryard.

So John kept an eye out at yard sales and antique shops for ice saws and tongs, and he built an ice house. It's much smaller than the one at Big Jim Pond because he doesn't need enough ice to cool a walk-in icebox. Then, too, his ice house is a lot tighter and better insulated, to boot.

Come a Friday night in late January, I get a call from my friend Chris. He and a few other neighbors will be helping John cut his ice, and would I care to join them? It's overcast and snowing lightly in the morning. By the time I get to the pond, Chris and John have cleared the snow off a patch of ice and scored a checkerboard of 12-by-16-inch rectangles onto it with a chainsaw. Chris has already started the first cut, wielding the long ice saw with a slightly circular motion, pushing almost straight down then pulling back at an angle, forward and down, back and up, over and over. Lean, young, and tough, Chris saws away, steady and tireless as a pump on an Oklahoma oil field.

I grab the other saw and start a fresh cut. Once we have two parallel cuts the length of our checkerboard, we stab down into the scored crosswise lines with ice chisels; the blocks break off as cleanly as window glass along a scored line. Yesterday's heavy snowfall is pressing down on the ice, and the instant Chris and John punch through it to clear away the first block, water gushes up around their feet. As we yank block after block up and out, we haul more water up, making our work site wetter by the minute. So along with the slipperiness of the ice comes the

lubrication of water on top of it, and yanking a 100-pound block of ice out of the water without getting yanked back in yourself is no mean feat. I sink the tongs into the block, give it a push downward to take advantage of its buoyancy as it bounces back up to the surface, then use that momentum to slide the block up and over the lip of the ice.

By now, Luke, Steve, and Joe have arrived, filling out our crew: one of us can keep on sawing and two can pull the loose blocks out and slide them over to the trailer where another two – each using shorter tongs – team up to hoist the blocks onto the trailer for John to shove into place. When the trailer is full, John runs the load up to his yard, where he and whoever has gone along for the ride skid the blocks into the ice house on a chute, pile them up, and fill the gaps with sawdust.

At noon, we head into the house for Karen's chicken soup, homemade bread, cookies, and beer. The crew's wives and kids are all invited, too, so a crop of footgear sprouts up inside the door, jackets pile up in the stairway, and we feast amidst the voices of young and old and everyone in between.

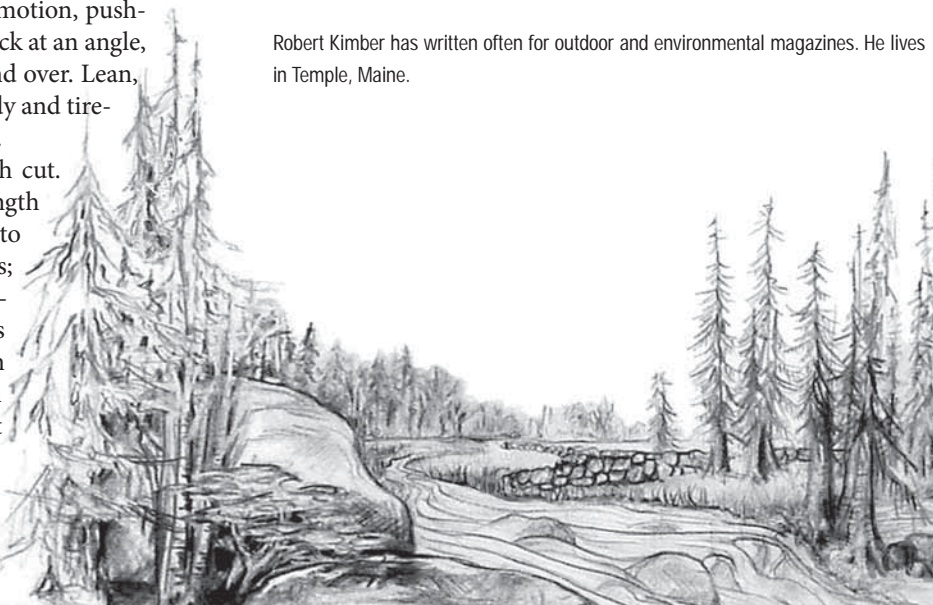
Before we head back out to cut the last load, John regales us with his Ice Cutters' Song.

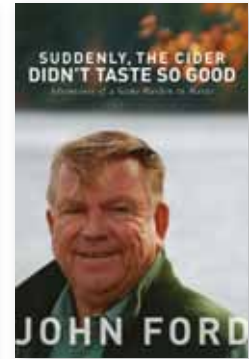
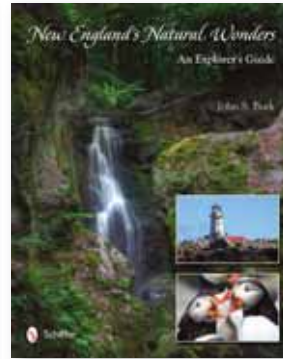
So pull on your wool socks and union suit
It's cold outside but we don't give a hoot.
Some people would say the weather ain't nice,
But we like it best 'cause we're gonna cut ice.

The harvest for the day? One-hundred and ten blocks of ice, 12-by-12-by-16 inches each, for a total of about five tons.

Lessons learned for the next ice cut: Wear knee-high rubber boots, maybe crampons, too.

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





America's Other Audubon

By Joy M. Kiser
Princeton Architectural Press, 2012

Genevieve Jones was ahead of her time. Born in 1847 in Circleville, Ohio, into a tight-knit and nurturing family, she grew up observing the natural world with her father, Nelson, and her brother, Howard. Homeschooled through high school and beyond, she excelled at science, math, languages, music, sewing, and art – seemingly everything she was exposed to. She never went to college, but Howard bought her duplicate copies of his college textbooks and she studied them at home, eventually surpassing her brother in chemistry, calculus, and classical poetry.

From an early age, Gennie identified gaps in the existing ornithological literature. Specifically, she saw no worthy counterpart to John James Audubon's iconic *Birds of America* (published in installments between 1826 and 1838) for nests and eggs. In her late twenties, she became despondent because of a forbidden marriage, and Nelson encouraged her to undertake a book of her own. He became her patron, organized the publishing and funding of the book, and even built an addition on their home so she and her collaborator, Eliza Shulze, could work. The plan was to issue the book in installments, and to cover all 130 of Ohio's nesting bird species, with nests and eggs in hand-painted lithographs.

Rutherford B. Hayes and Theodore Roosevelt were among the early subscribers to *Illustrations of the Nests and Eggs of Birds of Ohio*, whose first installment drew astonished praise. Yet after completing just five illustrations, Gennie contracted typhoid fever and died within three weeks. Her family took up the book, with her mother, Virginia, completing most of the remaining nests. Joy Kiser's book reproduces the 118 lithographs from the book in their original size: a luxurious 11-by-13-inch folio.

The illustrations are gorgeous. I love how bird nests draw order and beauty out of items that on their own seem disorganized and cast off: dead

grass, discarded bits of twine, mud, stray horse hairs. Gennie's and Eliza's lithographs beautifully capture the textural details of these materials and the nest structures, so that viewing the 16 nests they illustrated feels very much like encountering them in nature. Gennie placed an indigo bunting nest in an elderberry bush, painstakingly rendering not only split cornhusks and cobwebs, but also the thick-stemmed, large-leaved elderberry itself in its ungainly, insect-grazed glory.

It's fascinating to see Gennie's and Eliza's nests, imagining the two young women excited about the vast project ahead of them, and then transition to Virginia's work. Kiser notes that before Gennie's death, Virginia did not consider herself an artist and her previous work showed "a simplistic depiction of flowers and scenery that makes no attempt to convey the underlying structures and systems." Her nests are amazingly lovely, though unnecessarily ornate leaves and flowers in the early ones reflect her previous artistic outlet: painting china. Later, though, Virginia's illustrations develop the same bold, complex qualities as her daughter's, and it is virtually impossible to tell them apart.

I couldn't help but wonder how Gennie would have fared if she had gone to college. She would have matriculated around 1865, just after the Civil War, when very few women's colleges existed. Gennie's family ensured that she had every opportunity to develop academically, but how would a new environment, with its rich network of connections and possibilities, have altered her course (and maybe kept her out of Circleville's typhoid outbreak)?

Joy Kiser has produced an exceptional book whose only down side is its uninformative, incorrect title. *America's Other Audubon* does not indicate that an unparalleled nest reference lies within, or that this exceptional work resulted from at least eight peoples' efforts. Nor does the title reflect the Jones family's wholehearted odyssey to produce something truly remarkable. Still, this is an easy flaw to forgive once you open the book. Each lithograph is presented alongside text, written by the artist or Howard, which ranges from

the refreshingly descriptive (Gennie) to Victorian-flowery and anthropomorphic (Virginia). Kiser includes an informative 20-page introduction, and Howard's key to the eggs of each featured bird species. I can't imagine any naturalist not treasuring this book, which at \$45, costs less in real dollars than it sold for at its 1886 publication. It truly is a bargain of the century.

ALLAIRE DIAMOND

New England's Natural Wonders: An Explorer's Guide

By John S. Burk
Schiffer Books, 2012

It's a guidebook, but hardly one to slip in the backpack or back pocket while hiking. With its glossy color photos, *New England's Natural Wonders: An Explorer's Guide*, by John S. Burk, belongs on the coffee table at camp or the beach house. It's a leisurely page-through, a book to inspire outdoor adventure.

Burk, a researcher at Harvard Forest in Petersham, Massachusetts, and an author who has written several books, including *Wildlife of New England: A Viewers Guide*, takes readers across the six states in this latest book to natural areas renowned for scenery, geologic relevance, or biological import. Burk divides the region not by states, but topically, with chapter titles like "Alpine Mountains," "Old Forests," "Lakes," and "Coastal Southern."

Quick, can you explain the difference between bogs, swamps, and fens? Did you know that New England has a whopping 6,000 miles of ocean shoreline? Or that the difference between a lake and pond is not size, but whether an area under a particular body of water is deep and dark enough to inhibit plant growth? Or, for that matter, that Lake Champlain was once an inland sea, a major clue to that fact being the whale skeleton unearthed near its banks in 1849?

Burk offers colorful tidbits throughout the narrative, as in the possible origins of Purgatory Chasm in Sutton, Massachusetts – possibly named by Quakers, writes Burk, "who viewed this



rocky ravine in the hills south of Worcester as a place between heaven and hell.” Land features in the chasm have names such as “Devil’s Corncrib” and “Devil’s Pulpit.”

Burk writes about mountain formation, glacial impacts, river and lake formation, 300-year-old hemlocks, and peaks with exquisite views. As a guide, he tells us how to get there from here, what trails to take, where to find the boardwalk across a wetland, and where to perch to watch raptor migrations.

Burk’s style is clear and straightforward, his tone reverential and not preachy, though he reminds readers that invasive species, pesticides, and pollutants have taken a toll on New England’s natural world. His message: New England is exceedingly rich in natural diversity; it has wonderful places to embrace and protect.

As a photography book, *New England’s Natural Wonders* comes up a bit short. There’s a redundancy to some of the photos, especially in the “Waterfalls” chapter, where one waterfall looks almost the same as the next. And there are no photos of humans up close enjoying themselves in the outdoors, which is, after all, the idea behind the book.

And of more than 200 photographs, there are only five with snow! That’s an unfortunate oversight given that so many New Englanders love to experience their surroundings on skis and snowshoes.

Still, *Natural Wonders* is a book you can proudly send to Aunt Elizabeth and Uncle Ned out in Iowa to finally get them out this way. They can start their New England tour with a stop at the dinosaur museum at Dinosaur State Park in Connecticut, then meander north to Katahdin in Maine, which, at 5,267 feet, is New England’s highest peak – tall enough to awe anyone today as it did Henry David Thoreau in 1846.

DIRK VAN SUSTEREN

Suddenly, the Cider Didn’t Taste So Good: Adventures of a Game Warden in Maine

By John Ford
Islandport Press, 2012

“I’ll be darned; the little critter is sharper than I give him credit for,” writes now-retired Maine Game Warden John Ford of a young warden recruit. Together, with another warden wanna-be, the men work in the pitch dark of night to catch a couple of poachers who’ve set an illegal rope snare on the ground to capture deer.

Warden Ford praises the “little critter” when

the recruit locates a fishing line that runs from the rope snare to a nearby cabin. The fishing line is attached to an aluminum can filled with nuts and bolts inside the cabin – an alarm of sorts, sure to rattle like crazy when a deer (or anything else) steps into the rope snare.

And so Ford sets off the snare and begins blatting like a deer in distress. Minutes later, the poachers are hoofing it through the woods to their trap to see what they’ve caught, and the warden finds himself with only a few feet of night air between himself and a shotgun, pointed right at him by one of the now-disgruntled poachers. Ford pulls his .38 sidearm (or “peashooter,” as he calls it), and tells the men they’re surrounded by wardens – a slight exaggeration, but enough of a threat to get the poacher to drop his weapon and for the illegal trappers to cooperate with Ford from there on out.

Warden John Ford has got more than a few such tales up his sleeve – ranging from the precarious and dangerous to heartwarming and comical – which he recounts in *Suddenly, the Cider Didn’t Taste So Good: Adventures of a Game Warden in Maine*.

It’s not so much the stories Ford has to tell that makes the book enjoyable, it’s the simple, good-natured tone in which he tells them. Reading one of Ford’s stories is akin to listening to your favorite grandpa recall the glory days of his youth. Even the more scandalous tales have a bit of the “good ol’ days” in them, with plenty of “old pals,” “scuttle-butts,” and the occasional “gawd-damned turkey.” Ford lets readers know the many lengths to which people will go to get the wildlife they feel they are owed – permit be damned. Whether it’s nighttime deer-jacking or filling one’s waders to the brim with illegally caught smelt (really, one guy smuggles a mess of wiggling smelt in his waders), Ford takes pride in catching the criminals and enjoys a good laugh at their antics.

At times, Ford’s the butt of his own jokes. In one story, on one of his first days as a warden, he joins the local warden pilot on a floatplane flight above Walden County. When the pair spot a couple of women fishing in Unity Pond, they decide to dip on down and check the ladies’ licenses. Upon landing, rookie Ford exits the plane, planning to jump out of his seat to the pontoon below. He grossly misses the pontoon, though, and instead plunges straight down into the lake.

“There was no way in the hinges of hell that I wanted to resurface from the bottom of the pond,” Ford writes. “I could only imagine the fiasco this incident was about to become. It was a matter

of sheer survival that forced me to finally bob back up to the top,” where, he writes, the pilot’s hysterical laughter and one woman’s howling awaited him.

When he finally does resurface, Ford’s good-natured character shines through as he announces, “I guess they’re legal, Dick; I didn’t see any hidden stringer of fish beneath their canoe.”

In another story, a friend of Ford’s confronts him upon seeing Ford’s short, clumpy hair. Unbeknownst to the friend, the new ‘do’ was the result of chemotherapy treatment he was receiving for a malignant lymph node.

“By the damn, I was only 41 years old,” Ford writes of finding out about his cancer. In response to his friend’s comment on his hair, he writes about his new style: “I got it from God. I’m going through chemotherapy, and it’s the best he can do for now!”

While Ford’s friend was both “embarrassed and apologetic,” Ford reminds readers that, “It’s never a bad thing to share a little humor, no matter how severe the circumstances are.”

That, in a sentence, sums up John Ford and his 20-year career as a game warden. While I don’t think Ford’s writing will win him any prizes, there is no time wasted in reading the words of an honorable man doing good work.

MEGHAN OLIVER

Elegance, from *While Reading Bashō*

No elegance is
ascribed to sweat: dripping from
the carpenter’s nose

on to the clean ply-
wood. Yet I recall in my
big sheepskin how I

sweated in the snow,
heaving the axe and peavey,
and how sweet it was.

And how jubilee
cried in jay song to the gray
sky, and the white owl

sailed on extended
wings unerringly among
the snow-clad spruces.

HAYDEN CARRUTH, from *Doctor Jazz*
Copper Canyon Press, 2001
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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 costs of logging and trucking need to be subtracted from these figures to arrive at the price paid to the landowner. Because every job is different, these costs vary widely.

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

	NY	VT	NH	ME
DOLLARS PER THOUSAND BOARD FEET				
White Ash	NA	358	325	350
White Birch	300	250	325	375
Yellow Birch	375	442	433	535
Black Cherry	500	400	525	400
Sugar Maple	475	525	450	430
Red Maple	300	308	300	200
Red Oak	357	441	400	350

Logs scaled with the International 1/4-inch Rule.

Prices compiled November 1, 2012.

Talking Timber

Two issues back, an astute reader noted that in redesigning this page, we'd lost the disclaimer indicating that these mill prices are based on the International 1/4-inch Rule. Why does this matter? Because the estimated lumber volume in a log, and thus the price, varies depending on what rule you use.

There have been hundreds of different log rules in the past, but now there are three main ones in this region: Doyle, Scribner, and International 1/4-inch. (To learn more about obscure log rules, google "A Collection of Log Rules by Frank Freese" and prepare to have your mind blown.)

The Doyle rule, so named for Edward Doyle, was groundbreaking when it was invented in the 1820s, and quickly became the go-to rule. The formula

$$BF = (D - 4)^2 L/16$$

estimates volume based on log length, diameter, slabs, edging, shrinkage, and production of sawdust, though it's not perfect. The allowance for slabs and edging is too large for small logs and too small for large logs, among other problems. As a result, it underscales logs that are less than 30 inches in diameter – great for the buyer, but not so great for the seller. One seller back in the mid-1800s called it a "hoary old sinner of a log rule," a fair charge.

Clergyman J. M. Scribner tried to make things more accurate with his Scribner Rule in 1846, a rule based on a series of meticulously hand-drawn diagrams of logs. A formula that closely estimates the Scribner Rule is

$$BF = (0.79D^2 - 2D - 4) L/16.$$

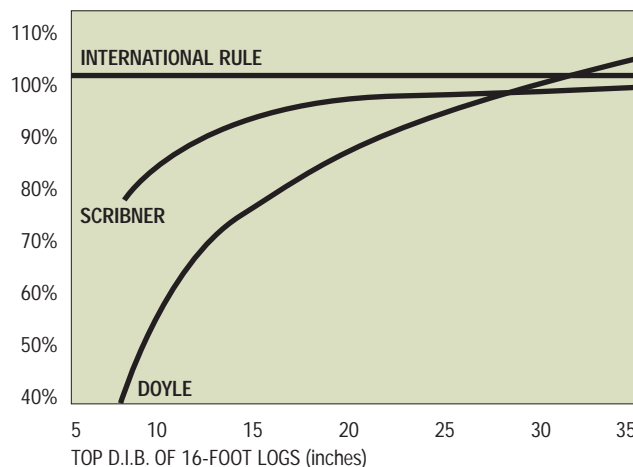
Scribner is more accurate than the Doyle Rule and is still quite popular out west and in southern pine plantations, but its critics point out that there's no uniform slab allowance, and like the Doyle Rule, there's no accounting for log taper.

Enter the International 1/4-inch Rule (formerly known as the International 1/8-inch Rule), invented by Canadian forester Judson C. Clark in 1917.

This rule better accounts for losses that occur in the sawing process and assumes a taper of 1/2-inch every 4 feet. For an 8-foot log, $BF = (0.398D^2 - 1.086D - 0.27)$. It's the most accurate rule of the three, and the one most commonly used in the Northeast.

If it's the most accurate, why doesn't everyone just switch to International 1/4-inch? Tradition. Logs have been scaled with Doyle and Scribner for so long that in some places it's just easier to keep the status quo and compensate for the error than to institute a whole new system.

So there you have it. Now, when your log buyer friends talk about buying at Doyle and selling at International, you'll get the joke. And since the point of equilibrium between Doyle and International is 30 inches, above which Doyle overestimates the board feet in a log, you can chime in on the joke, telling them great, you've got a bunch of 40-inch pine you want to sell them.



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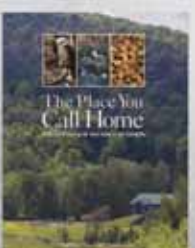
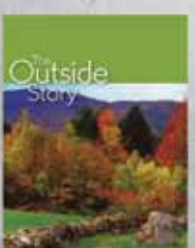
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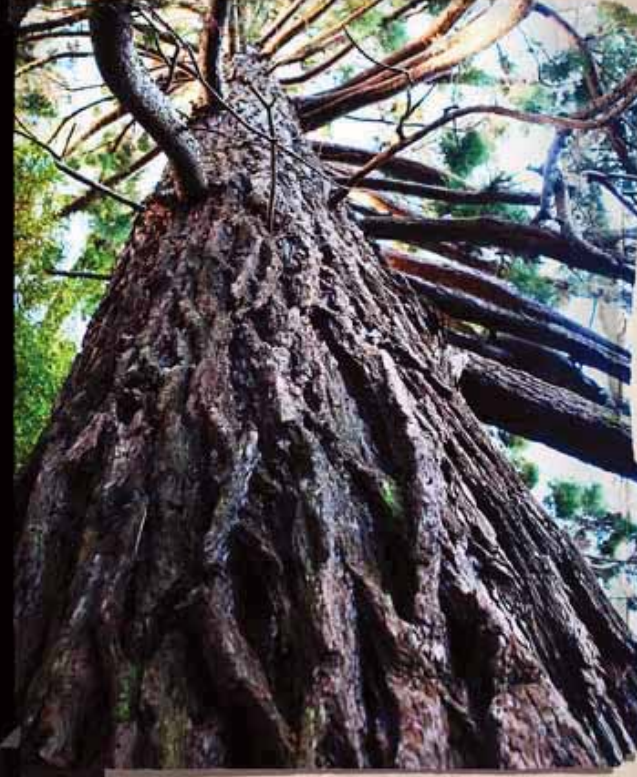
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Charlie Hunter, *Closed for the Season (Burlington Ferry)*, 2006, 48" x 48", oil on canvas

Those of us who live in the Northeast are familiar with the vicissitudes of winter. We know firsthand that not every day sparkles with rime ice or delivers fluffy drifts of sun-dappled snow. We know all too well the monochromatic gray days that stretch out under leaden skies – the days where color seems leached out of the landscape.

In *Closed for the Season (Burlington Ferry)*, Charlie Hunter teases out the beauty of those quiet days with great attention to light and atmosphere. He is a facile painter; the work looks as if it was dashed off in an energetic calligraphic flourish. Soft sweeping ribbons of tire tracks skid us around, while contrapuntally, the darkening road pulls us toward the maw of the dormant ferry terminal.

There is a commitment to truth in this depiction of the slushy semi-traveled road. Hunter likes to show what atmosphere, light, and temperature do to the things we build and

create. How is this day affecting the arching tire tracks and the quiet ferry dock? Writing about nontraditional subject matter in landscape painting, the art historian Kenneth Clark said: here is “an opportunity for the delicacy of perception, the act of love, which justifies the landscape of fact.”

Like most good painters, Hunter struggles to translate what moves him. The struggle is well masked here, and we are left with a seemingly unlabored depiction of a soft and changing day. Hunter said that his goal as an artist is “to paint beautifully that which is not traditionally considered beautiful.” He has achieved this in *Closed for the Season (Burlington Ferry)*.
— Adelaide Tyrol

Charlie Hunter is represented by West Branch Gallery, 17 Towne Farm Lane, Stowe, Vermont, www.westbranchgallery.com, 802-253-8943. He may be reached through his website: www.hunter-studio.com.

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



A PLACE in mind

Jennifer Mattern

Her hand is very small and cold in mine. Her head barely reaches my elbow. I think, she is so tiny.

Look up, she says.

I do, and I remember that I am small too. We are very small together, which of course is the best way to be very small in the world. We crane our necks, pondering the New England sky that we like to call ours. We study its sprinkling of icy winter stars. Our sky. Our stars. We have earned a few things in this life.

Twenty yards up the hill behind us stands our home: the pale, skinny house on the middle of the slope that dead-ends at the no-trespassing property that leads to the forbidden cemetery that no one we know has ever seen.

The cemetery ghosts will keep. Tonight, we are astronomers; we must heed the call of the stars.

We make our way to the field by the school, watched by weather-beaten white pines, benevolent red oaks, and hundreds of sugar maples. *Medium to dark-green leaves turn yellow, burnt orange or red in fall. Tolerates shade, likes a well-drained, moderately moist, fertile soil. Do not plant in confined areas or where salt is a problem.*

I left the dirty sprawl of Manhattan 12 years ago to live in this woodland, to raise my children. What do these trees know? *Medium height, dark hair, silver-gray at roots. Tolerates extremes poorly. Sap is salty, not recommended for consumption. Large crown. Needs space. Do not plant in heavily populated areas. Likes a well-stocked fridge, stray dogs, and stargazing.*

The maples, like my daughter, are indigenous to the Berkshire hills of western Massachusetts, but especially, it seems, to our particular block, in this particular small town. Rumor has it that our street has what the maples want, and they're determined to get it. I have no doubt they will win, someday. Already maple roots force their way through the stone foundation of our house, grabbing at the copper pipes, snagging discarded spiderwebs. The maples have not forgotten: they were here first. They fight for what is theirs.

In the field, She of the Small Hand lets go. She points at the sky with her free hand, still ungloved, unmittened. This is early winter, after all, when we tease out the cold with our still-warm skin, our cloudy breath. She is not ready to surrender to the ice and snow, not yet.

Look, she says. There. That big tree is sort of blocking it, but

I think that's Libra. The scales.

I don't think the tree means to block it, I say. Maybe the tree just thinks it's pointing it out. Maybe the tree's trying to be helpful.

She considers this.

Maybe, she says.

You were born on a night like this, I tell her. It was cold and bright and all the stars were out. What a perfect night to have a little girl, I thought.

She smiles and waits for me to say more. I hesitate. When she was born, just before dawn in a quiet hospital, her father was there. His there was our there; our here was his here. Now he lives across town.

She of the Small Hand spots something familiar in the eastern sky, over the school. We leave the unfinished story behind, sneaking up instead on the constellation we're hunting.

See? That's the bear, she says. The Big Dipper is part of the bear. Ursa.

We give each other a high five. I am amazed by her mind, what she remembers. All summer and fall, we stalked the stars at night, learning their names and their legends. Andromeda. Cassiopeia. Ursa Major. Canis Minor. Lepus.

The new winter wind gusts, testing itself. The tree branches release whatever they have left, whatever they can spare. I close my eyes for a moment, listening to the leaves scuttling across the small paved lot by the school.

I think that's Sirius, she says. No, Vega. See? That really, really bright one.

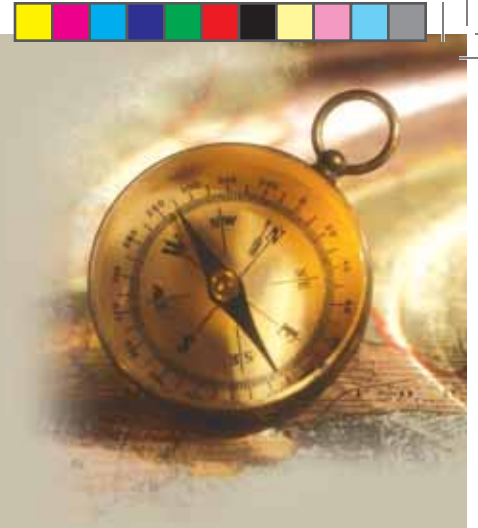
She lets go of my hand, to get a better look. She believes the brightest star in the sky is hers for the taking – somewhere just ahead, right here in this field, this patch of land pinned to the earth by the roots of sugar maples. If she goes to it, surely it will come to her.

Wow, it's so bright, she calls out. Do you see it now?

I keep my eyes closed, listening to the last leaves of the season, a paper constellation, circling my feet.

I see it, I say. I see.

A resident of the Berkshire hills of western Massachusetts, Jennifer Mattern is a playwright, essayist, and mother of two daughters. More of Mattern's work can be found at breedemandweep.com.



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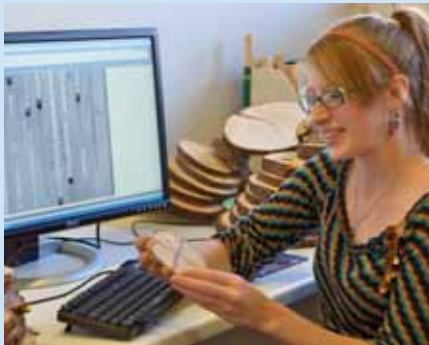
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