



The Place You Call Home

A Guide to Caring for Your Land in Vermont

A Northern Woodlands Publication

Welcome



Northern Woodlands

The Place You Call Home:
A Guide to Caring for
Your Land in Vermont

© Autumn 2008

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EVEN THOUGH I'VE LIVED IN A NUMBER OF CITIES, INCLUDING MANHATTAN, I've also spent lots of recreational time in the outdoors, mostly in the Adirondacks as a child and later in the mountains of northern New Mexico. Those experiences hiking, fishing, and snowshoeing reinforced my love of the land but didn't prepare me to own a piece of land. When my wife and I bought forestland in Vermont in the late 1980s, I was a true novice.

The first time we had our land logged, we made all the classic mistakes: we were away when the work was done; we had no signed contract with the logger; and we didn't have a forester mark the pines to be cut. Then, when I was cutting trees for firewood, plenty of nicely formed sugar maples ended up in the woodpile that would have been much more valuable as lumber. When I learned how boneheaded I'd been, I lamented that when we bought our land, we hadn't been given an owner's manual. When you buy an appliance, you get an owner's manual. Same thing with a car. But when you make the biggest purchase of your life – a piece of land – you're entirely on your own.

I became so fascinated with the land and all its systems that it literally became a full-time job for me. In 1994, in partnership with my friend and neighbor, Virginia Barlow, I started a magazine, *Vermont Woodlands*, that covered many of the subjects I wished I knew more about when I first walked my land: the plants and animals on it, its history, and its potential for wildlife habitat, recreation, and producing income. Five years later, that magazine expanded its coverage and was renamed *Northern Woodlands*.

For a decade and a half, we've been publishing information designed to inspire people to learn more about, and take better care of, this forest that sustains us. The publication you are now reading is a collection of material that we think will give landowners the information they need to make good decisions about their land. It is, in fact, the owner's manual I wished for nearly 20 years ago.

I've learned a lot about our woods over the years, but the most important lesson was realizing that we needed the services of a forester. Our land now has a forest management plan, which was developed by a consulting forester. Among other details, the plan contains strategies for creating grouse habitat in one stand and growing nice sugar maple in another. We have since had two more timber harvests, with a fine logger working under the guidance of our forester, and we have been thrilled with what's been accomplished. Most of the trees that have been cut have been those of poorer quality (which I now recognize readily); this has given the better trees more room to grow in size and value. The diversity of the wildlife species has been increased because we have carried out the plan to diversify the structure of the forest.

Even the most committed and effective tenders of the land are not born with a sense of stewardship, which only comes from spending lots of time on a piece of ground. By getting to know the woods in all seasons and in all weather, by walking the trails and tromping off between them, we develop an appreciation for the land's many gifts.

It's very easy to look at land simply as real estate, a certain number of acres, plus or minus, that surround the house. But land is so much more than that – it is a tremendous asset not only to the owner but also to the community. Forestland helps filter and store water so the supply of it remains plentiful and clean. It provides habitat for a stunning array of wildlife species, a broad diversity of habitat being the key to rich biodiversity. It serves as the backdrop for our dazzling views. And it provides a supply of wood, the processing of which employs thousands of people in the rural communities of Vermont.

As more and more people are attracted to what Vermont has to offer, the land is at increasing risk of being divided into house lots. Town and state regulations and planning efforts play a role in directing the development to the most appropriate places. But in truth, the future of the forest that surrounds us is in the hands of the thousands of individuals who now call that land home. The future is in the hands of people just like you.

— STEPHEN LONG

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JIM BLOCK



RICH FRUTCHER



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GERRY LEMMO

Our Home in Vermont

BY CHUCK WOOSTER

Vermont is the most rural state in the nation, according to the 2000 U.S. census, meaning that a higher percentage of us live in small towns than do in any other state in the nation. We live surrounded by fields and forests, and the natural world is part of our daily routines in a way that is not common elsewhere, even on those days when our daily dose of nature is limited to seeing a moose on the way to work or going out to the woodshed for a few sticks of firewood to throw into the woodstove at night.

For many Vermonters, nature's daily dose is far more than a mere teaspoon. We have the second-highest percentage of residents (after Alaska) who regularly participate in wildlife-based recreation (a category that runs from bird feeding to turkey hunting) and the highest percentage of people who heat their homes primarily with wood. We have tens of thousands of people out hiking the trails in the latest lightweight gear and thousands more out stalking deer in the traditional woolies. We have skiers and snowmobilers, kayakers and fishermen. And of course, we have many thousands of people whose jobs are directly tied to the outdoors, be it through milking cows, cutting trees, maintaining trails, or guiding leaf peepers down country roads.

Given how central the outdoors is to life in Vermont, the following statistic might surprise you: 87 percent of Vermont's land is privately owned. This is one of the highest percentages of any state in the country. And what it means is that, when it comes to

any of the abovementioned activities, the future is in the hands of those of us fortunate enough to own a piece of Vermont (even if that piece is only an acre or two).

It's easy to think otherwise, to assume that the natural world and all of the activities that depend on it are "protected" somehow, that Vermont has vast reserves of public land where the wildlife lives, where the trails are always open, where the land and streams are conserved, and where the foliage will always be lovely come autumn. Sure, there's the Green Mountain National Forest, running along the spine of the southern and central Greens and accounting for half of the state's public land holdings, and there are the numerous state parks, town forests, and other public holdings. These high-profile lands tend to occupy our imaginations, since they often include our most spectacular mountain peaks and pristine lakes. But they are the exceptions and not the rule.

Besides the high level of private ownership, here's another statistic that might surprise you: Vermont is the third-most forested state in the nation, trailing only Maine and New Hampshire. Seventy-eight percent of the state is wooded. Our postcards may show farms, but the numbers show trees. Indeed, stick a pin into a map of Vermont, and the parcel you'll likely land on is not a farm or a piece of National Forest but, rather, a private woodlot.

Taken together, these woodlands have tremendous economic significance to the state. Forest-based manufacturing, which includes everything from trucking logs to milling boards to crafting furniture, accounted for almost 10 percent of Vermont's



CHARLES H. WILLEY ©

Below: a field of sunflowers framed by the Taconic Mountains. The sunflowers will be harvested to make bio-diesel; the mountains supply western Vermont with timber, maple syrup and recreational opportunities. Inset: forest-based manufacturing accounted for almost 10 percent of Vermont's manufacturing economy in 2005.

manufacturing economy in 2005, totaling \$998 million. Forest-related recreation and tourism contributed another \$485 million to the economy. Throw in other forest-related products such as Christmas trees and maple products, and the total economic contribution of our state's forests in 2005 was \$1.5 billion.

The most common tree in our forests? Sugar maple. The most likely use for a sugar maple once it's been cut? Fuel, since six percent of our heat and electricity comes from burning wood, the highest percentage of any state. Besides firewood, many Vermonters cut trees to diversify wildlife habitat or to supply the local sawmill. Every timber harvest spreads benefits through the local economy as foresters, loggers, truckers, and sawmill operators all participate in the process.

Nearly 13,000 Vermonters work in the woods in one capacity or another, roughly half in the forest-products industry and the other half in related recreation and tourism. Together, the forest-based payroll adds up to \$300 million per year. Breaking this down to a smaller scale: each 1,000 acres of woodland supports 2.8 jobs.

While forests dominate the resource-based side of the Vermont economy, the farm sector plays a major role, too. Just over 8,500 Vermonters worked on farms in 2002, and gross receipts totaled \$553 million. Nearly all of Vermont's farms are owned by families or sole proprietors, though in a sign of the tight margins in the farm economy, only 53 percent of farmers list "farming" as their primary occupation.

Another 58,000 people work in the wholesale or retail processing and sale of Vermont farm products, which is why farming has such a central role in the public's perception of life in the Green Mountains. Vermonters eat more locally-grown food per person than people in any other state, including sunny, produce-rich states like California and Florida.

Of course, economic considerations are not the only reasons we enjoy our woods and pastures. The state is home to abundant wildlife, including some of the highest concentrations of songbird species anywhere north of the tropics. Deer, turkey, peregrine falcon, fisher, and loon populations have all recovered from difficult periods during the past century, and moose and coyote are expanding their territories. The key to all this has been the cooperation of the more than 80,000 people who own forestland in Vermont. John Austin, director of wildlife for the Vermont Department of Fish and Wildlife, said, "The role of the private

landowner in wildlife conservation cannot be underestimated, and we can't say often enough that private land is critical to sustaining healthy wildlife populations."

Indeed, private landowners play the defining role, not only in wildlife conservation but also in ensuring that there will always be land available for farming, forest products, and recreation. It all depends on access to land, especially large parcels of undeveloped land. And here is where Vermont's landscape is most at risk: in the trend toward smaller and smaller parcels through ongoing subdivision. The average parcel size in Vermont has been dropping for decades; since the 1970s, the amount of forestland in parcels greater than 500 acres has decreased by 33 percent, while the amount in the 10- to 49-acre range has jumped by 42 percent.

Small parcels of land are not in and of themselves a problem, but parcelization typically leads to several related problems, especially the fragmentation of wildlife habitat into blocks that become too small for many species to use. Animals that thrive in more suburban settings, such as raccoons, crows, and deer, replace those that require deeper forest, such as bobcat, black bear, and several songbird species. Small parcels make it more difficult to manage land for forest products, since a few dozen acres are typically required before a logging job starts to break even.

High property taxes are a major reason why people who would otherwise choose to keep their land undeveloped are forced to subdivide. Fortunately, there is a property tax program in Vermont called Use Value Appraisal (informally known as "current use") that taxes land on its value as farm and forestland, not its value for housing developments. Check with your county forester for details on enrolling your land. More than 15,000 landowners currently participate in Use Value Appraisal, and the protected land totals 2 million acres – one third of Vermont's land base.

Whether you own a scrap of backyard or a few thousand acres of timberland, the decisions you make about your land affect the future of Vermont. The good news is you're not alone. Whether your interests run to maple sugaring or bird watching, trail building or timber management, chances are that someone else near you has experience with these very same pursuits. And when you need professional assistance, the resource guide on page 94 should help point you in the right direction.

CHUCK WOOSTER IS THE ASSOCIATE EDITOR OF *Northern Woodlands* MAGAZINE.





NED THERRLEN

Forgotten Fruit: Apple Trees in the Wild

Far from forbidden – but often forsaken – wild apple trees are an unmistakable sight on almost any woods walk in New England.

Regardless of whether the old apple grove is an abandoned farm orchard or a collection of seed-grown mavericks, the look is similar: a few scraggly and struggling survivors just barely hanging on under the stifling shade of red maples, white pines, or any of the other species that outpace the naturally rotund apple tree.

You know the type. They have multiple stems of twisted, mostly rotten wood covered by loose, sapsucker-riddled bark. Their branches are mottled with moss and lichens, and they appear thorny for all the broken wood and dead spur shoots. What used to be a glorious spreading crown is now a pathetic collection of disproportionately long shoots desperately seeking a break in the canopy. And there atop those slender whips are a few sad leaves, eking out a living from whatever light the foliage of other species grudgingly lets through.

These are the apple trees that Thoreau described as the kind “you expect nothing but lichens to fall from.” To stumble upon a collection of them in the woods is an arresting experience. There is a certain tension about the scene. They are obviously not orchard trees, but they’re not quite forest trees, either. They’re in suspension, somewhere between cultured and wild.

When apple trees are in such limbo, it is easy to see them as decrepit has-beens, to focus on the decay and death. Throw in their usual associates – the remains of the collapsed barn, the cellar hole, the rock heap, and the bottle dump, all growing up to brush – and it can be downright depressing. What would Johnny Appleseed think?

Of course, many wild apple trees are in far better shape. Still, even in the best cases, it is easy to see wild apple trees as suppressed, to focus on the lack of leaves, the knobby stems and spur shoots of deadwood.

But look more closely at that scene. And consider it more broadly. See the vigor and vitality, the vibrance. This much is certain: things happen around apple trees. You don’t need a wildlife degree to know how popular apple trees are with animals of all kinds.

The active apple

A friend of mine is fond of describing forests more as verbs than as nouns. He likes to emphasize the activity of the forest – the living, breathing, dying, and rotting – and not just the stuff. It’s an intriguing concept, and when applied at a slightly smaller scale, it is particularly apropos of apple trees in the wild. Sure, it’s a tree or a group of trees, but to see them as active players in the life of the forest is to fully appreciate their value. Wild apple trees

Some apple trees hold onto their fruits well into winter, a boon for wildlife when food is scarce.

don’t just exist; they grow and give, fight and feed. They emerge, they succumb, they sprout, they break. They engender life. And through it all, wild apple trees are remarkably productive. It may not be board feet or bushels, but they put out nonetheless – and they do so in countless ways.

It is often said that apple trees are “good for wildlife.” That’s a little like saying water is good for fish; it’s the height of understatement. You’d be hard-pressed to find a tree species that is more variously giving of itself than an apple tree.

Foremost among an apple tree’s many gifts to wildlife are its fruits, the apples themselves. Their importance as a food source to game species like white-tailed deer, black bear, foxes, coyotes, and ruffed grouse is well documented. But there’s more to wildlife than those high-profile species, and there’s far more to the value of apple trees than their fleshy fruits.

First, the fruits are eaten by many more species than just the so-called “charismatic megafauna.” Look carefully at a fallen apple in the woods and you might see evidence of tampering by all manner of critters – from squirrels and jays to worms and snails.

Then there are the other kinds of food and cover the apple trees provide. Buds and twigs are browsed by deer, ruffed grouse, cottontail rabbits, and numerous others. Voles, rabbits, and mice seem to savor the inner bark of the trunk, especially in winter.

And even though some of the wood on those apple trees may be dead, it’s not without life. It provides excellent cavities for nesting and roosting sites for a variety of birds. Flycatchers, for example, use such trees if they’re growing in the woods, and bluebirds will nest in them if they grow near openings.

Mammals and birds not your thing? Don’t despair; the apple tree provides plenty for insects too. Yellow jackets swarm wind-fallen apples in the autumn, and apple blossoms are abuzz with honeybees in the spring. Throughout the year a great variety of other, less-obvious insects makes a good living on apple trees too.



© 2005 TOM KIM AN VOSS

This wild apple tree is truly prolific.



Ten Slow Steps to Apple Tree Restoration

The longevity, vigor, and yield of your wild or abandoned apple trees can be enhanced greatly by using some simple but pleasing cultural techniques. There is as much art as there is science to the improvement of apple trees, and no two situations are exactly alike, so there is no standardized prescription to follow.

However, there are a few basic principles that you can adapt to your particular circumstances and style.

Apple tree improvement involves two phases: release and restoration. Release work focuses on removing competing vegetation from around your apples, and restoration involves pruning and caring for the apple trees themselves. Both phases can be outlined in ten simple and purposefully slow steps.

Step 1: Carefully examine your tree(s). If you have several in various stages of vigor or decline, identify the ones with the best hope for rejuvenation and focus your attention on them. Mark these trees. Identify their competitors – all the other shrubs and trees from the apple stem out at least to the drip line of the crown – and mark them too.

Step 2: Slow down. Eat an apple.

Step 3: Remove the competitors. Cut out all those trees that you identified as shading or interfering with the growth of your target apple trees. At a minimum, remove the overtopping trees on at least three sides, especially those on the south side of the apple tree.

Step 4: Slow down. Go have some cider.

Step 5: Look more closely at your target trees with an eye toward improving them through pruning. On each tree, look for the presence of multiple stems. Choose the largest and most vigorous one and save it. Cut out the others – including basal sprouts – as

close to the ground as possible. Remember, it's quality that counts. If the largest stem on a tree is not the best, remove it and work with the next biggest but healthiest stem.

Step 6: Slow down. Make an apple pie.

Step 7: Look for broken, diseased, or dead wood and remove all of it.

Step 8: Slow down. Eat your pie.

Step 9: Inspect the remaining live crown. Don't be too eager to hack away. Try to leave healthy branches growing in a horizontal plane. Don't remove the spur shoots that grow on the sides of main branches – that's where the fruits grow. Focus your cutting efforts on crisscrossing branches that rub together and on water sprouts – those zillions of rapidly growing vertical shoots that sprout from the tree top. Try to reduce the spread of the upper limbs to allow more sunlight to reach the interior and lower limbs. This will encourage their fruitfulness.

Step 10: Step back and admire your work. Wait till next year, reevaluating the condition of your trees. Watch the wildlife move in from your neighbors' neglected trees.

A few cautions and comments. Did I mention going slowly? It's important. Don't try to remake the whole tree in one outing. The first annual pruning in particular should always be light. There is also a distinct possibility of shocking the tree with too severe a release. This is especially true of trees that have been under heavy shade for a long time. Releasing them too much and too fast can bring strange and unwanted responses from the tree – like death.

One way to ease into the release is to leave stand-

ing any other soft or hard mast-producing trees. If you've got, say, serviceberry or oaks around your apples, consider leaving them. Another way is to kill – but not fell – the competitors by girdling them. Cut a ring through the bark completely around the stem of the unwanted tree, and it will die and open the canopy a bit more gradually. This is especially useful when removing large trees that might otherwise trash your apple trees upon felling.

When it comes to removing dead apple wood, you can hardly go wrong. But, you may want to leave some of those large, hollow, and often horizontal branch segments. These make excellent nest sites for a variety of birds.

Always use good technique. Make clean cuts with sharp tools. Leave no stubs, nicks, tears, or splits.

Timing counts. Pruning apple trees is best done only when the tree is dormant – when there are no leaves. Late winter and early spring are best, from February to mid-April. You can cut out competitors at any time, but for best results, try to cut the hardwood competition just after they've broken bud or when they are stressed – during a drought or insect attack, for example.

What to do with all that brush and slash that you've cut? One idea is to pile it for wildlife cover. Cottontail rabbits are particularly fond of brush piles. The most effective piles are those that are made over rocks or stumps or the like.

A few helpful tools are all you need: short- and long-handled pruning saw and loppers, nursery shears, and maybe a sturdy ladder and a lightweight chainsaw.

Go to it. Slowly.

There are aphids and ants, maggots and mites, borers and beetles, scales and skeletonizers.

Microbes, you ask? Sure. The bacteria that cause fire blight disease have quite a time for themselves moving from blossoms to leaves to stems. Not to be outdone, the fungi are also well represented: frog-eye leaf spot, cedar-apple rust, and apple scab are all common apple diseases caused by fungi.

When it comes to illustrating the finer points of biotic diversity and species interactions, the Discovery Channel has nothing on forest-dwelling apple trees.

Where did they come from?

As valuable and important as apple trees are for wildlife, they have had a similarly long history with people. Indeed, the apple overcame a decidedly inauspicious start in the Garden of Eden to enjoy a long and storied relationship with human civilization. The apple, if not the apple tree, has become a powerful icon of Americana.

And so it has been in New England. Curiously, though, the apple is not native here – this despite its long history and widespread presence. There are a couple of species of wild crabs thought to be native to North America, but domesticated apple trees originated in Eurasia.

When European immigrants settled in North America, they brought with them seeds from their favorite apple trees. Many written histories state that planting apple orchards was among the first tasks the early settlers undertook.

Here in the Northeast, those first orchards were planted with imported seeds and were used to produce cider. Owing to the peculiarities of apple biology, these first seed-grown apple trees hybridized with each other and with crabs that had become naturalized. The result was an explosion of new varieties.

Initially, apple growing in New England – and throughout much of the U.S., as land was settled – was limited to seedling trees of uncultivated varieties. Since apple trees do not reproduce true to seed, growers intent on cultivating any particular variety had to learn and develop sophisticated methods of grafting and propagation.

Eventually, three varieties emerged as the early

favorites: Baldwin, Northern Spy, and Rhode Island Greening. Of course, there were others, including Summer Rambo, Cox Orange Pippin, Nonesuch, Honeygold, Wolf River, Wealthy, Fameuse, and Winter Banana.

By 1900, commercial orchards of cultivated trees had become the source of New England's apples. Slowly, but inexorably, New England's open landscape reverted to forests, and the remaining small, hill-farm cider orchards gradually slipped into the woods.

Abandoned but not forgotten

Considering their importance to both wildlife and people, it is no surprise that abandoned and decrepit apple trees have become the focus of some intensive restoration and management programs.

Because forest-grown apple trees provide so much for wildlife and because they are often lacking in vigor, managers try to “release” them from the competition of surrounding trees. This entails cutting all surrounding trees and shrubs back to the drip line of the apple tree and removing large overtopping trees from at least three sides, especially toward the south side of the tree.

“We try to release apple trees wherever we have the opportunity,” said Chuck Vile, a state lands wildlife forester with the Department of Forests, Parks and Recreation in Essex Junction, Vermont. “If we’re doing a timber sale on state land and we find some apple trees, we release them. It’s an excellent way to diversify the habitat for a variety of wildlife. It’s not like a bird feeder; you don’t have to tend it every day.”

As if saving the apple trees and increasing their production of fruits were not benefit enough, releasing apple trees also yields indirect benefits. Removing competing trees stimulates growth of new and different species – herbs, shrubs, and tree seedlings – in the understory, which provide added food and cover to a variety of critters.

And as Vile explains, apple trees are not the only target of such release projects. “We’ll do it for any soft mast (food) producing trees and shrubs – cherries, serviceberry, dogwoods – and we don’t cut hard mast producers like oaks and beech to release an apple tree.”

Maybe it’s excitement and anticipation – not tension – that I feel among the apple trees living on the edge between cultured and wild. After all, there’s always the promise of fruit. Right after Thoreau described those decrepit trees he went on to point out the apples on the ground beneath them. “Surely apples are the noblest of fruits,” he wrote.

Something tells me he did not mean noble in the patrician, aristocratic sense. I’d rather believe that he saw apples as noble because of their dignity, generosity, and magnanimity. He rightly pointed out that we, too, can partake of the apple tree’s offerings.

In imploring us to get out and walk among the wild apples, he wrote, “The outdoor air and exercise which the walker gets give a different tone to his palate, and he craves a fruit which the sedentary would call harsh and crabbed. What is sour in the house a bracing walk makes sweet.”

MICHAEL SNYDER IS THE CHITTENDEN COUNTY FORESTER.



This wild apple tree has been released from competition.

STORY AND PHOTOS BY SUSAN C. MORSE

Dog or Cat? Is the track you found that of a dog or a cat? When you first discover a track, carefully determine which of the following diagnostic features you can identify. By process of elimination, you can often find specific clues that will reveal whether you're examining the track of a wild cat or that of a domestic or wild canid.



Cat

Four smaller, teardrop-shaped toe impressions are asymmetrically arranged (one toe ahead of the others). This leading toe corresponds to our middle finger, the digit one should never use in bad traffic in Los Angeles. Interestingly, cats have a little toe positioned on the outside like our little finger, providing a sure clue to which footprint you are studying.

Note that the cat's palm imprint is the dominant feature in the track, which is the opposite of the dog.

The palm pad is blunt and/or bilobed, like an "m." This feature depends on whether the substrate is soft or hard and the resulting depth of the foot's impression.

The bottom edge of the palm is divided into a roughly straight alignment of three lobes, which are even with one another.

The combination of the asymmetrical toe arrangement and the shape of the palm will not permit an "X" to be drawn through the track of any cat, be it Bengal tiger, bobcat, or beloved housecat.

Non-retractable cat claws usually don't appear in tracks. However, when they do, they arch forward in front of the toe impressions – sometimes inserting themselves as tiny sharp holes, sometimes as slits – according to the substrate and the mood of the cat. Mud, ice, and tricky terrain are sure to bring out CLAWS!



Dog

Four large toe impressions are symmetrically arranged in a stepped-forward and rear-toe pattern. Most often, blunt nail impressions will register; however, sometimes they will not. All toes are roughly the same in size and are dominant in the track, appearing collectively larger than the palm impression. Red fox toes and especially the palm pad appear muffled and smallish due to abundant foot fur.

The palm impression is pointed – like the pointed face of a dog (bulldogs and pugs not included!)

The bottom edge of the palm pad appears as an uneven, chevron-shaped arrangement of two thinner, lower, outer lobes encircling a somewhat more robust center lobe, which is situated higher on the track.

"X" marks the spot. You can readily trace an "X" through the ridges in the tracks of fox, dog, coyote, or wolf. This feature will often persist in old tracks even after other clues begin to disappear.

Thicker, blunt nail impressions of dogs usually appear in their tracks, typically extending directly from the toe impressions. Gray fox nails will appear more catlike – delicately inserting themselves forward of the toe prints. Be aware of the fact that dogs, wild and domestic alike, with worn nails and/or thick, callused pads will sometimes leave tracks that show no nail marks – which brings us to our conclusion... When in doubt, follow it out; don't be a nerd, find that turd!

SUSAN C. MORSE IS THE FOUNDER AND PROGRAM DIRECTOR OF KEEPING TRACK IN HUNTINGTON, VERMONT.

A Look at the Season's Main Events

By VIRGINIA BARLOW

MARCH

APRIL

MAY

First week

Pussy willows will soon begin to open. Bring some indoors for an early taste of spring / Brown creepers are among the earliest spring migrants, perhaps because they don't migrate far. Listen for their song, a thin, sibilant *see-see-see* / Skunk cabbage is flowering in swamps. In southern New England it may have been up and blooming since January / White-breasted nuthatches may use birdhouses, starting soon. The entrance hole should be 1¼ inches in diameter

Willow pollen is the first spring food for many species of bees / Spring peepers begin peeping in earnest. Isolated peepers will peep until November, but only now is there a big deafening chorus of them / The spirited song of the vesper sparrow, an early migrant, is often heard at dusk – hence its name / Killdeer return. It's not easy to tell the male and female apart, plus soon they will both incubate the eggs and care for the chicks / Raccoons are up and about and trying to wreck birdfeeders at night

During the breeding season, sapsuckers still consume sap, but their diet shifts primarily to insects. They catch insects in midair and capture them at sap wells / Sparrows are sometimes missed among the more colorful warblers. Here or coming soon are tree, fox, white-throated, song, white-crowned, and field sparrows / Time to bring in the birdfeeder to keep hungry bears from developing bad habits as they come out of hibernation

Second week

"When the wind is from the north and west, that's when sugaring is the best." / Coltsfoot is one of the earliest wildflowers. Brought from Europe because it was used as a cough remedy, it has found a niche here in wet gravel at the edges of roads / Songbirds save the least favorite foods for last; look for pine and evening grosbeaks and robins eating sumac berries / Like all fish-eating ducks, the hooded mergansers now moving north have serrated bills for holding their slippery prey

After a winter in the soil, white pine weevils are ascending to the terminal shoots of their host trees to feed and lay eggs / Female hazelnut flowers have extended their tiny purple tongues, and the male catkins are shedding pollen / Red foxes are giving birth to 3 to 7 pups. Until the pups open their eyes, the male brings food, and the female leaves the den only for water / Mink are giving birth to 3 to 6 young, not far from water, perhaps under roots along a stream or in an old muskrat lodge

Dandelion leaves taste best when picked before the flowers come out / Queen bumblebees are laying their first clutch of eggs / Smelt are running upstream / At this time of year, orioles will eat oranges from the bird feeder. Yellow-bellied sapsuckers sometimes join them / The five-petaled white flowers of shadbush are out along roadside and in deciduous woods / Flickers are laying five to eight white eggs. Both parents will incubate them for about two weeks; the male usually takes the night shift

Third week

March 21: The vernal equinox, or first day of spring, when day and night are of equal length all over the world / When the snow melts, don't blame shrews for those tunnels you see in the lawn. They do live there, but the tunnels were made by moles / Great horned owls are nesting in old redtailed hawk nests / Male woodcocks return as soon as the ground has thawed enough to make earthworms accessible. Listen for the *peent* and whistling wings of the male's courtship flight shortly after sunset

Watch for returning yellow-rumped warblers. They use a variety of techniques for catching insects and will work over decaying logs, bark, or litter, and sometimes they hawk for insects / Nest excavation takes about 20 days for downy woodpeckers and 16 days for hairies / Basswood buds aren't just pretty; in spring they also are good to nibble on / Loons return to inland lakes from coastal wintering areas / Trout lilies are blooming. The pretty yellow flowers follow the sun during the day and close at night

Young plantain leaves are good in salads, but soon they will become stringy / Woodcock eggs hatch. The precocial chicks leave the nest within a day of hatching and at four weeks old are difficult to distinguish from the adults / Ruffed grouse chicks follow their mothers and eat insects and spiders. She will brood them at night until they can fly, about 12 days after hatching / Late warblers arrive when oaks begin to leaf out: bluewinged, goldenwinged, Tennessee, Cape May, prairie, baybreasted, Wilson's, Canada

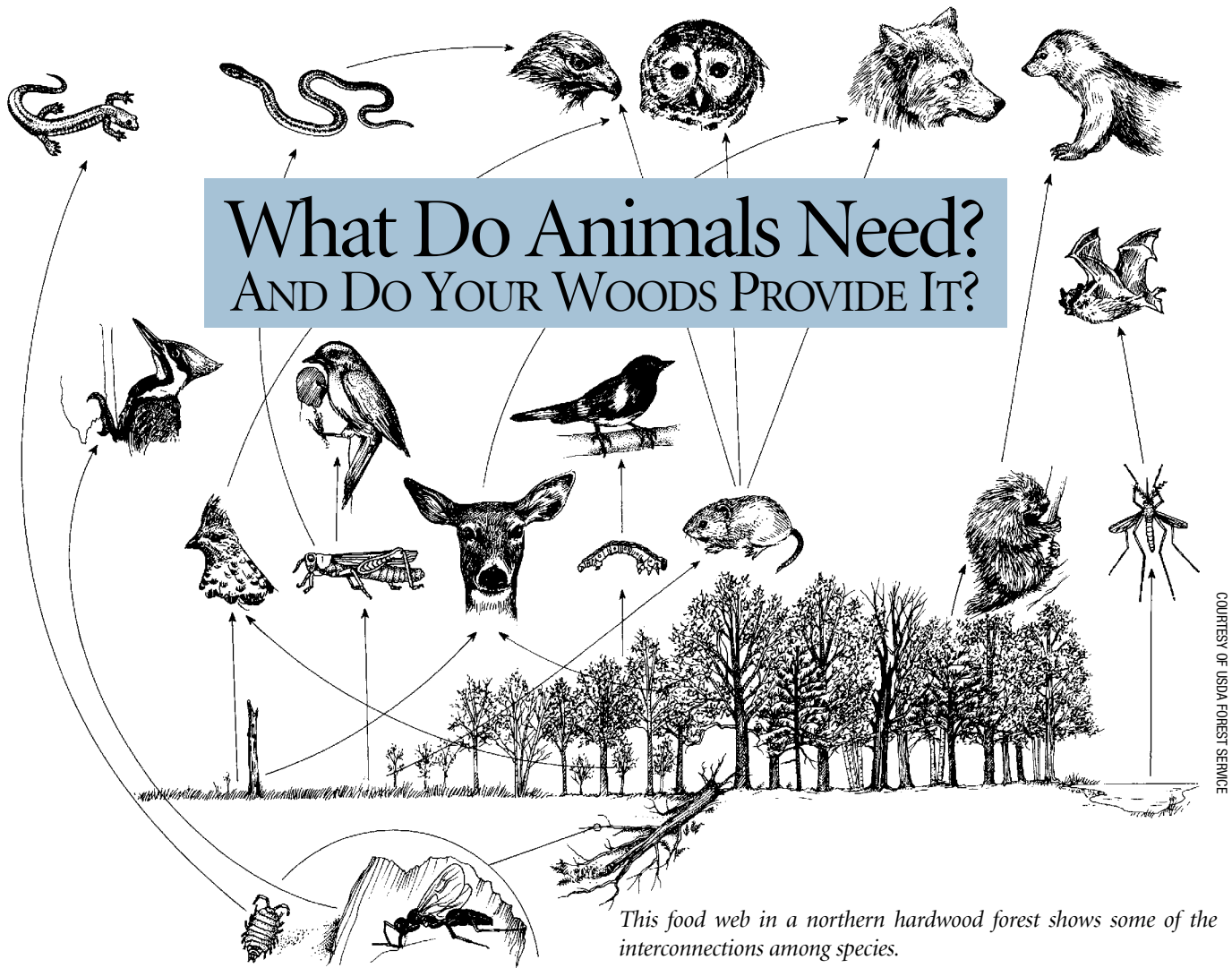
Fourth week

Fox sparrows are moving through / Red-tailed hawks are returning. They are also called chicken hawks, although they normally eat more rodents, woodchucks, and rabbits than chickens / Many hawks add greenery to their nests. Sprigs of green at this time of year indicate an active nest / The severity of apple scab infections in the season ahead can be reduced by raking up and removing last year's fallen leaves

Look for osprey and great blue herons along big rivers / Spring migrants: black and white, palm and pine warblers. Also, solitary vireos, hermit thrushes, and winter wrens / Pear thrips adults are emerging from the soil and flying to sugar maple buds, ready to pierce the buds as soon as they begin to open / Balsam shootboring sawflies, about the size of large blackflies, may be abundant in Christmas tree plantations at midday in the warmth of the sun

Unck, the sound of plucking a loose banjo string, can be heard now through August, mostly at night, from ponds with green frogs / Fawns will be born soon. Most newborns are walking and nursing when less than one hour old / Honeybees may swarm, especially on a warm, sunny day following days of rain or cool cloudiness / Look for cedar waxwings in flowering apple trees, eating the petals / Lilacs are in full bloom – what a change since March 1st!

These listings are from observations and reports in our home territory at about 1000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.



BY STEPHEN LONG

What makes one piece of ground a haven for seemingly every species that Noah saved while another is comparatively void of animals? And how does a forestland owner know whether her woods is an ark or a wasteland?

At the heart of what has to be a complex answer is one simple statement: every animal species needs food, water, and cover in a physical arrangement that meets its specific needs. Whether or not a plot of land can serve as home to any particular species depends on its capacity to provide the requisite combination of food, water, and cover. Some animals are generalists – white-tailed deer are a prime example – that can thrive under a multi-

tude of situations, from the industrial forest, to agricultural land, to suburbia. But there are less-adaptable species whose habitat requirements are so specific that the loss of that particular habitat can put the species' local population in a tailspin. The woodcock, for instance, feeds in dense young stands, nests in slightly more mature woods (15 to 30 years old) and performs its courtship ritual out in the open. If these three elements don't exist in close proximity to one another – and the combination is becoming scarcer in the Northeast where forests are aging and former agricultural land is turning into subdivisions – woodcock will not be there.

It's not by accident that both examples I've cited – deer and woodcock – are game animals. For many years, wildlife management meant game management. State fish and game departments saw their job as managing game animals for the people (hunters)

who, through license fees and excise taxes on sporting goods, paid their salaries. That mission has shifted in the past few decades, a change signaled by the renaming of many departments from “Fish and Game” to “Fish and Wildlife.” Many wildlife departments now specifically incorporate a non-game division. This shift has come about through recognition that wildlife belongs to all the people, not just hunters and anglers, and that watching wildlife is a pastime enjoyed by thousands.

Because of wildlife managers’ historic focus on game animals, it is the game animals’ habitat needs that have been studied most thoroughly. Volumes and volumes have been written about managing habitats for turkeys, ruffed grouse, woodcock, whitetails, snowshoe hare, quail, cottontails, migratory waterfowl, and game fish such as trout and bass. Hunting and conservation groups like Wild Turkey Federation, Ruffed Grouse Society, Ducks Unlimited, and Trout Unlimited have spent considerable time and money planting oak, patch-cutting aspen stands, building duck boxes, and restoring streambanks, all in the name of providing for the needs of their favorite species. Fortunately, though, by concentrating on the needs of game animals, managers have also been providing good habitat for many other species as well. For instance, the ruffed grouse requires thick sapling stands of hardwoods with dead logs on the ground for its breeding habitat. This same habitat serves the needs of a number of small mammals, amphibians, and songbirds, including veeries, redstarts, and rose-breasted grosbeaks.

Today, instead of featured species, wildlife managers and forestland owners are thinking in terms of biological diversity, or biodiversity. They are paying attention to food webs and biotic communities. These refer to the collections of plants, animals, and other organisms that occupy an area, co-existing in a way that is mutually sustaining to the species, if not necessarily to the individuals.

As in a human community, not all of the residents are present all the time. In a thicket, for instance, migratory birds may use the habitat for much of their northern stay. Ruffed grouse hens, on the other hand, use it for breeding, then move to more open woods for nesting. Others, like the fisher, pass through while hunting for a meal, so the thicket is a very small part of the five square miles it might roam in a month. At the other extreme, an animal with a small home range (the red-backed vole, for instance) can find all the seeds, nuts, and insects it needs in a quarter-acre thicket. The presence of all of these animals, along with the plants and insects, has an effect on all the other parts of the community.

The number of vertebrates native to the region is surprisingly small. In the New England states, there are 338 species: 62 mammals, 220 birds, and 56 reptiles and amphibians, according to Mariko Yamasaki, a wildlife biologist who works with the USDA Forest Service, in Durham, New Hampshire. Yamasaki is the co-author (with Richard DeGraaf) of *New England Wildlife: Habitat, Natural History, and Distribution*. This book, an update of a U.S. Forest Service publication by the same name, and its companion volume, *New England Wildlife: Management of Forested Habitats*, have been the bibles for New England wildlife managers, helping them provide for the habitat needs of New England’s mammals, birds, reptiles, and amphibians.

Most of these animals have small home ranges: two-thirds of them require less than 10 acres, and 85 percent live on 50 acres or less. Since 50 acres is the average holding of a Northeastern landowner, it’s quite possible for most landowners to play a significant role in the presence or absence of a large number of wildlife species.

No matter how hospitable your land is, however, it will not be home to all of these species, or even half of them. To put this into perspective, Yamasaki and her colleagues have done much of their research at the Bartlett Experimental Forest, which comprises 2,600 acres of fairly typical northeastern forestland in northern New Hampshire. Here’s a place where researchers have been taking an ongoing inventory for decades, which has given them as thorough an accounting of species as can be expected anywhere. In this 4 square miles of forest, they have documented the presence of 35 species of mammals, 90 species of birds, and 15 species of reptiles and amphibians. That’s only 40 percent of the possible species.

If you want to encourage the presence of a particular species, there is information available through state fish and wildlife agencies to help you get started. Keep in mind that the task will be different if, rather than a songbird, it’s a large mammal you’re interested in because you probably do not own enough land to serve all the needs of the large mammals – deer, moose, black bear – whose ranges are measured in square miles rather than acres.

Fifty of the resident vertebrate species have ranges larger than 50 acres, so landowners will be able to provide only part of their required land base. These species include the wide-ranging predators and carrion-eaters – both mammals and birds – along with a range of others including the loon, wild turkey, and pileated woodpecker. In this case, it’s a collection of many adjacent landowners who hold the key to habitat.

“More and more, we as a people are very interested in the large landscape creatures. Isn’t it time we started thinking about the large landscapes?” said Charles Johnson, former Vermont state naturalist and author of *The Nature of Vermont*. “People really need to be thinking about the larger picture and where they fit into it. For bobcats and bears, for instance, it’s essential to have large stretches of continuous forest cover.”

Johnson cites new houses being built on hitherto unpopulated ridges and hilltops as the most serious impediment to continuous forest cover, an opinion shared by Yamasaki. She said, “Traveled roads are barriers. That’s why the White [Mountain National Forest] gates logging roads when the work is done – so there’s no traffic. But a woods road is not fragmenting if people are not driving on it. Animals will walk across it, no problem. The problem comes when there’s a change in usage and people are driving on it every day.”

Evaluating habitat

If the key to good wildlife habitat were to be summed up most succinctly, it would be in one word: variety. Beyond being the spice of life, variety is the single most important factor in determining whether wildlife will find your patch of woods hospitable. And that

“More and more, we as a people are very interested in the large landscape creatures. Isn’t it time we started thinking about the large landscape?” —CHARLES JOHNSON

variety has to be considered on a number of different scales, ranging from a patch of less than an acre up to the entire landscape.

The first step in evaluating your land is to get the big picture, both figuratively and literally. Yamasaki said, “The larger landscape is the first thing to consider. Is it forested? Is it mixed farms and forest? Is it suburban?” The wider look at the landscape allows you to determine whether your land is typical of what surrounds it, or whether it may provide some unique features.

“Look for things that have inherent diversity,” Yamasaki said. “What is there besides woods: are there aquatic or wetland situations, are there any strikingly different elevations? That’s the stuff you either have or you don’t have; you’re not going to make any more of it. The more interesting the mixture of those things, the more interesting the piece of land is going to be for critters.”

How large a landscape do you need to be thinking about? As a rule of thumb, Yamasaki recommends that you know what an area 10 times your own acreage looks like. If you are the typical forest landowner and own approximately 50 acres, then you should take a look at topographical maps and aerial photos that cover at least 500 acres.

Aerial photos and topographical maps are available for the entire region. Your local offices of the extension or county forester or the Natural Resources Conservation Service can help you obtain aerial photos of your land. They are helpful tools in looking at your own land and placing it in the larger context. They’re also great fun. If a forester has developed a management plan for your property, the map that accompanies it will be invaluable. Photocopy it and add details to it as you discover more about your land. As you look at these maps or photos, it’s variety that you are seeking: variety in elevation, in land cover, in forest type. If, for instance, your reverting pastureland is the only open land in the area, it can have tremendous significance for any number of grassland birds, including the bobolink and eastern meadowlark. If, on the other hand, your land is part of an unbroken stretch of sidehill hardwoods or bottomland spruce-fir, then your challenge will be to introduce some variety through your management choices.

Charles Johnson also recommends looking at soil maps and bedrock maps, which can help you recognize an anomaly on your land. It may be that your land serves as a deer wintering area or that it holds endangered plant or animal species. These, too, are mapped and available from the state fish and wildlife departments.

Mariko Yamasaki said that the different styles of landowners’ use of their land over the years has precluded uniformity of habitat. “In New England, the intensity of management has not been uniform. Because of different outlooks and different types of landowners, the likelihood of managing stands all alike is really low.”

She notes that other parts of the country don’t have the built-in mix that is so important in the Northeast’s landscape. “The terrain is extraordinarily heterogeneous, sites are extraordinarily

heterogeneous, the landscape is changing dramatically every 5 to 10 acres, and so it’s harder to be absolutely uniform. However, having said that, the tendency of a new kind of landowner to want New England to look like untouched woods does have an effect over time, and that’s what we’re seeing.”

The effect of a societal preference for a mature forest is particularly apparent in the southern part of the region, where land is owned increasingly by people with urban or suburban attitudes toward logging and forest management. There, the forest can be markedly lacking in an understory, which provides food and cover for so many species. The opposite is true in large sections of the industrial forest in Maine, which is dominated by young, early successional forests. There, the challenge is to find the late-successional stands that dominate southern Vermont, New Hampshire, New York, and Maine.

“People are talking about unbroken forest canopy being the epitome of what folks in New England want to see,” says Yamasaki, “but frankly, from a wildlife habitat perspective, this is Boresville. It’s horrible! There are reasons to do that, but there are a whole lot of reasons not to make it the only tool in your bag.”

The party in Boresville – the break in an otherwise unbroken canopy – comes either from natural disturbances such as ice storms (remember January, 1998?) or windstorms that blow down sections of forest, or forest management that imitates nature by removing patches of trees.

Variety. Diversity. Heterogeneity. Once you’ve gotten acquainted with the bird’s-eye view and you can see whether your land provides any variety on the landscape scale, it’s time to take a walk so you can see what it all looks like on the ground. And the good news is that one walk won’t be enough for you to get the complete picture.

A walk in the woods

Many people who take walks in their woods have developed a routine. Maybe there are logging roads, trails, or other kinds of woods roads that serve as the regular route. Or there are particular stops along the way that just have to be made – the hilltop opening with a great view, or a favorite huge old tree. Contrast that with the way a forester conducts a timber cruise, which is to lay out a grid over a map of the



STEPHEN LONG

Mariko Yamasaki

Water, Food, and Cover

Water, food and cover are the essentials of life for any species. Water comes in many forms, whether standing in ponds and lakes, running in streams, brooks and rivers, or pouring forth from the ground in a spring. Its more ephemeral forms – rain-soaked shrubs or dewy grass – can meet the water requirements of many small species.

The forest is full of food. From beneath the ground to the forest canopy, there is a tremendous variety of food. Animals eat parts of plants that range in size from grasses to trees: they eat the leaves, stems, buds, flowers, and seeds of trees, shrubs, forbs, and grasses. They eat fungi, mosses, lichens. And they eat each other.

The relationship between predator and prey is at the heart of habitat, which makes it nearly impossible to talk separately of animals' needs for food and cover. It's true that animals require cover from the elements – they need shelter from heat, wind, cold, and precipitation. But more important – literally, of life and death importance – is the need for cover from predation.

The predator-prey relationship determines the habitat choices that nearly all animals make. Predators are seeking prey. Prey animals are seeking food and always aware of cover that will make them less vulnerable to predators. At specific times, they are looking for different kinds of cover: travel and escape cover is different from roosting or sleeping cover. Depending on who is the prey and who is the predator, cover can take many forms. Tunnels provide voles with cover from most of the mammals and all of the birds that prey on them. Thick stands of hardwood saplings provide grouse with shelter from their chief avian predator, the goshawk. Thick stands of softwoods and brush keep rabbits and hare safe from fox, coyote, bobcat, and lynx. A lone spruce in an otherwise deciduous forest is a magnet for nesting songbirds. For their nest sites, hen turkeys look for low shrubby cover next to a tree or stump.

When you think of predators, the region's larger ones – coyotes and bobcats – come to mind. But think smaller, too: fox; fisher, mink, and other weasels. Think beyond mammals: owls and hawks. And if you're willing to

recognize invertebrates as prey, then it becomes wide open: turkeys eat grasshoppers, woodcocks eat worms. Insects are a staple for many songbirds, if not throughout the summer, at least for their broods. The strict herbivores in the crowd are few: a dozen or so mammals and fewer birds. Not a single reptile or amphibian in northern New England relies solely on plants.

Why is this so important?

"Prey has to be available," Mariko Yamasaki said. "Predators have to have something to eat, and there has to be some predictability in the likelihood that they'll find something to eat if they wander through [a particular area]."

Some of her research at the Bartlett Experimental Forest in the White Mountains of New Hampshire has been on the small mammal prey base that serves the needs of the small- to medium-sized predators. She said that six species of small mammals supply 95 percent of the biomass that's available to be eaten: short-tail shrew, red-backed vole, masked shrew, woodland jumping mouse, deer mouse, and white-footed mouse.

What about the bobcat, whose numbers are decreasing across the area, and the lynx, which some organizations are trying to have listed as an endangered species? What about large carnivores like the mountain lion and the wolf that many people would like to see back in these woods? Said Yamasaki, "These are big area wanderers, hundreds of thousands of acres for some of these things. Again, prey has to be available."

And while society's concerns for safety and possible economic loss will have a lot to say about whether wolves and mountain lions are welcome in the Northeast, their presence and that of bobcat and lynx is tied to the existence of a viable prey base. The lynx relies particularly on snowshoe hare, but hare populations are down, largely due to loss of habitat. "People in New England are not doing a whole lot to make the prey bases attractive enough to hold the larger carnivores. There's less regenerating forests and consequently there's not as many bunnies. The New England cottontail is close to being listed [as an endangered species]. They love abandoned farmland, they love real brushy dense hardwood regeneration. The more you make the cuts smaller, the less regeneration, and the less opportunity for snowshoes and others to get by in and flourish. And it's not just the large carnivores; there's a whole slug of species – owls, for instance – that are tied into what rabbit and hare are doing."

land, identify the sample plot points, and then head out with a compass to examine the woods from that series of pre-determined points. It's a thorough and scientifically sound method for getting detailed information about the woods.

I'm not suggesting that you set up a grid of plot points for the exploration of your woods, but you should adopt the *spirit* of the forester's timber cruise, if not its rigor. Cover the ground systematically. Above all, get off the trail. Explore areas you habitually bypass. If you do, it's guaranteed that you will see your land with new perspective.

What are you looking for?

On your first pass through, get the general impressions. Observe on the ground what you will have already seen on your topographical map and your aerial photos. See how the non-forest areas that showed up in the photos make the transition to the adjacent forest. Try to develop an eye for the stands, that is,

groups of trees that are about the same size and the same dominant species. Notice the size of the trees and their density. See if you can note when the forest changes in appearance. It can change in type or it can change in the size and relative density of the trees. Thus, you could find yourself going from a mature saw-timber stand of northern hardwoods into a pole-sized stand of aspen and paper birch and then into a mature stand of white pine. Take along a field guide if you need help identifying tree species.

If you don't have a management plan prepared by a forester, sketch out a map as you make the rounds. Photocopy and enlarge the topographical map of your land, draw the boundaries and, using the openings, streams, or other features that show on the topo map, sketch in your stands.

Besides doing the mapping, Charles Johnson recommends taking an inventory of the species that are present. In winter, migratory birds will be gone and reptiles and amphibians will be

hibernating, but you'll be able to see tracks of mammals and birds like the grouse and turkey. For the breeding bird survey, June is the best month. Contact your local Audubon chapter and see if a volunteer can come along and help you with bird identification. Carry a notebook and make note of confirmed species.

Said Johnson, "People hear the word 'inventory' and they're afraid that they're looking at days and days and days. You can make predictions that if it's all sidehill northern hardwoods, it's going to be more or less the same as far as wildlife goes, so you can spend little time there. But the anomalies on your land might show some interesting things. If you have identified them beforehand – maybe you have a vernal pool or a swamp in the midst of an otherwise continuous stand of mature hardwoods – then you can concentrate your effort there."

Horizontal and vertical diversity

One of the more subtle features that you'll be looking for on your walks is horizontal and vertical diversity. One way of understanding these concepts is to think first of a football field, because it has neither. It's flat, is made up of two dimensions, not three, and growing on it is an unbroken monoculture of Kentucky bluegrass. I suppose you could call the yardline markers an interruption in the otherwise sameness of the horizontal plane, and you could call the goalposts vertical diversity, but let's not. One other good reason to think of a football field is that it is approximately an acre in size (without the end zones, a football field covers 1.1 acres).

While it isn't utterly void of wildlife – robins are finding worms, and moles are tunneling beneath it unless the groundskeeper has found a way to control them – a football field has grave limitations. But with that flat, grassy area as a starting point, there are a number of ways to improve on it. First, you can't consider it on its own, outside of its context. If it is bordered by woods, chances are there are bats roosting adjacent to it who will fly out at dusk and pick off insects. Swallows, too. Deer may even come out of the woods and graze if the groundskeeper lets the grass get long between games. Place it in a city, surround it with stands and lights for night games and suddenly you have a lot of birds. Naturalist Ted Levin of Thetford, Vermont, has documented 16 species of birds while watching a game at Yankee

Stadium. (Yes, the Yankees play baseball, not football, but trust me, that doesn't make a difference.)

So even a flat, grassy surface has some merit for wildlife. For the moment, let's forget about the surrounding context, and let's make improvements in the diversity of the field itself. The first thing we'll do is add a stand of hardwoods between the goal lines and the 30-yard lines. Between the 30 and the 40, make it a pasture that hasn't been grazed for 10 years. And between the two 40-yard lines, add a stand of softwoods. By changing from hardwood to pasture to softwoods to pasture and back to hardwoods as you go from one end of the field to the other, you have created horizontal diversity. However, there is no vertical diversity, unless the stands we placed there have it within them.

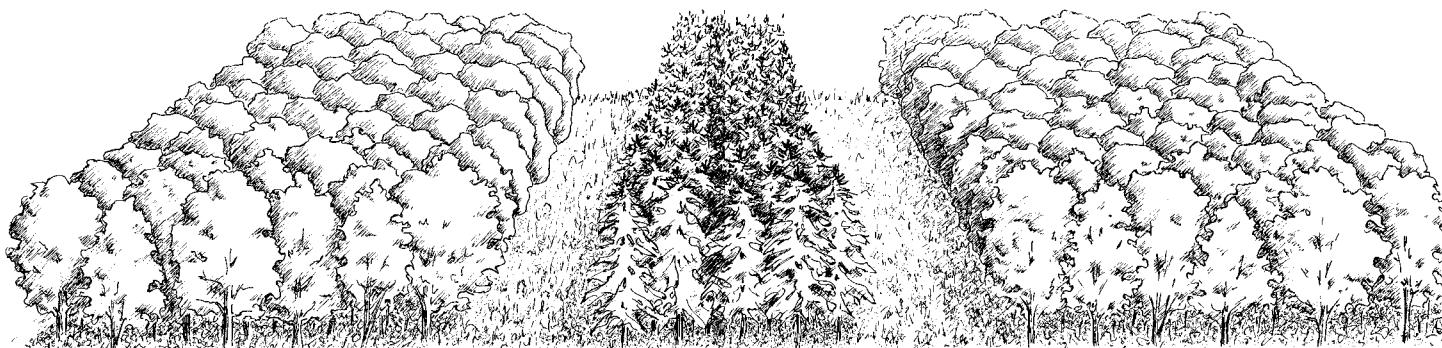
Since we're playing God, let's go ahead and do it. In the hardwood stands, let's have about 60 percent canopy cover. The trees are 12 to 16 inches in diameter and the tallest are 60 feet tall. In the openings among them, there are hardwood saplings growing among thick patches of shrubs. Shadbush and dogwoods get a chance at the edges. In other places, there are trees that regenerated 30 years ago; they're not quite half as tall as the sawtimber, and only four or five inches in diameter. In the softwoods, let's interrupt the dominance of the mature spruce with some patches of regenerating spruce and fir. They're three or four feet high and so thick they're hard to walk through. Paper birch and pin cherry are interspersed in the softwoods. And there are brambles and other sun-loving shrubs. Suddenly, at all the levels – from the forest floor to the canopy – there is food and cover.

Then, along the transitional edges between the mature softwoods and the pasture, let's put some pole-size trees, and since there is a good adjacent seed source, we'll scatter some softwood seedlings in the pasture among the knee-high grass, juniper, mullein, and thistle.

Let's jack up one corner of the field so it's 30 feet higher than its diagonally opposite corner. And let's have a small stream find its way from the top corner to the lowest corner. Winding its way to the stream from one of the other corners, let's have a woods road that naturally reseeded itself in a combination of wildflowers, grasses, and other herbaceous plants.

Of course, that's an utterly unrealistic preponderance of

Here's the football field after we've put in the stands of trees, providing horizontal diversity, which is crucial for wide-ranging animals. Traveling from (or over) one end of the field to the other, an animal would encounter hardwoods, then pasture, softwoods, pasture, then hardwoods again.





CHARLES H. WILLEY ©



CHARLES H. WILLEY ©

Both moose and wood duck are drawn to beaver ponds.

diversity for a single acre of ground. Also, lines between stands are never this clearly defined, unless one of the stands is a plantation. It's much more likely that the kinds of changes I've described would take place on a scale of at least 30 or 40 acres.

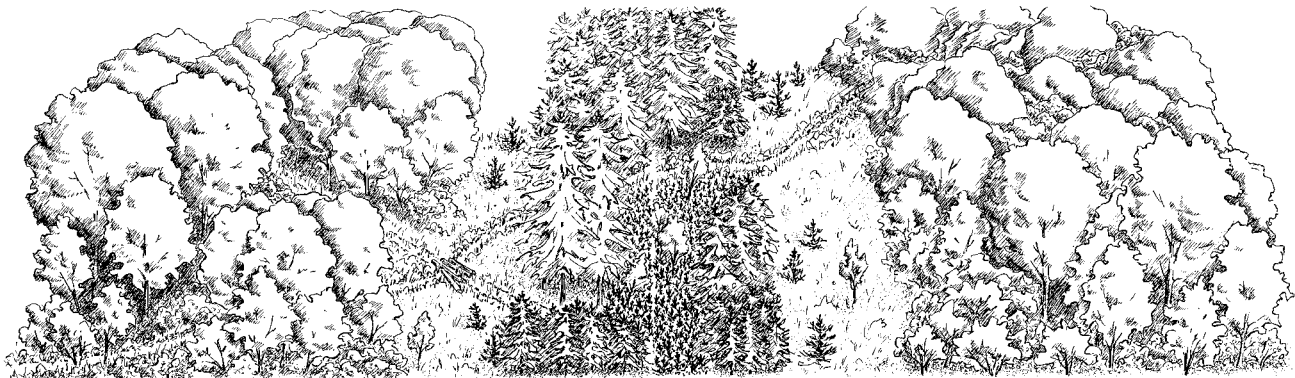
But the forest we've assembled is now full of diversity, both horizontal and vertical. For wide-ranging mammals (predators, along with deer and moose) and birds (raptors and carrion eaters, for example), it's the horizontal diversity that's so important. They need a variety of cover, and thus food sources, to travel through or above. Just as it would be hard for a red fox to eat, drink, and sleep on a football field (even if we extended it to the fox's home range of 400 acres), it would be equally difficult for

the fox in a 400-acre stand of mature hardwoods with little or no understory.

For forest birds, it's vertical diversity that is crucial. The wood thrush, for example, sings from the canopy, nests in the mid-story, and feeds on the ground. Almost all – if not all – songbirds use more than one layer for feeding, roosting, breeding, nesting, and raising broods.

Complex three-dimensionality is at the heart of habitat. And the more complex the structure of the forest, the greater diversity of animals whose needs will be filled there.

Much greater complexity comes from adding vertical diversity within the stands. The more complex the structure of the forest, the greater diversity of animals whose needs will be filled there.



ILLUSTRATIONS BY BESSY BRIGHAM

A checklist

Finally, as you walk through your woods, use this checklist and make note of special features, ranging from landscape scale to individual trees, that are a boon to many species of wildlife. Add these features to your map.

•**Deer wintering areas.** These are mapped by state fish and wildlife departments. One sign that deer are using an area in winter is overbrowsed hardwood saplings (thick branching makes them look broomy) within primarily softwood stands. Deer are such efficient generalists that they can find food and cover almost anywhere nine months of the year. Winter habitat is the only limiting factor; without it, there can be large winter kills in prolonged periods of deep snow and below-zero temperatures.

•**Wetlands.** Swamps, marshes, bogs. Wetlands are home to a tremendous variety of plants and animals; these special biotic communities are found nowhere else. Animals are drawn by water, thick cover, and food including invertebrates and plants unique to wetlands.

•**Vernal pools.** These are specialized wetlands – depressions in the forest floor that hold water only in spring. Void of living vegetation but perhaps containing some fallen woody debris, they are very important habitat for a number of species of salamanders, frogs, and invertebrates such as fairy shrimp.

•**Rivers or streams.** Not only the watercourse is important but also the riparian zone along rivers and streams, which serves as a travel corridor for many species.

•**Lakes, ponds.** Shorelines have some of the same qualities as riparian zones. They also provide nesting sites for waterfowl. If the lake is large enough, it might have loons.

•**Beaver ponds.** True magnets for wildlife ranging from moose to muskrat. Waterfowl, songbirds, reptiles and amphibians, herons, otter, mink – all are drawn to the cover, food, and water the beavers create.

•**Woodland seeps or springs.** Particularly important for salamanders, they are also sought out by turkeys, bears, and migrating birds in the spring. Seep vegetation is the first to green up, and the surrounding ground is the first to thaw.

•**Dead and down wood.** Decomposing trunks, limbs, and stumps are used by many species of reptiles, amphibians, birds, and mammals. They provide cover, moisture, nest and den sites, and food in the form of insects, mosses, and lichens. This is a very important and easily overlooked habitat feature.

•**Stone walls or cellar holes.** Besides being remnants of our past, these can provide safe openings for ground-dwelling animals like snakes and burrowing mammals, and hiding places for chipmunks and mice.

•**Groves of beech or oak.** The seeds of all trees provide food, but beechnuts and acorns are a critical source of protein for animals preparing for winter. Before entering hibernation, bears load up on beechnuts if they are available. Their claw marks will still show many years later in the beech's smooth bark if they have climbed it in search of nuts. They also gorge on acorns, as do deer, who need to put on fat to get them through winter. Beechnuts and acorns, known as hard mast, are also eaten by turkeys.

•**Soft mast.** Many trees and shrubs provide fruits and berries,

and hundreds of species rely on them. Particularly important are cherries (from the black cherry to the pin cherry), blackberries, raspberries, and wild apples, either as single trees or old orchards. Wild apples are a particularly important late-season food.

•**Overstory inclusions.** A few softwoods within a predominantly hardwood stand provide cover and nesting sites for birds. Hardwoods within softwood stands provide food. Either one provides structural diversity.

•**Large cavity trees.** Woodpeckers are the excavators, but the cavities they make are then used as nest sites for many birds and den sites for mammals. Songbirds, squirrels, bats, weasels, owls, and raccoons are among the many species that use cavity trees. As the crown dies back, cavity trees are used as perches and roosts. When looking for cavity trees, think also of those in the future. Prime candidates are injured trees and those with a limb broken off. Think also of leaving large trees in your woodlot, those that are too poorly formed to be a sawlog and too big to be handled as firewood.

•**Raptor nests.** Hawks and owls nest high in the canopy, making their own nests or re-using other species' nests of twigs and sticks. Many of the nests are used repeatedly year after year, especially if there is a minimum of human activity near the nests during breeding season.

•**Cliffs and ledges.** Important niches for bobcats, which have had much of their habitat usurped by coyotes.

•**Rare plant or animal sites or communities.** This is the one feature that will probably require outside help to identify, but your legwork can get the process started. If an area looks substantially different from its surroundings, take note of the species of plants. Check with your state natural heritage office (most likely within the fish and wildlife department) or with The Nature Conservancy to see whether there are any rare sites mapped on your land. Depending on the state, these range widely from floodplain forests to white cedar swamps to natural stands of red pine.

Observing, understanding, and mapping the features of your land can be an end in itself, or it can be the first step in developing a management plan. Your forestland's potential can best be realized if you enlist the services of a forester.

STEPHEN LONG IS CO-EDITOR OF *Northern Woodlands* MAGAZINE.

Author's note: In researching this article, I have found the following publications to be particularly helpful:

New England Wildlife: Management of Forested Habitats, by Richard DeGraaf, Mariko Yamasaki, William Leak, and John Lanier.

New England Wildlife: Habitat, Natural History, and Distribution, by Richard DeGraaf and Mariko Yamasaki.

Biodiversity in the Forests of Maine, by Gro Flatebo, Carol Foss, and Steven Pelletier; edited by Catherine Elliott.

Good Forestry in the Granite State, by The New Hampshire Forest Sustainability Standards Work Team.

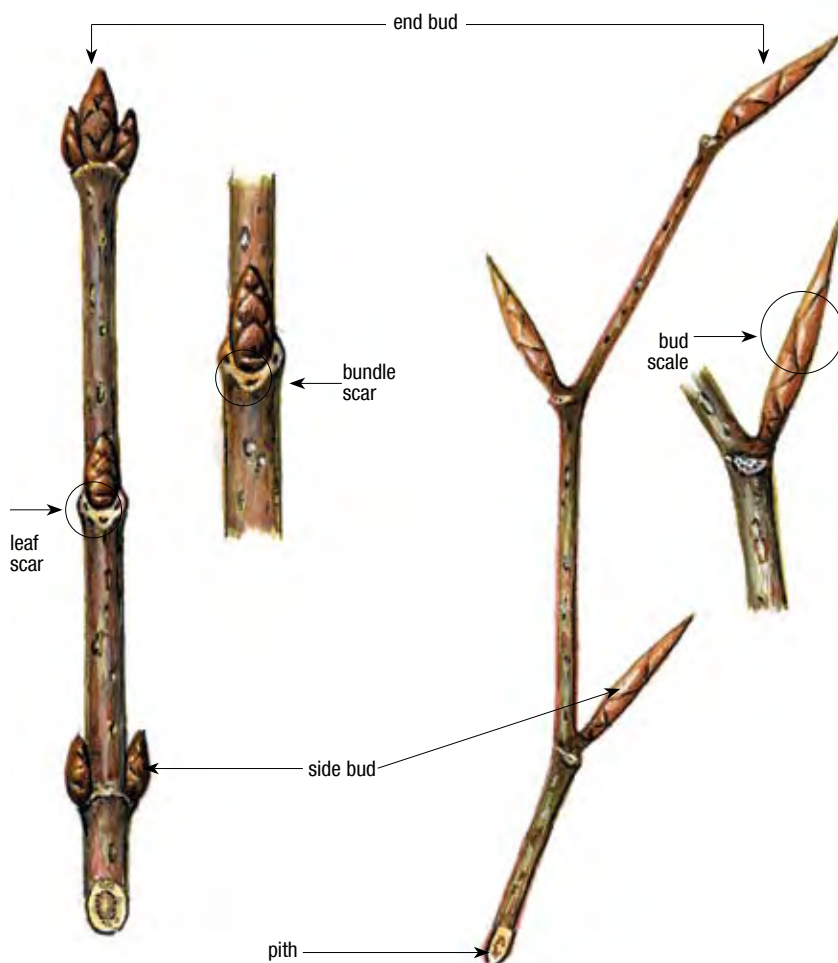
The Elements of Biodiversity, compiled and edited by Brian Stone and Scott Darling of Vermont's Agency of Natural Resources.

Sorting the Saplings

A Quick Guide to Winter Tree and Shrub Identification

BY ANA RUESINK
ILLUSTRATIONS BY
REBECCA MERRILEES

When winter's winds remove the multi-colored cloak of leaves from northern hills, most of us return our tree guides to the bookshelves. Without leaves, woody residents of the northern forest seem to lose much of their distinctiveness – especially the young ones. Where once we may have seen a forest understory of red maple, gray birch, and eastern hophornbeam, now suddenly we see nothing but “brush.”



Yet woody plants in winter are anything but featureless. A moment's scrutiny with a 10x magnifying lens or even with the naked eye reveals details, distinctions, and marvelous diversity. Identifying deciduous trees in winter – without their showy clothes on – can be one of the great joys of a cold, gray winter and an antidote to the first impression of dull uniformity that so often attends our visits to the winter woods.

Take along your magnifying lens and be sure to retrieve your field guide before venturing out to learn to identify the trees in your wintry forest. Sure, the jargon-rich entries can be a bit forbidding at first, like this excerpt from *The Illustrated Book of Trees* by William Carey Grimm, in which he describes eastern hophornbeam:

“The twigs are slender, more or less zig-zag, tough, dull yellowish-brown to reddish-brown in color, and either smooth or slightly hairy. There is no terminal bud, the lateral ones diverging at an angle of about 45 degrees from the twigs. They are ovoid, sharp-pointed and about 1/4 inch long; with from eight to 12 greenish-brown to reddish-brown, and longitudinally striate scales. Fruits may occasionally persist into the winter, and small catkins, usually in groups of three, are often present.”

But don't despair. The language and concepts are well within reach.

In deciduous forests of the Northeast, you could encounter roughly 70 species of trees. Considering woody shrubs as well adds another 80 species to the list. Daunting? Just be glad you don't live in the tropics, where woody plant species number in the thousands (and you're stuck with 12 months of bad skiing).

In some plant groups, such as maples and poplars, all the species can be easily identified in winter. In others, like oaks and roses, you can make a reasonable guess. In still others – willows, hawthorns, shadbushes – even a guess is difficult. In those cases, there's nothing to do but hunker down and wait for spring.

First learn the toxic plants – poison sumac and poison ivy – and avoid them. Then start with plants that you already know. Be systematic in your examination, noting twig arrangement, buds, leaf scars, tree architecture, and other features. Examine your twigs in good light, and use a magnifying lens if possible. The details will astound you! Raid your bookshelves and haul a few good guides out into the field. Or better yet, harvest a few twigs on your winter rambles and bring them home, where you can inspect them in good light and by the comfortable warmth of a blazing woodstove. In winter, there's no risk that your specimens will wilt.

Features to focus on

Numerous plant parts and features hold clues to tree identity in winter. Leaves, in truth, are distractingly obvious. Stripping trees down to the bare branches beneath frees us to look for nuance and subtlety, to invest all our senses in close examination, and to marvel at the deep blend of form, function, and beauty that is a tree.

Many trees in the northern forest have one or two striking features that permit easy identification in winter – consider the sticky, aromatic buds of balsam poplar, the lance-shaped, sharp-tipped buds of American beech, or the monkey-faced leaf scars of butternut. For the rest, you'll need to examine a suite of characteristics before making your final diagnosis.

Resist the temptation to look at bark for guidance once a woody plant's leaves are gone. Sure, you can see bark without a magnifying lens or a ladder, but that's the only easy thing about it. Distinctive lines, ridges, flakes, stripes, textures, and colors often aren't expressed until a tree reaches maturity and the bark has had a few decades to twist and split with age. In a stand of

saplings, bark won't help you distinguish hophornbeam from birch, cherry, or hazelnut. Other aspects are more helpful; here are some of the most useful features to focus on in winter:

- **Twig arrangement:** when first faced with an unknown tree in winter, check out the twigs. On most trees, twigs are attached in an alternating pattern along each branch. A few notable exceptions occur, in accordance with the so-called MAD Honey Principle. Woody plants in these groups – maple, ash, dogwood, and members of the honeysuckle family – arrange their twigs opposite to each other in pairs. There are spoilers in every kingdom, of course, and a small handful of woody plants have discarded the simple elegance of opposite vs. alternate in favor of a twig arrangement best described as “sub-opposite.” Look at common buckthorn for an example.
- **Bud arrangement:** bud characteristics can help reduce the list of possible species to one or several (see sketches). Find a representative twig and look at how the buds are arranged along its length. Like twigs and leaves, buds may be opposite each other in pairs, sub-opposite, or alternate. Note that these three elements function together – on any woody plant, the twigs, leaves, and buds are all either opposite, sub-opposite, or alternate. Alternately arranged buds usually spiral around the twig in two, three, or five planes. Bud size may be constant or it may vary from the base of a twig to its tip. Buds may hug the twig tightly or lean away at a 45-degree angle. Terminal buds may be solitary or clustered, while side buds may be crowded or sparse along the length of the twig.
- **Bud size and shape:** fat ones, skinny ones, shiny ones, hairy ones: buds exhibit a remarkable variety of shapes and forms. Each bud is, in fact, a short branch, and it may contain leaves or flowers or both. It may be a terminal bud, which contains the true growing tip of the branch, or a side bud, which does not. The buds of most woody plants are protected by scales, but in a few, such as witch hazel and hobblebush, the buds are naked.
- **Bud or twig color:** even in winter, the plant world has its share of flashy dressers. Look for the distinctive sulfur-yellow buds of bitternut hickory or the characteristic blotchy green twigs of boxelder. Most trees dress their buds and twigs in more subtle colors, but even browns, purples, and grays can be diagnostic against a white background of snow.
- **Leaf scars:** although leaves fall away in winter, leaf scars remain on the twigs to mark the corky place where a leaf was once attached. Leaf scars may be round, triangular, or elliptical; they may be enormous or hardly visible at all; they may encircle the bud like a cup, or the bud may perch daintily on top. In general, the largest leaf scars belong to woody plants with big compound leaves – such as butternut, hickories, and ashes.
- **Bundle scars:** on the leaf scar's surface, one to many small dots or lines present a variety of patterns. These are the bundle scars, where nutrients and water once passed between leaf and stem. Each tree species has a characteristic bundle scar design, and for a winter botanist equipped with a simple magnifying lens, bundle scars are a great aid in identification.

Recommended Field Guides

Campbell, Christopher S., Fay Hyland, and Mary L.F. Campbell. 1975. *Winter Keys to Woody Plants of Maine* (revised edition). University of Maine Press, Orono, Maine.

Cope, Edward A. and Walter C. Muenscher. 2001. *Muenscher's Keys to Woody Plants*. Cornell University Press, Ithaca, New York.

Harlow, William M. 1946. *Fruit Key and Twig Key to Trees and Shrubs*. Dover Publications, Inc., New York.

Trelease, William, 1979. *Winter Botany: An Identification Guide to Native and Cultivated Trees and Shrubs*. Dover Publications, Inc., New York.

- **Overall tree architecture** (for those who prefer the big picture): just as an expert birder can often identify a bird by its silhouette alone, a savvy student of winter trees can learn to recognize distinctive shapes and growth forms. Look for the graceful, vase-shaped form of American elm, the contorted branches of pignut hickory, or the irregular, zigzag branching pattern of black cherry. White ash generally sports chunky twigs and branches, while gray birch grows clumps of slender twigs sometimes described as “twigglers.” Of course, tree shapes are mainly useful for older, open-grown trees and shrubs. A young tree might look entirely unlike a grizzled veteran of the same species. But within limits, tree architecture can be a satisfying and successful way to learn your trees – especially larger trees that hold their twigs and buds beyond the reach of most magnifying lenses.
- **Unusual features:** several woody plants can be easily identified with a quick scratch-and-sniff. Two birches – black and yellow – smell sweet like wintergreen when their twigs are bruised, while cherries have an aroma best described as

rancid peanut butter. Other unusual features to look for include thorns (hawthorn, for example), spines (prickly ash), catkins (beaked hazelnut), persistent leaves (American beech), and persistent fruit (high-bush cranberry).

Go for it!

Once you’re comfortable examining winter features such as buds and twigs, you may find that these new skills come in handy during other seasons as well. Most winter buds are formed by July or early August, so bud and twig characteristics are useful except for a three-month period in early summer at the height of the growing season. And, of course, features like pith, thorns, spines, aromatic twigs, and tree silhouettes are always present for identification purposes.

So when the gray days of winter threaten to bring you down, head for the hills and enjoy the beauty in the “brush.”

ANA RUESINK IS AN ECOLOGIST AND CONSERVATION PLANNER WHO LIVES IN BURLINGTON, VERMONT.



Buds in opposite pairs: sugar maple (also typical of ashes, dogwoods, and other maples)



Spiral, three-ranked buds that hug the twig: quaking aspen (typical of other poplars as well)



Buds in sub-opposite pairs: common buckthorn



Spiral, five-ranked, equal-sized buds that hug the twig: black willow (typical of other willows as well)



Two-ranked* buds, with the largest buds at the tip of the twig: hophornbeam (also typical of hackberry and elms)



Spiral buds, with the largest buds clustered at the tip of the twig: red oak (typical of cherries and other oaks)



Two-ranked, equal-sized buds that diverge from the twig: American beech (also typical of birches)



Large end buds and few side buds: American basswood (also typical of shadbushes and apples)

*In two-ranked species, buds form at two sides of the twig; in three-ranked species, it’s three sides, and so on.

Current Use

Property Tax Program Helps Keep Working Land Well-Managed

BY DEB BRIGHTON

On the calendar of events marking the passage of seasons in the forest, we can reliably note the annual arrival of the property tax bill. Unlike some woodland-dependent species that may be threatened or endangered, the property tax bill is alive and well and growing with vigor. Fortunately for owners of Vermont forestland, the State's Use Value Appraisal (UVA) program offers some relief, bringing the tax bill's value and growth rate into line with that of the trees.

All real estate in Vermont – except those properties enrolled in UVA – is assessed at its fair market value, which is sometimes known as its “highest and best use.” The fair market value is determined by the market and is measured by recent sales of comparable property. UVA essentially replaces this market-based determination of “best” (many people disagree that what commands the highest price is necessarily best) with a declaration that the most important use of enrolled land shall be productive agricultural or forestry. As a result, enrolled land is assessed at its value for that use, which generally results in a reduction of 80 to 90 percent in its assessed value and resulting property tax bill.

UVA, sometimes known as “current use,” was born in the 1970s, after the Legislature heard testimony that farm and forestland was being sold for development because the property tax bills could no longer be supported by the returns from working the land. Recognizing the importance of farmland and forests to the state, the Legislature designed the UVA program to keep this working land in production by reducing the property-tax pressure to sell. Because the emphasis was on *productive* land, the program required management of the land and a manageable parcel size. To make sure the public expenditure didn't spur speculation, a penalty was imposed if the enrolled land was subsequently developed. Although there have been modifications over the years, the basic program remains today.

For forestland to be eligible, at least 25 contiguous acres must be enrolled. If there is a house on the property, at least two acres surrounding the house must be excluded, thereby making 27 acres the effective minimum size for houselots. The land must be managed according to an approved management plan and state standards. In general, this means: hiring a private consulting forester to develop a management plan; following the plan, including cutting trees when appropriate; filing a report with the state detailing management activities; and allowing the state to inspect the property.

The requirement for management has been controversial at times. Some forest owners prefer not to cut trees, and, although recent changes in the law will allow certain ecologically sensitive areas to be exempt from timber harvesting, the thrust of the pro-

gram is still to manage for timber. Other landholders don't want the government telling them what to do on their private property. This seems to be a long-time Vermont tradition. In 1909, *Rutland Herald* editor H.L. Hindley characterized the Vermont farmer's perspective on creating a State Forester position as: “Hain't a going to have no expert poking round my wood lots and telling me what I can't do.”

Still, many landholders who have invested in their management plans and accepted the inspections have been pleased to find that in the process they have learned a great deal about their woods. In addition, the public can take some comfort in the fact that roughly half of Vermont's forestland, in parcels larger than 25 acres, is now managed according to state standards. Brian Stone, a recently retired forester who began work with the Department of Forests, Parks and Recreation before the passage of the UVA legislation, has witnessed the improvement the program has brought to the management of private land. Stone said, “The UVA program is the best stewardship program ever to have happened in the state – bar none.”

Farmland can also be enrolled in UVA, though the requirements are different. Agricultural land enrolled in the program is also required to be managed, but there is no requirement for a plan and there is no inspection. At least 25 acres of agricultural land must be enrolled, but smaller parcels may be enrolled if they are leased to a farmer or if they produce at least \$2,000 from the sale of farm crops. There are many special provisions for farms that are owned by people who qualify as farmers.

Once land is accepted in the program, the landowner can expect to enjoy fairly substantial tax savings. There are two use values determined by the state each year: one for agricultural land and one for forest land. In 2007, these values were \$146 and \$133 per acre, respectively. These use values are, on average, less than 15 percent of the value that otherwise would have been assessed. The use value can be closer to two percent of fair market value in towns that are particularly attractive to development, where forestland has been valued at \$6,000 or more per acre.

If the enrolled land is ever developed, subdivided so as to create a parcel smaller than 25 acres, or cut contrary to the management plan or standards, the landholder must pay a Land Use Change Tax. If the land has been enrolled for less than ten years, the Land Use Change Tax is 20 percent of the value of the developed land; if the land has been enrolled for longer, the tax drops to 10 percent of the value of the developed land. Note that the tax applies to the developed portion only. The most common application of the tax is when a landowner develops (and pays the change tax on) only a portion of the enrolled land. In this case, the rest of the land can stay enrolled if it still meets the minimum acreage requirement.

Right: Land enrolled in the UVA program must be managed according to an approved management plan. In general, this means hiring a private consulting forester to develop a management plan, then following the plan, including cutting trees when appropriate. Lower right: Vermont's "current use" program is designed to protect fields and forestland from development. One by-product of Vermont's working forest is the creation of recreational trails.



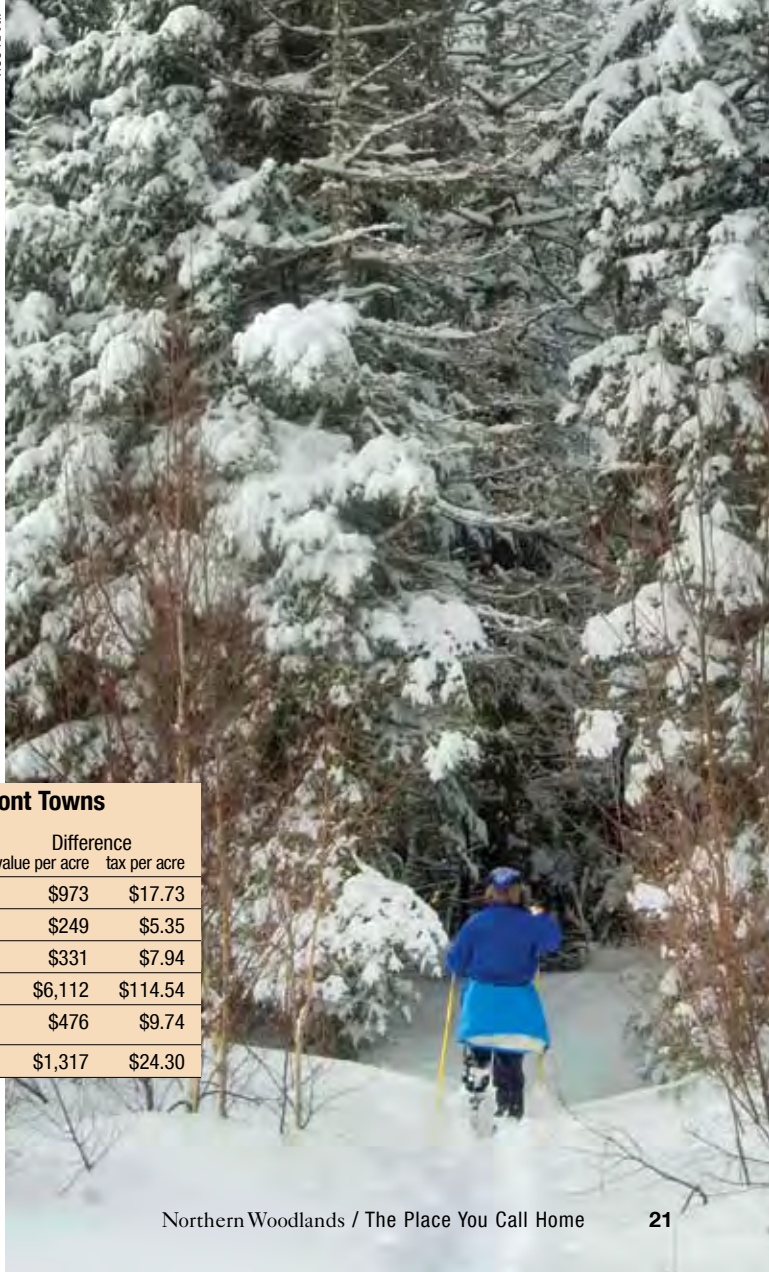
JIM BLOCK
JOHN DOUGLAS/FLYING SQUIRREL

Perhaps because of various attempts to change the UVA program over the years, there are several key points that are often misunderstood and worth noting:

- Enrolled land is not required to be open to the public. Posting is not prohibited. The only restriction related to hunting is that land used for fee hunting or fishing can't be enrolled.
- Although there are statewide property tax provisions that differentiate between Vermont residents and nonresidents, there is no such distinction in the UVA program. Roughly 20 percent of land in the state is owned by nonresidents, and a similar percent of the land enrolled in UVA is owned by nonresidents.
- Land encumbered with a conservation easement is eligible for the program and is assessed at its use value, just as other enrolled land is.
- There has not been widespread development of enrolled land. In 2007, the Land Use Change Tax was paid on less than one tenth of one percent of the enrolled land.
- The lower tax bill on enrolled property does not mean its taxes are shifted to the neighboring properties in town. Unlike other states, Vermont completely reimburses the host town for any tax revenue it does not collect as a result of the program. This means the state as a whole – as opposed to an individual town – shares the costs as well as the benefits of the program.

For more information about enrolling in the Use Value Appraisal program, contact your county forester. A list of county foresters is included in the Resource Guide on page 94.

DEB BRIGHTON IS AN ECONOMIC POLICY ANALYST AND THE FORMER DIRECTOR OF THE UVA PROGRAM.



JIM BLOCK

Effect of Enrollment in UVA Program on Property Tax in Six Vermont Towns							
Town	County	Without Use Value		At Use Value		Difference	
		value per acre	tax per acre	value per acre	tax per acre	value per acre	tax per acre
Bennington	Bennington	\$1,108	\$20.21	\$135	\$2.49	\$973	\$17.73
East Haven	Essex	\$354	\$7.62	\$105	\$2.26	\$249	\$5.35
Fair Haven	Rutland	\$466	\$11.17	\$135	\$3.23	\$331	\$7.94
Shelburne	Chittenden	\$6,255	\$117.20	\$142	\$2.67	\$6,112	\$114.54
Townsend	Windham	\$603	\$12.34	\$128	\$2.60	\$476	\$9.74
Tunbridge	Orange	\$1,449	\$26.73	\$132	\$2.43	\$1,317	\$24.30

This table, with figures from 2006, illustrates the significant savings a landowner enjoys when they enroll in the UVA program. Towns were chosen to illustrate the wide range in property values across the state.

A Look at the Season's Main Events

By VIRGINIA BARLOW

JUNE

JULY

AUGUST

First week

On fine mornings, honeybees may swarm, leaving the hive with the old queen. A new queen will emerge from the old hive and will mate with several drones high in the air / On hot, humid nights listen for the trill of gray tree frogs as they begin to congregate at mating ponds. With a flashlight and some patience, you can follow the calls to their source, often in trees or among shrubbery near ponds and marshes

One of the planet's most successful creations, the mosquito has been around for 50 million years. A female mosquito can suck up two and a half times her empty weight in blood / The fragrance of milkweed in bloom can be almost overwhelming. Bees, moths, wasps, butterflies, and even flies are drawn to its nectar / Look for the eggs of green frogs – floating masses of jelly with black-and-white eggs. Laid late, usually when the water is warm, they hatch within a week

Large dragonflies such as the green darner (*Ajax junius*) may replace flying with some gliding on hot days to prevent overheating their flight muscles / Ruffed grouse chicks are eating more vegetable matter and fewer invertebrates. High-protein insect food is the norm only during their first few weeks of life / On hot days the beautiful blue flowers of chicory will fold up by noon / Eastern newts can coexist with fish in permanent ponds, protected from predation by toxic secretions in their skin

Second week

Listen for the crash of big, chunky June bugs (they are really beetles) on window screens / Though the woodchuck can be a major nuisance in the garden, keep in mind that other animals such as cottontails, weasels, and red foxes use its burrows / Blackflies are among the many insects that are pollinating blueberry flowers / White pine leaders that are infested with the white pine weevil will soon wilt and become evident. Corrective pruning can be done any time / Peak of alpine bloom in the White Mountains

By now milk snakes have laid their 5-24 eggs. They will hatch from late August to October / Deer mouse population is on the rise. It grows from one mouse per 2 acres in spring to a high of 22 mice per 2 acres in autumn / New bumblebee queens are out / Damage by the larvae of alder flea beetles is clearly visible. The black caterpillars usually occur in innocuous numbers, but occasionally there is a population explosion. The cobalt adults overwintered and were feeding in the spring, before laying eggs

Backswimmers patrol the surface of ponds, nabbing mosquito larvae as they come up for air / White-faced hornet nests are getting bigger, as a growing population of workers adds layers of paper – made of chewed up, weathered wood – to the outside / Green frogs stay near water and will jump in with a splash and a yelp if startled / Chokecherries and the first blackberries are ripe, but black cherries are still green / Splashes of red are starting to show here and there on a few scattered red maples

Third week

Look for the yellow robber flies hanging around beehives, sometimes gobbling up pollen-laden bees as they come home from work / Cedar waxwings are choosing nest sites, usually near fruiting trees and shrubs. They may use pieces of string or yarn if you put them out / Sometimes young great horned owls tumble from the nest before they can fly and are fed on the ground by both parents / Shadbush fruits are ripe

Little brown bats may consume half their weight in insects in an evening. Look for them over wetlands or still water, where insects are abundant / Tall meadow rue is blooming, its feathery flower heads well above other roadside and marshy plants / Bullfrog tadpoles are transforming into adults. After spending two years as mostly vegetarian or scavenging tadpoles, as adults they will eat any kind of animal they can catch / Ambush bugs are hiding in flower clusters, waiting for unsuspecting honeybees

Flickers on the ground are picking off ants. Their sticky tongues can extend up to 2 inches beyond the tip of the bill / The fine airborne pollen of ragweed will be with us until the first frost / Chimney swifts will migrate soon / A fringe of stiff hairs on the hind feet of northern water shrews allows them to run across the water's surface / Yellow-bellied sapsucker parents are still with the fledglings. Unlike other woodpeckers, they don't excavate beetle larvae. Their major summer foods are fruit, ants, sap, and the inner bark of trees

Fourth week

When the population of arborvitae leaf-miners is high, you will see the tiny moths now if you shake the foliage of a cedar tree / Goldfinches begin building nests. They form pairs in May but delay brood rearing to coincide with the ripening of thistle seeds and other composites / Female garter snakes bask to optimize the temperature for their developing offspring. They will give birth from July to early August

Look for chipping sparrows in the cabbage patch. They love cabbageworm / If eastern chipmunks produce two litters, the second batch is usually born in late July / The summer diet of screech owls features large insects: moths, June beetles, katydids, and crickets. Outdoor lights may attract the insects and the owls / Toads are tiny – 0.3 to 0.4 inches long – when they transform into adults and leave their breeding pools / Blueberries are in fruit

Joe Pye weed (pink), boneset (white), and goldenrod (yellow) are flowering in colorful masses at the edges of wetlands / Juniper berries can be crushed as a seasoning for veal or roast lamb / Painted turtle eggs begin to hatch, about 65 days after they were laid, if they have escaped notice by skunks, foxes, and raccoons / Newly transformed northern leopard froglets, just over one inch long, are leaving water for grassy meadows

These listings are from observations and reports in our home territory at about 1000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.

A Celebration of Dead Trees

BY GALE LAWRENCE

I manage for dead trees.

Don't get me wrong. I don't actually go out and kill them, but when I see an aging giant showing signs of decline, or notice a top blown off, or look up to my ridge and locate the stark silhouette of the long-dead pine that marks my northwest corner, I perceive value.

The loggers and foresters among you might be getting nervous at this point, assuming that I'm some sort of fuzzy-headed tree-hugger who wouldn't know a board foot from a bird song. But I assure you that my 100 acres of woodland are under the supervision of a sane and reliable forester. Sawtimber production is the long-range objective of the management plan she has written for me, and I promise I will contribute a reasonable number of board feet to the wood supply. But because my own stated objective – right there on the first page of my management plan – is wildlife habitat, I could not do better than to prioritize my dead trees.

There's no danger of my becoming a necrophiliac, however. On the contrary, I am endlessly fascinated, amazed, and surprised by life, especially by watching the way life works in the wild. And, ironically, it is my dead trees that offer me the most life to look at.

First there is the life of the tree itself. If the dead tree achieved any size, it probably led a long and interesting life marked by the seasonal and annual rhythms characteristic of its species, including enough seed production to assure the perpetuation of its genes.

But trees, like human beings, reach a point in their lives when their vigor diminishes, their ability to resist diseases and insect attacks decreases, and they begin to decline. The difference between the way trees and human beings die is that trees take

In the last stage of death, fallen trees are broken down by fungi and other organisms until they return to earth and nourish the next generation.

much longer. A big one might spend a century dying and in the process serve wildlife in innumerable ways. I like to think of this extended dying as the tree's "death cycle," and to me it's every bit as interesting as the life cycle.

A tree's death cycle can begin with old age or it can begin earlier as the result of an injury or insect attack. As the tree begins to die, leaves or needles fall off the dead branches, creating exposed perches for birds. Predatory birds such as eagles, hawks, and falcons use these perches as lookouts. Flycatchers also use them. They feed by "hawking" insects – that is, by flying out from an exposed perch like a small hawk, catching a passing insect, and returning to the perch to eat it.

In the next stage of the tree's death cycle, the bark loosens, creating nesting opportunities for the intriguing little bark gleaners called brown creepers, who wedge their nests between the tree trunk and a shingle of loose bark. Bats also use loose bark to roost under during the day.

When the central column of the trunk begins to decay, the tree is ready for wood-

Dead branch stubs and rotted heartwood make it easier for woodpeckers to excavate a home.



KATHRYN LIND JOHNSON

peckers. They drill through the hard exterior wood and then easily excavate a nesting cavity in the soft interior. These cavities, which woodpeckers excavate anew every year, serve as winter roosts and future nesting cavities for the many species of birds that don't have the equipment to excavate cavities for themselves.

If the tree still stands tall after it has lost its bark and most of its branches, it is called a "snag." These snags can persist for years, providing perches and nesting and roosting cavities for generations of birds. If a snag breaks off or decomposes to a height of less than 20 feet, it is called a "stub." Stubs are often riddled with insects, which provide food for insect-eating birds, and when they become punky enough, they offer nesting opportunities to black-capped chickadees. Chickadees can't excavate hard wood, but they can chip away at and carry off bits of punk to create themselves perfect little nesting cavities.

Even after the stub falls or crumbles to the forest floor, the death cycle is not complete. Carpenter ants and other insects invade the decomposing wood, providing food for pileated woodpeckers and other forest dwellers. Amphibians, reptiles, and small mammals seek both food and refuge inside and under the rotting wood.

At this advanced stage of the death cycle, new plants often begin to grow from what's left of the old tree, transforming it into what's called a "nurse log." Finally, the nurse log is reduced to humus, contributing the last of its nutrients to the forest soil,

This pileated woodpecker is starting an excavation in a sugar maple.

By the time fungi fruit into puffballs like these, there is extensive interior decay in the host tree.



GERRY LEMMO

where they can be recycled into future trees.

The stage of the tree's death cycle that interests me most is what I call the woodpecker stage. That stage can begin long before the tree dies. All it takes is an injury. A portion of the trunk or an upright branch might be injured by wind, ice, fire, insects, or logging activities, admitting fungi that attack and begin decomposing the wood.

A healthy tree responds to the invading fungi by self-protecting. It compartmentalizes the decay so that whatever decomposition is going to occur can't move beyond a fixed boundary. New, healthy wood forms outside this boundary, and the tree continues to grow upward and outward with the rot contained in a central column that grows no bigger than the diameter of the tree at the time it was injured. This interior rot progresses only downward from the injury, creating a tree that looks and acts very much alive but has a lower, central portion that is decaying.

Woodpeckers are experts at detecting these trees. That's because these injured survivors are just as good at providing nesting cavities as dead trees are. The outside sapwood is still strong and healthy, providing good protection and insulation, while the inside heartwood is decaying, making a cavity easy to excavate.

Different-sized woodpeckers prefer different-sized cavities, so they look for different-sized trees. In Vermont, eight species of woodpeckers need cavity trees, but I can ignore three of them – the red-headed, the three-toed, and the black-backed – because they are relatively uncommon or rare. I do pay close attention to the other five and consider them indicators of the different size-class cavity trees that are available in my woods.

The downy woodpecker, for instance, looks for trees that are about 8 inches in diameter at breast height. For those of you who, like me, don't own Biltmore sticks or specially designed measuring tapes that can convert circumference to diameter, there is a relatively easy way to come up with a personal reference system that will help you ballpark the diameters of prospective woodpecker trees – and it's only a little bit embarrassing,

I said earlier that I am not a tree hugger. However, to estimate a quick diameter at breast height (DBH), I'm willing to do it. By hugging and measuring the circumferences of numerous trees and



NEO THERREIN



ROGER IRWIN



GERRY LEMMO

Above: Ruffed grouse use downed logs for drumming, their mating display. Right: This flying squirrel uses a hole made by a woodpecker.

then dividing by π (3.1416), I have learned that my own personal hugs range from 6 to 18 inches DBH. A skinny little 6-incher, I can hug all the way around and touch both shoulders. An 18-incher stretches my hug to its limits: the tips of my longest fingers can just barely touch on the far side.

I have come up with three intermediate-sized hugs that help me measure intermediate-sized trees: 8-inch DBH for downy woodpeckers; 12-inch DBH for hairy woodpeckers; and 15-inch DBH for the northern flickers. The pileated woodpecker's need for big trees, ones that are in the 22-inch DBH range, is humbling. Stretch as hard as I can, I can't reach around them – which pleases me. They make me feel small. Not diminished, just small, which, strangely enough, enlarges me, or at least rear-ranges my sense of scale.

If all this hugging and measuring is too much for you, you can simplify the program by focusing on only the biggest of your injured, dying, or dead trees. The smaller woodpeckers can readily excavate their nesting cavities in bigger trees, but pileated woodpeckers can't use smaller ones. So if you manage for big dead trees, you'll have the present taken care of, and all you'll need to do is retain enough smaller dying trees to provide replacements.

Actually, my personal woodpecker-based, dead-tree management program isn't too far removed from what the U.S. Forest Service does. According to Clayton Grove, wildlife biologist for the Green Mountain and Finger Lakes National Forests, most

“soft snags” – dead trees with most of their wood in an advanced stage of decay – are left for wildlife. In addition, four trees classified as “hard snags,” “den trees,” or “replacement trees” – trees just like those I wander around looking for – are left per acre. That means that I can feel perfectly justified in my pursuits until I find upwards of 400 dead, dying, and decaying trees.

Vermont's Fish & Wildlife Department suggests that we should try to leave at least one large-diameter den tree per acre, plus as many snags as possible, while observing human safety concerns, plus some live trees “showing signs of reduced vigor, broken limbs, or scars [because they] may be good candidates as replacement snags.” These guidelines, though less numerical than the Green Mountain National Forest's, are liberal enough to make me feel downright virtuous as I patrol my woods for what I have to come to call woodpecker trees.

If I had said at the outset that I manage for woodpeckers, I wouldn't have had much to explain. After all, woodpeckers – and most other cavity-nesting birds, for that matter – are insect eaters, so they are good guys. They contribute to the health of the forest and therefore to marketable sawtimber. But woodpeckers are so mobile and hard for me to count that I would have difficulty monitoring the progress or success of my personal management program. Because trees stand still and can be measured, observed, and evaluated over time, I feel more comfortable counting them. The truth is that I have perfect confidence in the woodpeckers' ability to manage themselves, if I can just assure them a healthy number of dead trees.

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GERRY LEMMO

This flat bark beetle eats insects and fungi beneath loose bark.

Consulting Foresters: What They Do and Why You Need One

By STEPHEN LONG



MICHAEL SILBERMAN



On a woods walk with a landowner, a forester will gather information for the management plan.

WHAT DO YOU THINK OF WHEN YOU SEE A SKIDDER PARKED IN A LANDING NEXT TO A LARGE PILE OF LOGS?

If you've never had the experience of having logging done on your land, the sight and sound of such an imposing piece of equipment could bring forth a shudder of dread. But every day across the region, logging contractors are using skidders, feller-bunchers, and cut-to-length harvesters to cut trees and bring them to market. And with a good relationship among all the key players – an informed landowner, an experienced forester, and a skillful logger – these timber harvests can bring about many positive outcomes: improved conditions for growing valuable trees, income for the landowner, diversification of wildlife habitat, establishment of a network of trails. But if that crucial relationship doesn't work out, things can definitely go wrong in the woods.

The problem often starts with a landowner who knows just enough about logging to get into serious trouble. Unschooled landowners see dollar signs when a logging contractor tells them that he will thin their woods for them and pay them good money for what he takes off their land.

Caveat emptor doesn't exactly apply here – the buyer is well aware. It is the seller who too often doesn't know the true value of the trees that are being sold or, more importantly, which ones should be sold. And if the logger is making the choice of which trees to cut, there is no incentive for him to cut those that have little value. But removing the poorly formed trees is an essential part of good forest management, because it gives the better trees more light, nutrients, and water.

Most forestry observers would concur that there have been steady improvements in the practice of forestry across the Northeast in the last decade or so. Still, there's no mistaking that forests throughout the Northeast have suffered for generations from a style of cutting that removed only the most valuable trees, leaving behind an impoverished forest. It's known as highgrading, and the best way to avoid having it happen on your land is to enlist the services of a good consulting forester.

Brian Stone, recently retired chief of resource management for Vermont's Forestry Division, says, "Most people are not qualified to make their own stock investments, and they know it. They need stock brokers to pay attention to what's happening and to use their expertise to make recommendations," said Stone.

"And when you have a toothache, you don't fill your own teeth. You go to a dentist, a specialist, someone who provides analysis, an assessment, an inventory if you will – someone who can advise you of your choices. It's the same with woodland owners. Very few can do the work on their own. It takes an experienced professional forester to make it happen. That doesn't mean handing over the responsibility. My best days in the field are spent walking with a landowner, explaining to them what they have and giving them options."

There are many consulting foresters in Vermont who will take that walk with a landowner. These foresters – trained in silviculture,

Consulting forester Lynn Levine and the Silberman family study a moose track.

forest health, statistics, surveying, ecology, plant identification, physiology, organizational skills, business management, and communication – are the best means of insuring that a landowner knows what he or she is getting into when the skidder and the log trucks start work. As the landowner's agent, the consultant represents the client's interests both in the short term – negotiating a contract with the logger and making sure the contract's conditions are met – and in the long term – marking the trees with an eye on the future forest.

Consulting foresters will do everything from drawing up the initial management plan to helping to plan the conservation of an estate. In between, they will manage timber sales, appraise land and timber, locate boundaries, and provide information about government programs that assist landowners. Probably the two most common tasks a consultant does for a landowner are preparing a forest management plan and administering a timber sale.

Management plans

At its simplest, a management plan describes the present conditions of the forest in terms of species, quality, and volume of the trees. It includes a map of the different stands of trees and notes whether any diseases are evident. It lays out a plan for the next 10 to 15 years' worth of harvesting activities and is intended to be used as a guide for any work that is done in that time. A useful management plan comes about through conversations between the consultant and landowner in which they discuss interests and philosophies and what the landowner wants from his or her land. It is not meant to be altered any time the landowner is strapped for cash but instead should provide the big picture of how the forest will change over time.

The management plan usually assumes there will be periodic timber harvests. When it's time for a timber sale, the consultant will handle all the details: helping to choose a logging contractor, preparing a timber sale contract, marking the trees to be cut, laying out the woods roads, and assuring that the details of the contract are met. In this capacity, the forester makes sure that the situation works well for both the landowner and the logger.

Many foresters also serve as tremendous sources of information on much more than timber sales. Lynn Levine, a consulting forester from Dummerston, Vermont, sees her job at least partly as an educator, and she's as comfortable wearing her naturalist hat as well as her forest management hat. One of the bonus services she provides her clients is keeping a journal of what she sees when she's at work on their land.

"People love to hear what I saw on their land: tracks and wildlife, unusual formations," she said. "Every client thinks that their land is the most special piece of land in the state. Walking around, they've gotten to know their land so well. They know that they saw a deer once down in that gully, and so that gully stays special to them. Or there's a tree over there that's been marked by bears. That's what they want to protect. That's why they own the land."

Levine's description of her clients corroborates the results of surveys that have been done in a number of states to find out more about non-industrial, private forestland owners. The



PHOTOS BY NED THERREN



surveys results show that the forests of the Northeast are owned primarily by people for whom the land is a place to take walks, to see wildlife, to have something beautiful they can call their own. Most aren't averse to the occasional timber sale, which they see as something that can help offset the property taxes. But growing sawlogs and making money from timber sales is not their top priority.

Levine has marked trees for three timber sales for John Whitman on his 280 acres in Readsboro, Vermont. Over the years, she has watched as Whitman has become more and more knowledgeable about his woods. She calls him her "super client" because he has enthusiastically taken on much of the improvement work himself. He releases apple trees and harvests all the firewood he needs through crop-tree release cuts.

Said Whitman, "When we

bought the land, it had been highgraded. It was overstocked, and the mature trees were basically low quality. I look forward with some pride to increasing the quality of the stands." Whitman would like to see some commercial rewards for improving his timber but is also very interested in his forest's capacity as habitat for wildlife. He is involved with Vermont Coverts, an organization that helps landowners increase their land's habitat potential.

"We have plenty of deer, and this past winter, a moose has been in. I've seen bear scat, and I tracked a fisher across the property. One of the pieces is a younger stand, so it has lots of rabbits, and there's the coyotes chasing the rabbits. So it's not one specific species we're targeting except perhaps the patch cuts that were specifically for grouse," Whitman said.

Levine has an active list of 200 clients; their forestland averages around 100 acres. When she is managing a logging job for them, she will see them regularly for a while, followed by a stretch when their only contact will be the letter Levine writes to every client in the winter. She works with a dozen or so loggers. "We've mutually chosen each other to work with," she said.

Before she handles the first timber sale for a client, she arranges to have a very frank talk. "I tell them: 'You hired me to handle this logging operation. I want you to know that I will make sure that the loggers do the least amount of damage that is possible. However, when they're done, you might be horrified by what you see. The stumps are bright, there's slash on the ground, the roads are denuded. There might be some skidder damage. There's always change.' People think of the forest as a place of no change, but there is constant change. I spell it out. And most people tell me after it's done that I prepared them so well that it doesn't look as bad as they expected.

"I make sure that the roads are put to bed, that the best trees are left to grow, that the road design is sensible. I am working with clients who are environmentally very sensitive. They're not sure they want this to be done to their land. It's not pretty. But I've trained myself to look up, to see what's left. And the difference is in the long run. Even the most sensitive people think that it looks fine in the long run."

In her years as a forester, Levine has seen steady improvement in the logging contractors who are doing the work. "The quality of work that loggers are doing today is so much better than when I first started. Now I go out on jobs and don't even have to mark where the waterbars should be. They're already in place. It's definitely been taken to a higher level."

Separation of powers

Ross Morgan, a consulting forester in Craftsbury Common, Vermont, agrees that loggers have recognized the importance of doing much more careful work, but he is quick to point out that that doesn't mean the forestry decisions should be left up to them.

"People don't like me to say this," he says. "But the fact is loggers are not out there practicing silviculture. The logger's job is to get the wood out and market it. It's the forester's job to practice good silviculture." An experienced logger will be just as interested in the outcome and will take great pains not to compromise the new forest by damaging the trees left behind. But in the division

Top: A forester uses a diameter tape to determine this tree's diameter. Bottom: Most consulting foresters develop long-term relationships with a handful of loggers and work with them regularly.

of responsibility that Morgan describes, it is the logging contractor's job to implement the cutting decisions (known in the trade as the prescription) made by the forester.

For Morgan, good forestry is a holy calling. He lives it, breathes it, and loves to talk about it. After many years working in the woods and as a college instructor, he is a frequent public speaker. When he stands up in front of a group in a jacket and tie, he proclaims them the only clothes he owns that aren't spattered in blue paint. He says proudly and cheerfully that his highest and best use is out there in the woods with his paint gun, marking trees.

"The idea of forestry is a guided and well-thought-out intrusion. Intrusion is a rough word, but in the right context, it's a good word, because what we're trying to do is intrude as human beings into a natural system to extract things we want. You start by understanding geology, soils, natural systems in terms of plant communities, and the animals that are part of them, and then you ask, 'How do I intrude into the system to remove products for human beings without destroying it?' If it's planned out and thought out honoring that natural system and its processes, then the damage to that system can be minimized."

The damage he wants to minimize is not only the temporary aesthetic changes that can seem so devastating. He is more concerned with the long-term damage that comes from cutting so heavily that the remaining stand is endangered, by compromising the regeneration of desirable species, and by taking only the best wood and leaving behind a forest of culls.

Morgan believes that the future of the forest relies on excellent silviculture practiced by a forester who has a combination of a good academic background along with the practical experience from years of making decisions in the forest. Brian Stone agreed, saying, "Forestry is not just technical know-how, it's not just reading all the books. I look at my forestry degree as my license to practice. Then I went out and learned *how* to practice. A good forester has the background and the experience to provide sound advice, service, and outcome."

Whether it's an even-aged stand that has resulted from field abandonment 70 years ago, or an uneven-aged stand brought about by a forester's work to bring its dynamics more into line with the natural system, the work of manipulating the forest is terrifically complex. It requires an ability to see into the future – as many as 100 years for hardwoods like maples – and to envision the stand's architecture at the various stages along the way.

"That intricacy, that delicacy is only done by those people who have studied these models, studied the system, marked trees in a hundred different situations, and come to these findings," said Morgan. "That decision can't belong to a logging contractor who has spent his life figuring out how to carefully get this wood out, how to cut this hitch, how to get it to the landing, how to do

Finding a Forester

Your county forester will have a list of consulting foresters for hire in your area. Contact information for county foresters can be found in the Resource Guide on page 94.

When you have some names, make some calls. Get a sense of the forester's working style and areas of expertise. They don't all know the same things: some are particularly interested in habitat improvement; some specialize in managing sugarbushes. If one sounds like a good match, make an appointment to get together. Most (not all) foresters will go for a woods walk free of charge.

Ask any potential forester for references. Get the names of three people the consultant has worked for in the last year. Talk to those landowners and ask if you can visit their woods.

Go for the walk. Look around. Taking Brian Stone's analogy of the dentist one step further, you can at least partly judge a dentist's or a forester's work by what they leave behind. Are the trees healthy and straight, or do they look like corkscrews? And while you may not be capable of evaluating the silviculture, you can get a sense of how careful the work was. Would you want your woods to look like this?

Most consulting foresters charge for their services in one of two ways: either they charge an hourly rate (most often it is between \$30 and \$60 an hour) plus expenses; or they take a percentage of the proceeds of the timber sale. The percentage will range from 10 to 50 percent; if the logs are bringing high prices, the percentage should be lower than if the logs are of poor quality. Charging a percentage is frowned on by some foresters, including Brian Stone. He said, "The theory is that with a high set of standards, someone won't consciously improve the condition of their wallet by making choices that are against the interests of the landowner. My opinion is that a percentage sale makes a forester want to cut more."

Clearly, it's a question of trust. Even under an hourly arrangement, there's no way to know that the forester is not padding his or her hours. Some foresters, Ross Morgan included, offer their clients a choice between the two methods. In general, there won't be much of a difference in the total bill, regardless of which way the services are tallied. Another variation is that some foresters find it convenient to bill for management plans on a per acre basis.

the marketing. When the logging contractor takes over the skills of the forester, I don't see good forestry being practiced. You can see some aesthetically pleasing jobs but not the details of good silviculture."

Like Levine, Morgan has a cadre of loggers who have worked with him for many years. Craftsbury logger George Allen said, "I'd rather have Ross mark the trees. I want to do a good job, and he marks the way they should be marked. When I first go in, I think I might want to take a few more of the bigger ones, but after going back to jobs we did a while back, I see why he left the bigger ones. What we're trying to do is grow three generations of timber. This way, I might be able to go back in 10 years and thin out some more."

Besides marking timber, there are plenty of the forester's tasks that many loggers are happy not to have to worry about, landowner relations being primary among them. No matter howregarious a contractor might be, having regular discussions about the job with the landowner can compromise his productivity. Most loggers have little interest in engaging in the kind of pre-harvest, heart-to-heart conversation Lynn Levine has with each client.

For his part, Morgan says that he doesn't have the skills to be a logger. "I'd be a drastic failure trying to get the wood out of the woods because I just don't have the background. I've cut a lot, I run a chainsaw, but I'm not a logging contractor. That's a very demanding and high-skilled job. Good work comes from the logging contractor's realization that I have a body of knowledge in silviculture, and my recognition of their immense skill to extract the wood. Good forestry practices are the linking of the skills of the logging contractor with the skills of the forester."

STEPHEN LONG IS THE CO-EDITOR OF *Northern Woodlands* MAGAZINE.



Birds in the Brush

THE LOWDOWN ON GROUND-NESTERS

BY BRYAN PFEIFFER / ILLUSTRATION BY ADELAIDE TYROL

THE OVENBIRD WAS AGITATED. AND WHO COULD BLAME HER?
I HAD UNWITTINGLY WALKED TOO CLOSE TO HER NEST.

She and her mate had chosen a rich stand of old hardwoods in Vermont's central piedmont. Foamflower, miterwort, and early saxifrage were in bloom up to my ankles. Forest openings were carpets of violets. Maidenhair fern, the most elegant plant in the woods, reached its semicircular fronds toward the sun.

The ovenbird is an unwarbler-like warbler. Olive above and heavily streaked below, this songbird looks more like a miniature thrush than a member of that glittering, lyrical family of birds, the warblers, or Parulidae. The one dashing feature on the ovenbird is its orange racing stripe – edged in black – running from the forehead to the nape. When excited, the ovenbird will sometimes raise the feathers on its head, making its point with a pumpkin-colored Mohawk hairdo.

My approach certainly made these ovenbirds excited. The female prepared to defend her nest. The male flew to a sugar maple at the edge of his territory and began shouting, with a full crescendo, his penetrating *TEA-cher! TEA-cher! TEA-cher! TEA-cher!* – one of the most enduring and revealing sounds of the northern hardwoods.

What isn't so revealing, however, is the ovenbird's nest site; it's hidden on the forest floor. And that is hardly unusual among birds. A good number of our songbirds, even those ordinarily foraging high in trees, nest on the ground or a few feet above in the shrub and sapling layer. Their presence provides convincing evidence that life in healthy woodlands – everything from songbirds to salamanders – does not thrive by tall trees alone.

To be sure, the planet is sprinkled with ground-nesting birds: loons, most duck





Black-throated blue warbler eggs

species, geese, sandpipers (the solitary sandpiper, which uses deserted songbird nests in trees, is a notable exception), gulls, terns, and jaegers, just to name a few. Many of these birds nest on the ground because they like to be near the water's edge or simply because they breed in treeless areas of the arctic.

Consider as well some birds that nest *in* the ground. Oceangoing petrels squirm into burrows at the seashore. Alcids – murrelets, razorbills, and guillemots, the so-called “penguins of the north” – nest on seaside ledges or in rock crevices, although one of the most famous alcids, the Atlantic puffin, prefers burrows. Belted kingfishers excavate horizontal burrows into vertical banks near water.

More surprising, however, are the numerous members of bird families normally associated with lofty trees – vireos, wrens, thrushes, warblers, and certain sparrows – that nest on or near the ground. After all, these birds belong to the great order Passeriformes, or Passerines, the perching birds, so named for their having four toes – three facing forward and one (the inner, corresponding to our big toe) facing backward – designed for perching on branches. (Feet are important in bird taxonomy – consider the finer points of the hawk's foot or webbing on a duck's foot.)



Ovenbird

“People really don't think much about the fact that birds nest at different levels in the woods,” says David Capen, a professor of wildlife biology at the University of Vermont. “Woodland owners often assume that since a bird can fly, if it doesn't have a place to nest at two feet it will just move up to eight feet.”

Recall from high school biology class the lessons on ecological niches. We all know that living things are opportunistic. They'll go where they can find food or nutrients, where they can survive and reproduce. In the woods, few vacancies go unfilled – from canopy to soil. Yet how do songbirds survive down there? It would seem that ground-nesting species are at a certain disadvantage to their more arboreal cousins. Raccoons, skunks, opossums, coyotes, foxes, rats, mice, house cats, and even humans are well-known, ground-dwelling predators of bird eggs and young. But ground-nesters prosper nevertheless. And like any creature, they adjust to life in the leaf litter with some clever adaptations – ranging from camouflage to outright trickery.

Rewind to that pair of ovenbirds. Their backs were the color of fallen leaves. The female, somewhere on the forest floor, blended in like a leaf in a forest. That's a shared strategy for ground-nesters: their uppersides tend to be the color of their habitats – brown, tan, olive, or green.

The hermit thrush, which nests on or near the ground in softwoods or mixed woods, is olive-brown on its back. The mourning warbler, nesting low in the shrub in open deciduous woods and wetland edges, may be bright yellow below, but gray and green uppersides make it more obscure to predators above.

The male black-throated blue warbler, which nests in the shrub layer in hardwoods, is metallic blue above – not exactly the right color for hiding in hobblebush. But the female black-throated blue is downright drab for a warbler – overall gray-green. And if you're a black-throated blue warbler sitting on eggs all day, not being blue helps you and your offspring stay alive. This sexual dimorphism – the more cryptic female plumage in many, not all, songbirds – is a wise adaptation in any nest location, high or low in the forest.

Even though I could hear that male ovenbird shouting at me, I never actually saw him. Ovenbirds have another advantage that enhances their protective coloration. Most birds reveal their location when they move, flitting from leaf to leaf or hopping across the ground. Ovenbirds don't hop; they walk stealthily. Countless times I've heard a calling ovenbird, louder than anything in the woods, sitting somewhere on a branch at eye-level, yet for all intents and purposes invisible.

Even so, this female ovenbird made herself quite visible. She actually walked toward me, not at all concerned that I might notice her near the nest. In fact, as it turned out, this was all part of her plan. She wanted to be seen. So I stepped closer. She then did what any self-respecting ovenbird with eggs would do. She drooped both wings as if they were broken. And with her wing tips dragging the ground, she began to walk away.

It was a smart move on her part. Lots of birds – killdeer and ruffed grouse (also ground nesters) among the most noticeable – do this broken-wing trick. It's called a distraction display. By feigning an injury, the bird believes the intruder will pursue an easy prey with a busted wing. Some birds will feign exhaustion. Others will scoot like a rodent.

In any event, when the actor draws the predator a sufficient distance from the nest, the performance reaches its finale: the bird flies off in full health to return to her nest, which presumably is now out of the predator's sight. Sleight of hand (sleight of wing, rather) has come to the forest.

This drama is played out on the ground or in the shrub layer of our forests every year at nesting time.



Black-throated blue warbler and nest

We walk over, alongside, and under it with every ramble in the woods. Some of the best proof of birds nesting at various heights in the forest came in 1961 from the Canadian-born ecologist Robert MacArthur. He demonstrated that the vertical complexity of forest vegetation – the diversity of heights and density of foliage at those heights – is directly proportional to breeding bird diversity. MacArthur called it “foliage height diversity.” It’s classic reading in college-level ornithology. Grasslands have exceedingly low forest height diversity; shrublands have more; and tropical forests with multiple canopy layers have the highest.

To oversimplify, animals – no matter where they live – need food, water, and shelter. More specifically, birds need nesting sites, perches for resting or singing, and vegetation structure for finding food. A forestland owner needs nothing more than common sense to realize that the higher the vegetative diversity, the higher the species diversity. “As the understory becomes more simple, the bird species complexity becomes more simple,” says William McShae, a wildlife biologist with the Smithsonian Institution’s Conservation and Research Center in Front Royal, Virginia.

In the woodlands of McShae’s Virginia, and in Pennsylvania and other states, wildlife biologists are seeing declines in ground-nesting bird species. The culprit is a native herbivore that harms songbirds indirectly: the white-tailed deer. The loss of larger predators such as wolf and cougar has contributed to a rise in whitetails. And an overabundance of deer can eviscerate understory vegetation. They literally eat songbirds out of house and home.

“There is absolutely no question that regions with high deer populations have depauperate understories,” says Capen, “and bird species have been documented to be pretty seriously impacted.”

But deer aren’t the only understory-clearing culprits. In New England, in places where deer densities aren’t as high, sugarbush owners sometimes clear forest understory vegetation, making it easier to get around to trees and buckets. Residential landowners with small woodlots sometimes clear understory plants, creating a comfortable, park-like aesthetic, but depriving a class of songbirds of crucial habitat. It means fewer birds in the woods, at the feeders and, as a result, perhaps an increase in insect pests.

Having lured me into her one-act play (and away from the nest), the female ovenbird felt the tug of her eggs. It was cool and rainy that morning, so she couldn’t leave her eggs uncovered for very long. I backed off. And she began a slow, stealthy walk toward her nest.

That nest is how the ovenbird gets its name – and it is perhaps the most important example of how songbirds can survive on the ground. The ovenbird walked to the base of a



ROY W. PUGHEN

Slate-colored junco

clump of Christmas fern. She had inadvertently revealed the location of the supreme priority in her life at that moment. Her nest was a small dome woven from older fern fronds and leaves. With its front entrance, it looked like a classic domed oven. Inside were five tiny, pale eggs. There can be few better bird hiding places in the woods.

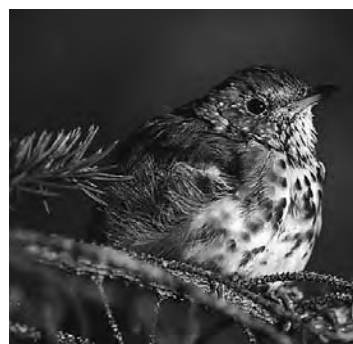


STEVEN D. FACCOLO

Ruffed grouse

Nest location and camouflage are critical to ground-nesters. And it seems to work well for them. Consider studies in which researchers place artificial nests with eggs at different locations in the woods – on the ground, in the shrub layer, and higher in the canopy. The results show consistently that the nests placed in the shrub layer and canopy are hit by predators more often than those located on the ground. It seems to be an easier place to hide a nest.

Think of the winter wren. Actually, try finding one. Despite its explosive song, which is an extended series of excited trills and



STEVEN D. FACCOLO

Hermit thrush

buzzing, this little brown bird regularly eludes bird-watchers. Finding its nest is like finding money in the woods – it’s hidden in a tree cavity, under a stump, or in the exposed roots of a tip-up. The black-and-white warbler, much more obvious with its zebra pattern and nuthatch-style foraging habits, conceals its nest at the foot of a log or stump, among a tangle of

exposed roots or in some depression. The Nashville warbler may feed in plain view out at the tips of conifer twigs, but its nest is tucked away under a clump of sedge, grass, or other vegetation.

Never would I have found that ovenbird nest had I not been clever enough to hide and watch the female walk to it. Even better was watching her step into the nest and settle on her eggs.

But it was time to leave her alone. I turned and started my walk out of the woods toward breakfast. The male ovenbird began singing again. Scarlet tanagers and rose-breasted grosbeaks, two of the showiest birds in these woods, were singing and glowing in the canopy. But walking that morning through those woods, my thoughts were with the invisible ground nesters – probably only a few steps away.

BRYAN PEEFFER OF PLAINFIELD, VERMONT, IS AN AUTHOR, NATURALIST, PHOTOGRAPHER AND FOUNDER OF VERMONT BIRD TOURS, SPECIALIZING IN GUIDED NATURE OUTINGS ACROSS THE COUNTRY.



A Rocky Past: Rural History is Written in

By VIRGINIA BARLOW

Almost anyone who has walked in the woods of the Northeast has paused more than once to puzzle over the stone walls that run like stitching through much of the region's wooded land. Even in dense forest, a mile from the nearest habitation, the stone walls speak of a tamed landscape: a farmer, his team of oxen, a stone boat, sheep, and cropland.

Though thousands of miles of these walls were built in New England in the eighteenth and nineteenth centuries, very little is known about their origins. Giovanna Peebles, Vermont's state archaeologist, attributes the lack of written materials to the fact that stone walls were such a common part of everyday life. Mention of them in diaries or newspaper stories "was about as likely as writing about the fact that you reheated last night's supper in the microwave."

It is difficult to tell, for instance, when a stone wall was built, because construction styles changed very little over time, though you can sometimes tell the footprint of a particular mason. "I think you can probably identify certain very brilliant stone masons, as to their particular work. It's like looking at a work of art and knowing Picasso did this," said Peebles. Still, we don't know how many masons were responsible for the walls we see today, or how many farmers built their own.

We do know something, however, about what stone walls were designed to accomplish. Little more than 100 years ago, 60 to 80 percent of New England's land had been cleared, either for cropland or pasture. Many of us have heard this figure before, but still find it difficult to absorb. All we see now are trees, but in 1880, wherever you looked, there was open land, being used either for crops or for grazing animals.

Fences were needed to separate the two. As far back as 1642, a court decreed that "every man must secure his corne and meadowe against great cattell," though at that time fences were made of stumps or split rails and were only replaced by stone fences when wood became scarcer.

Jane Dorney, a geographer from Richmond, Vermont, uses stone walls to determine how land was used in the past. She says that the links between the nineteenth-century farming landscape and the twentieth-century forested landscape are so strong that they challenge the philosophical separation of humans and nature. We think of the forest as nature, and the field as human, but in fact we can't make that distinction. Much of the forest is the way it is because of past human activity.

"The process of figuring out how an area was used is like solving a multi-dimensional problem," Dorney said. "People who like to solve puzzles enjoy this kind of work."

Dorney believes, as do most archaeologists, that the tumbling-down walls we now see once kept large and/or nimble animals where they belonged. Old photographs and lithographs show that stubby stone walls were extended with "stakes and riders" or with



ERIC SHERLOWITZ

Stone

a thicket of posts stuck into the wall. Many old walls now have a strand or two of barbed wire running along the top, an indication that these walls were functional at some time after the late nineteenth century, when barbed wire came into general use.

Although stone walls were occasionally built as boundaries between one farmer's pasture and another's, Dorney believes that the most important role of a fence was to separate pasture from non-pasture.

Separating the sheep from the oats

One thing Dorney looks for is a row of large, old trees, older than the surrounding forest, growing out of one side of a stone wall. "These trees, most often sugar maple, white ash, or black cherry, are on the side of the fence that once was cropland. On the pasture side, such palatable species would have been eaten by grazing animals, but plows and harrows do not approach a stone wall as closely as an animal does," Dorney said.

The kinds of trees you find on each side of the wall also tell a story. When cropland is abandoned, the bare earth offers an ideal seedbed, and trees, usually hardwoods, will colonize it within a few years. Gray birch is often the pioneer, but sugar maple can be quite aggressive and may form pure stands in which the trees are almost exactly the same age. Other factors, such as the soil type and depth, the depth to the water table, and the amount of slope may influence which tree species become established.

On the other hand, pasture, being grass-covered, presents a problem for many tree seeds and is recaptured only slowly over

many years by members of the woody clan. Uneven-aged softwoods are strongly correlated with abandoned pasture. Peter Marchand, author of *North Woods*, believes that the relatively heavy, wind-disseminated seeds of conifers "work down to the soil surface and provide enough stored energy to develop a seedling large enough to compete successfully with grass." If cropland was used as pasture before being abandoned altogether, the forest might look similar on both sides of the stone wall. In these cases, you will need to look for other clues.

Land that has never been plowed is often hummocky, a result of generations of trees toppling over and raising big mounds of soil with their roots. These pits and mounds persist for hundreds of years and are only erased by plowing and harrowing. Along with the bumps, you may well find more rocks on the pasture side of the wall. Some large rocks may have been removed or piled on top of one another when land was used as pasture, but most are likely to have been left right where the last glacier deposited them.

Hawthorn and barberry are two sun-loving plants that grow up in old pastures. Their thorns and prickles protect them from grazing animals, and they may have gotten a head start before a pasture was abandoned. Black locust is valuable for fence posts because of its resistance to decay, and though not native to the Northeast, a patch of the trees was often kept in a convenient, out-of-the-way place on many northeastern farms. Sprouts grow from the roots of older trees, and a supply of fence posts may still be growing on a long-deserted farm.



NEED THERRIEN



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STEVEN D. FACCO

Clockwise from left: Repairing stone walls is not just an historical activity!

Note the use of granite, a readily available material, in this New Hampshire stone wall.

Stone walls provide havens for all sorts of wildlife, from insects to chipmunks, like this one with nest material.

There's rocks in them there hills

Stone walls that march up steep hillsides indicate that even steep terrain was cleared and used for grazing. This evidence corroborates the view that the earliest settlers were strongly attracted to slopes rather than to valleys for their farm sites. In particular they preferred south-facing slopes; early maps often show roads and houses on the south-facing sides of brooks, separated by an expanse of uninhabited north-facing slope.

Early settlers also showed a preference for the highest elevations at which farming was possible – roughly up to 1,800 feet. At these elevations the soil warms in the spring sun, and cool air drains to the valleys, where malaria was thought to linger. Because early farms were largely self-sufficient, the distance to market was not a significant factor. Some high-elevation farms remained in use for a long time, which would explain why Dorney has found some of the most well-tended stone walls at higher elevations.

On the other hand, there are few stone walls to be found at the region's lowest elevations, such as along the Connecticut River Valley. Here, the stones that were distributed by glaciers over the neighboring hills were buried in a deep, fine sediment at the bottoms of post-glacial lakes.

Harvesting the crop of stones

Some fields produced abundant crops of stone, and it was necessary to get rid of them. Most of the stones in a wall came from one side – the side that was cultivated, where they posed a hazard to farm equipment. Before spring plowing, removing the annual crop of stones that had been heaved up into the plow zone by frost action was an annual ritual.

The size of the stones in a wall may even help identify the crops that were raised, according to some writers. The presence of very small stones suggests that the adjacent field may have been used for growing root crops, for which even small stones are a

hindrance. When early farmers dug their potatoes, turnips, and carrots, they threw aside the stones they found, later adding them to a nearby wall.

These appear as part of the rubble or small stone filling inside a double wall. Depending on the soil type, finding a really large number of small stones built into a wall may indicate that the field was cultivated over a long period of time.

On the cultivated side, the surface of the ground will be much smoother than on the pasture side, and perhaps you can find a “dead furrow,” the last, usually downhill, ridge that tends to grow in size each time a field is plowed because the smoothing effect of the harrow does not quite reach to the edge of the soil that the plow has turned over. If soil has piled up against the inside of a wall at the lower side of a field, this, too, suggests a period of plowing, which causes more erosion than turf-covered grazing land.

The walls nearest the house and barn, according to Dorney, are often the finest. Perhaps this is because they were the first built and longest tended, but they were also the ones most likely to be seen by the neighbors. There was a time when, as one historian has said, “the quality of enclosures was not uncommonly taken as a measure of a farmer's competence.”

The tumbling walls bordering abandoned fields today seem ineffectual and puzzling without a house and barn to give meaning to their shapes and patterns. There was a time, however, when the way these walls divided up the land was crucial to the whole economy and workings of a rural society.

FOR MORE INFORMATION SEE *SERMONS IN STONE: THE STONE WALLS OF NEW ENGLAND AND NEW YORK*, BY SUSAN ALLPORT, AND TWO BOOKS BY ROBERT M. THORSON: *EXPLORING STONE WALLS: A FIELD GUIDE TO STONE WALLS AND STONE BY STONE: THE MAGNIFICENT HISTORY OF NEW ENGLAND'S STONE WALLS*.

VIRGINIA BARLOW IS THE CO-EDITOR OF *Northern Woodlands* MAGAZINE.

By VIRGINIA BARLOW

White pine weevil, *Pissodes strobi*

Beginning in June, white pines whose terminal shoots are wilting and have turned yellowish almost always have the same cause – the white pine weevil. This plump, quarter-inch-long beetle has a tapering head that narrows to a long snout with chewing mouthparts at the end. Two antennae sprout from the snout, first aiming off in the wrong direction, then taking a sharp bend forward. Overall, the beetle looks like a harmless Dr. Seuss character.

But, far from harmless, it is the most economically damaging pest of white pine. The feeding of its larvae kills the terminal shoot and bud cluster, destroying at least two years' growth and leaving several side branches to compete for dominance. This competition at best leaves a bent tree trunk, but just as often the tree forks, which drastically reduces the likelihood that it will ever produce a halfway decent sawlog. Some trees get nailed again and again by weevils, leaving a disordered mess of stems that can be very irritating to look at.

On warm days in April, adult beetles begin emerging from their winter quarters in the litter just as white pine buds begin to swell. Both males and females crawl or fly to the treetops where they feed and mate – for good measure, perhaps, as most of them have mated the autumn before and the females retain viable sperm.

Preferring sunlit, vigorous, fat terminal shoots at heights between 4 and 30 feet, the females chew holes just below the bud cluster and lay a couple of eggs in each hole, covering the opening with a protective wad of excrement. Usually two or three females will lay eggs in the same shoot. If only a few eggs are laid in a shoot, the tree may produce enough pitch to drown the larvae when they hatch. If too many larvae hatch, some will starve. Each female lays a total of about 100 eggs.

The larvae move downward as they feed in the cambium and inner bark, and as they grow, their feeding mines coalesce, girdling and killing the stem. After five or six weeks of feeding and molting, they make cocoons of wood chips and pupate.

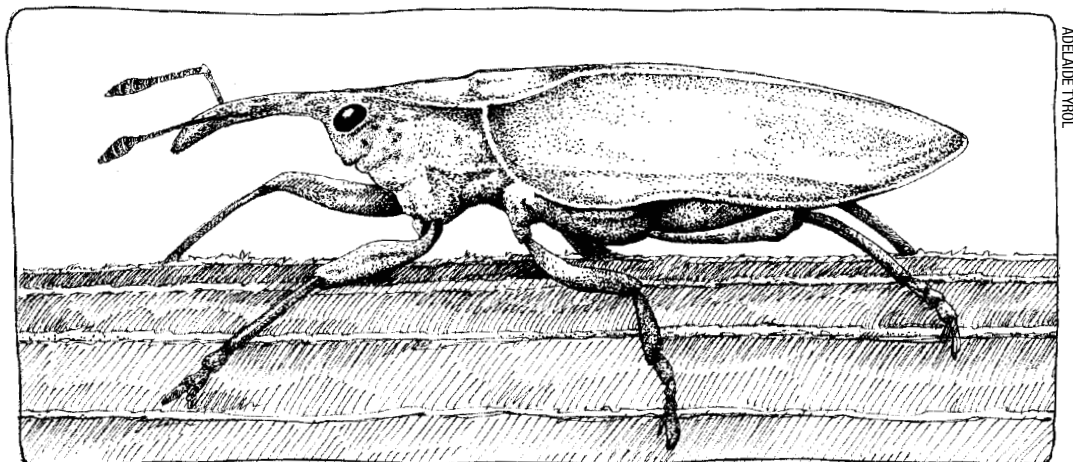
Meanwhile, the wilted terminal shoots have turned from yellow to brown. Left alone, the dead leader persists for many years and may be an entrance point for *Phellinus pini*, the major heart rot fungus disease of older white pines. Before mid-July, when adult weevils begin to emerge, is the best time to prune and burn the infested part, if it is within reach. And while you are there, removing all but the best lateral shoot will make it easier for the tree to get itself straightened out.

From late July to early September, adult weevils emerge through BB-sized holes and begin to feed on buds and bark tissue. By late October, almost all have dug themselves into the litter, most of them within eight inches of a white pine.

Though a native pest, the white pine weevil's natural enemies – including a fly, a couple of wasps, many birds, and small mammals (during the winter) – do not keep it under control. The heavily sodded fields that dense even-aged stands of pine have taken over following the abandonment of agriculture are a weevil's delight. Heavy clay soils also seem to be preferred by the insect.

Tree resistance does seem to vary, and planting white pine at close spacing, preferably with a mix of other species, mitigates the damage somewhat. The weevils like full sun, so partial shade can be helpful, though more than 40 to 50 percent shade will slow a pine's growth significantly.

In short, several precautions will help a little, but none very much.



ADELAIDE THOMAS

WOODLAND INVASIVES:

DOING BATTLE WITH NON-NATIVE PLANTS

BY TOVAR CERULLI

A huge mound of vines, 8 feet wide by a dozen yards long, lay baking in the August sun. The effort required to cut all those vines by hand, drag them out of the woods, and pile them up to dry suggested someone with a mission.

Walking past the mound, I left the clearing and turned down a woods trail in search of that someone.

A few minutes later, I found David Paganelli at work with a chainsaw. Strewn along the slope were the felled stems and silver-bottomed leaves of another targeted plant, autumn olive (*Elaeagnus umbellata*). Working alongside him – wielding clippers and a yellow mustard squeeze-bottle – was his son Ryan, dragged out here during a visit home from Tufts Medical School. Father and son had spent most of that day cutting olives and applying Roundup to the stumps.

David greeted me with an easy smile and was eager to jump right into the subject at hand – invasive plants. “We’ve got quite a bouquet here,” he began. He estimates that 12 to 15 percent of his 200 wooded acres in Strafford had been dominated by autumn olives. After hundreds of hours of labor, there are still several acres left to clear. Shade-tolerant buckthorns – both common (*Rhamnus cathartica*) and glossy (*Frangula alnus*) – are scattered over the entire property, forming a patient and ubiquitous understory. There are also a few barberries on ledge outcrops among the larger trees and 20 to 30 Morrow’s honeysuckle (*Lonicera morrowii*) shrubs to deal with.

And the pile of vines in the clearing? Oriental bittersweet (*Celastrus orbiculatus*). Paganelli didn’t even know he had it until a year earlier. He’d seen it in the woods’ edge, but noted that “it never really clicked until last fall, when I looked over and saw this bright yellow vine.” When he investigated, he found the bittersweet was so thick he couldn’t walk into it. A 25-yard-diameter area of sugar maple poles was completely covered with vines just a few inches apart, intertwined and twisted around everything. Along the edges, he was able to remove the bittersweet and save the hardwoods. But at the center of the infestation, the maple poles – bent over and broken by the weight of the vines – had to be cut down.

“One of our biggest problems,” said Paganelli, “is that even those of us who are supposed to be informed don’t know much



JOHN DOUGLAS / FRANK SOURHEB

Dave Paganelli prepares for battle.

about invasive species.” He has been the Orange County Forester for nearly two decades. Yet, when he first walked this property and bought it five years ago, he didn’t recognize the problems he faced.

He’d been generally aware of the problem: invasives are species that adversely affect ecosystems to which they are not native. They are aggressive competitors that reproduce vigorously – often producing abundant seed every year – and can choke out native plant communities. “Many of them leaf out early in the spring, ahead of native species, and drop their leaves later in the fall,” he said. “Those extra weeks are a significant advantage in a short growing season.” Outside their own native habitats, invasives are no longer held in check by the insects and diseases they evolved with, nor by their natural mammalian predators. Norway maple seedlings, for example, are mostly ignored by squirrels and deer, who much prefer to browse young sugar

USING HERBICIDES

Due to ecological concerns, some people are understandably reluctant to use herbicides. In the case of invasives, however, many experts feel that their judicious application is better than letting the plants thrive.

Ted Elliman of the New England Wild Flower Society uses herbicides in his work. “We certainly don’t discourage people from using them on their own land,” he said. “We just advise them to use the best chemicals and techniques for the application, and in the right concentrations.”

The herbicide most widely used in invasives control is glyphosate. Originally sold under the trade name Roundup, glyphosate is no longer under patent and is available in various formulations. It works by inhibiting an enzyme reaction crucial to plant survival. Although it is a full-spectrum herbicide, killing most plants, it is considered significantly less toxic than many other herbicides, including chemicals from the organochlorine family such as DDT.

Appropriate concentrations of herbicide vary depending on the application. More diluted solutions are used for spraying leaves, while higher concentrations are used for direct application to cut stumps. Cut-stump application is particularly effective in the fall, when nutrients are being moved downward into the plant’s root system for winter storage. Directly applying the herbicide to the stump also minimizes the risk of inadvertently spraying other plants and animals. (Alternatively, cut stumps of woody species can be covered with a patch of heavy-duty black plastic tied around the stump to suppress resprouting.)

Cut-stump applications can be impractical, especially with vines that have extensive root systems. In the case of Oriental bittersweet, for example, a spray treatment of triclopyr is often recommended. This herbicide kills broadleaf weeds and woody plants without affecting grasses or sedges.

For further guidelines on herbicide use, landowners can consult conservation organizations experienced in invasive species control. If wetlands are nearby, your state environmental agency must be consulted. Local regulations may also apply.



JOHN DOUGLAS / FLYING SQUIRREL

The best-laid plans

Paganelli figures that the olives he’s battling got their start when a previous owner planted seedlings purchased from the State as part of a well-intended wildlife food-plot program. The origin of Paganelli’s olives in a pro-wildlife effort is ironic, since invasive plants spell trouble for wildlife: their dominance of a given area reduces the diversity of available food. And research suggests that the berries of many invasive species – including autumn olive – may lack the high-calorie, high-lipid nutritional value of fruits from native trees and shrubs such as dogwoods and winterberry holly.

Most of the invasives that threaten our woodlands were originally brought here as ornamental landscape plantings, and these introductions continue today. Others were planted as domestic crops or to benefit wildlife. Once invasive plants mature, their seeds are spread by wind, birds, and other seed-eating animals, and human carriers who don’t know any better. Paganelli recalls how, years ago, he and his wife clipped some bittersweet along the Housatonic River in Connecticut and brought it home as a decoration for their front door. He hopes none of those seeds survived the compost heap, but doesn’t know for sure. Forest invasives can also spread when plant parts – or seed-laden soils – travel from one place to another on logging or construction equipment or recreational vehicles, just as aquatic invasives such as Eurasian water milfoil hitch rides on boats.

Because woodland invasives gain footholds in human settlements, their distribution patterns vary dramatically. Along the edge of Lake Champlain, for example, in a relatively mild climate with long-standing human settlements, the concentration of invasives is high. But in the Northeast Kingdom, where historical settlement and disturbances have been sparser and winters are colder, there are very few invasives.

The need for early response

With woodland invasives, early detection and early response are vital. In the “establishment phase,” when the plants are just getting started, it takes only a few minutes to pull, cut, or spray them. When that window of opportunity closes and they reach the “expansion phase,” growth and seed production shoot up exponentially. Once invasives achieve the “saturation phase” – as Paganelli’s autumn olives have done in many places – they’re much more difficult to remove. At that point, labor-intensive cutting and hand-application of herbicide to each stump is often the only solution. (Another measure in use in some areas is called “over-planting.” After invasives are removed, fast-growing trees are planted to provide shade and slow down any re-establishment of the invasive.)

Once invasives have become deeply entrenched across a region, complete removal becomes essentially impossible. Paul Fuhrmann, a resource manager and restoration specialist for Ecology and Environment, Inc., based near Buffalo, is active in New York’s efforts to control invasive species. “Eradication on a landscape scale is not feasible,” he said, “but control and management within selected habitats can be a realistic goal.”

Though each battle is different, Fuhrmann notes that the first

maples; likewise, beavers generally don’t touch buckthorn.

While nearly 5,000 non-native plant species grow wild in the U.S., only a fraction of those cause serious trouble. Nationwide, the U.S. spends \$120 billion per year on controlling and mitigating the effects of those few species, and invasives have a negative affect on almost half of all species federally listed as threatened or endangered. Globally, invasive plant and animal species are a leading threat to biological diversity, second only to outright habitat loss.

“But,” said Paganelli, “I honestly thought: ‘This is somebody else’s problem.’ I thought it was just happening in southern New England and Vermont’s southernmost counties.” This land has taught him otherwise. A nutrient-rich northern hardwood site with a south-facing slope and thin soil susceptible to over-drying, the property is 75 percent sugar maple. Just 25 years ago, it was pasture. And open land offers invasives their best opportunity to gain a foothold.

steps are always to assess the situation and then to define your goals. “What are you doing it for?” he asks. “For botanical diversity? For wildlife species of concern? For recreational uses?” These questions are often accompanied by more difficult ones: Can you achieve those goals? Are they practical and affordable? What are the costs, benefits, and alternatives? Whatever your objective, you can’t expect to achieve it with any one-time solution. When it comes to invasives, commitment is crucial.

In Fuhrmann’s work, his basic goal is to reestablish more natural succession patterns. That kind of habitat modification usually involves much more than just pulling or cutting the invasive in question. “You have to replace it with native vegetation, something that’s vigorous enough to compete and maybe put some shade over the invasive,” he said.

Across New York and New England, says Fuhrmann, new soil disturbances of any kind – including those caused by removing invasives – need to be carefully considered. Unless vegetation recovery plans are thought out properly, invasives are likely to take over. Rose Paul, director of science and stewardship for The Nature Conservancy’s Vermont chapter, pointed out that it’s particularly important to remove invasives before a logging job: “If the canopy is opened up, we’re giving them a free meal ticket.”

Paul says there’s an important role for the State to play in providing education and leadership for forest owners. She notes that Vermonters are far more aware of aquatic invasive species – such as milfoil, zebra mussels, and water chestnut – than they are of terrestrial invasives. Since all navigable waters are subject to public oversight, the State’s Water Quality Division has stepped in with species control and public education efforts. But with so much of Vermont’s land in private hands, there hasn’t been a comparable public effort concerning terrestrial species.

Paul is concerned because shifts appear to be occurring very rapidly. “I’m finding invasives like barberry and bittersweet in places where I didn’t see them just a few years ago,” she said. “Something is suddenly triggering them to really take off and thrive.” The Northeast Kingdom might have it easy for the moment, but Paul expects that to change in the next decade. “If I was a forest owner there, I’d start watching for species like barberry now. Time spent walking and monitoring your property is the most effective effort you’ll ever spend on invasives.”



JOHN DOUGLAS / FLYING SQUIRREL

Dave Paganelli: removes a buckthorn he just cut.



JAPANESE BARBERRY
Berberis vulgaris (pictured)



COMMON BARBERRY
B. thunbergii



ORIENTAL BITTERSWEET
Celastrus orbiculatus



COMMON BUCKTHORN
Rhamnus cathartica (pictured)
GLOSSY BUCKTHORN
Frangula alnus



BURNING BUSH
Euonymus alatus



GARLIC MUSTARD
Alliaria petiolata



BUSH HONEYSUCKLES
Lonicera maackii,
L. morrowii,
L. tatarica,
L. x bella



JAPANESE HONEYSUCKLE
Lonicera japonica



AUTUMN OLIVE
Elaeagnus umbellata

NORWAY MAPLE
Acer platanoides

DESCRIPTION AND HABITAT	THREATS	CONTROL AND REMOVAL
Deciduous shrub. Compact and twiggy, usually growing two to three feet, sometimes six feet tall. The small leaves are either untoothed (Japanese) or sharply toothed (common). Beneath each cluster of Japanese barberry leaves is a single spine; common barberry has two or three spines. One of the first plants to leaf out in spring. Clusters of ½-inch yellow flowers produce scarlet berries; foliage turns orange or red in autumn. Grows along roadsides and open fields and in open woods. The Japanese variety, being more shade tolerant, is more often found in forest.	Where barberry establishes a dense, shady ground cover, little else is able to sprout or grow. Deer and other browsers avoid it in favor of native plants. Raises soil pH and reduces depth of leaf litter on the forest floor.	The entire plant and roots can be pulled with hand tools or by other mechanical means. Alternatively, the stem can be cut and herbicide applied to the stump.
Deciduous woody vine. Climbs in a twining pattern to 60 feet high. Vine base can reach two to five inches in diameter. Alternate leaves are highly variable in shape and size; small, greenish-yellow flowers. Best identified in fall, when yellow fruits split, displaying the scarlet seed covering. Grows in forests, fields, wetlands, and beaches. (Note: American bittersweet, <i>C. scandens</i> , looks similar but produces flowers and fruits only at the end of the branch. Oriental bittersweet has flower and fruit clusters between leaf and stem. While <i>C. scandens</i> is native and non-invasive, this has been complicated by hybridization in the wild.)	Twining vines girdle the trees and shrubs they climb. Vine mass can pull trees down and make them more vulnerable to wind, snow, and ice damage. Once an infestation is well-established, a nearly impenetrable mat blankets the area, shading and choking out other vegetation. Unfortunately, it remains popular as an ornamental.	A combination of mechanical removal and herbicide (often triclopyr) is typical. Large infestations are difficult to control, as roots sucker and seeds persist in the soil for several years. In fields, weekly mowing is effective. Infrequent mowing merely stimulates root-sprouting.
Deciduous shrub or dense, small tree. Dark bark with lenticels. Leaves of glossy buckthorn have parallel veins. Common buckthorn has smooth, rounded, finely-toothed, sub-opposite leaves; black, glossy fruit; twigs often tipped with sharp thorns. Glossy buckthorn has glossy, oval, toothless, alternate leaves; red fruit turns nearly black. Larger specimens can resemble old apple trees and grow to 20 feet. Shade-tolerant. Occurs in a wide variety of habitats – including fields and forests – with common tending toward drier, alkaline sites and glossy preferring wet, acidic soil.	Dense stands shade out all other shrubs and tree seedlings, as well as wildflowers and other herbaceous plants, reducing habitat for small mammals and birds. Seedlings can wait decades for the canopy to be opened. Laxative properties of fruits can harm wildlife or rob them of energy. Elevates nitrogen content of forest soils, altering insect communities.	In small numbers, seedlings can be pulled by hand and hung in nearby trees to desiccate. In thicker stands, pulling can stimulate growth, as can mowing or burning. Foliar herbicide is sometimes required. Larger trees can be girdled, or cut (with herbicide then applied to the stump).
Deciduous shrub. Leaves are opposite, elliptic, one to three inches long and finely serrated; dark green in summer, they turn an unmistakable bright red in autumn. The bush is also known as “winged euonymus” for the cork-like wings that often grow from the sides of smaller branches. Flowers are small and yellow-green. Smooth, purple-red, ½-inch-long fruits appear in fall. Grows in full sun to full shade and in a wide variety of soils. Still widely used in landscape and highway plantings.	In a well-established stand, the thick foliage casts heavy shade, which – combined with a shallow, dense root system – prohibits all other undergrowth species. The numerous seeds are widely spread by birds.	Smaller plants should be pulled by hand or dug out with hand tools. Larger shrubs can be cut and herbicide applied to the stump. For extremely large infestations, herbicide can be sprayed in early summer.
Biennial. First-year plants show basal rosettes of kidney-shaped leaves with scalloped teeth. In spring, second-year plants generate stalks two to three feet tall with alternate, heart-shaped, sharply toothed leaves and clusters of white, cross-shaped flowers. When crushed, new leaves and stems emit a strong garlic odor. Taproot is slender and white with a distinct S-curve. Highly adaptable; grows in sun to heavy shade, favoring forest and forest-edge habitats.	Shade tolerance, dense growth, and prolific seed production (to 6,000 per plant) make it an aggressive competitor, especially against other spring-blooming species. Kills mycorrhizal fungi, thus threatening hardwood regeneration. Certain native butterfly larvae often die when hatched from eggs laid on garlic mustard.	Infestations are best pulled by hand (with care taken to remove the taproot) or repeatedly cut at ground level before seeds form. Second-year plants are best removed when in full bloom. Fire or herbicides are sometimes used for larger areas. Seeds persist in soil for up to five years.
Deciduous shrubs. Growth is multi-stemmed with opposing branches. Mature plants usually reach 6-10 feet tall. Leaves are opposite and one to three inches long. Sweet-smelling white, yellow, or pink flowers are tubular and paired. Berries are red or, rarely, yellow. Preferring sun to shade, they aggressively invade abandoned fields and forest edges but are also found in intact forests. (Note: less common is the Northeast’s native and beneficial fly-honeysuckle, <i>L. canadensis</i> . It can be distinguished from exotics by the pith in the center of each stem. Cut a stem crosswise and the pith of <i>L. canadensis</i> will be white and solid. Non-native piths are brown and often become hollow.)	Spreading quickly in disturbed soils, honey-suckles can severely affect forest regeneration after logging. Mature bushes cast heavy shade and suppress growth of native species, resulting in a reduction of plant diversity. Because invasive honeysuckle is rarely eaten by deer, its presence increases browsing pressure on the relatively fewer, nearby native species.	Small plants can be pulled by hand. With mechanical removal techniques, any portion of the root left behind may resprout. Cutting and applying herbicide to the stump can be effective, especially in autumn.
Trailing or climbing, woody, semi-evergreen vine. Usually 6-10 feet long, but can reach 30 feet. Opposite one- to two-inch long leaves. Flowers are similar to bush honeysuckles’, but berries are small and black, rather than red. Habitat is similar to bush varieties. (Note: native honeysuckle vines are distinguished by their red berries and connate, or fused, upper leaves. The upper leaves of <i>L. japonica</i> are separate.)	Competes ferociously for both light and soil resources, spreading by seeds, runners, and underground rhizomes. Can, like bittersweet, topple trees and shrubs.	Very difficult to control, due to its several propagation strategies. Pulling often leaves roots and rhizomes behind. Herbicide (sometimes in tandem with fire) is often applied in fall or winter.
Deciduous shrub or small tree. Grows to 20 or 30 feet. Autumn olive’s alternate gray-green leaves are oval, smooth-edged, and – when mature – silvery underneath. Small, tubular, white or yellow flowers grow in clusters. Fruits are a pale, pinkish red. Olives can tolerate a wide variety of conditions, from wetlands to forests, and have a special advantage on infertile sites: they are capable of nitrogen-fixing.	Outcompeting native species, olives can form dense thickets that alter natural succession patterns and reduce plant, bird, and other wildlife diversity. Can interfere with the nitrogen cycle of native species dependent on poor soils. Prolific seeds are easily spread by birds. Can flower and set fruit at three to five years old.	Small plants can be hand-pulled. Herbicide is often required, applied to cut stumps or as a foliar spray. Cutting (without herbicide follow-up) and burning merely stimulate sprouting and more vigorous growth.
Deciduous tree. Grows to 60 feet. Popular as an ornamental and street-side tree, it resembles sugar maple. Norway maple’s bark is more regularly grooved than that of sugar maple and its autumn color is more yellow. Norway maple is most easily distinguished by the milky sap emitted from broken stems or torn leaves. Shade-tolerant, fast-growing, and stress-resistant, it succeeds in a variety of conditions and locations.	Outcompetes sugar maple by spreading rapidly to disturbed forest sites. Seedlings sprout vigorously. Mature trees form a denser canopy than sugar maple, shading out wildflowers and other tree seedlings.	Control methods include pulling seedlings, cutting trees, and – when necessary – applying herbicide to prevent re-sprouting.

PHOTO CREDITS: NAJA KRAUS, NYSDEC FOREST HEALTH & PROTECTION; GERRY LEMMO; GERRY LEMMO; LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG; NAJA KRAUS, NYSDEC FOREST HEALTH & PROTECTION; NAJA KRAUS, NYSDEC FOREST HEALTH & PROTECTION; CHUCK BARGERON, UNIVERSITY OF GEORGIA, BUGWOOD.ORG; DAVE SPIER; PAUL WRAY, IOWA STATE UNIVERSITY, BUGWOOD.ORG

A threat on many levels

Forest owners aren't the only folks who should be concerned. Lawrence Pyne, an avid sportsman and host of Vermont Public Television's *Outdoor Journal*, hunts with a friend in the Taconics of southern New England. "Down there you can look at a mature hardwood ridge you'd think would have a beautiful open under-

story. When you get there, it's almost impassable barberry," said Pyne. "It's sobering. To think of that moving our way – and we're told it is – is alarming."

Once, sitting down to hunt turkey on a mature hardwood side hill in the Taconics of southern New England, Pyne couldn't see more than 10 to 15 feet in any direction. The entire understory was garlic mustard (*Alliaria petiolata*), a species that has also established itself in the Champlain Valley and could seriously threaten the future of sugar maple. According to a 2006 study at Harvard, garlic mustard devastates hardwood regeneration by killing the mycorrhizal fungi that provide vital nutrient links for the trees' root systems.

It's this kind of impact – the interruption of natural forest succession patterns – that most bothers Paul Fuhrmann. In the case of garlic mustard, soil chemistry is literally being changed. "It's really insidious," said Fuhrmann. "There's an unseen biological war going on under the forest floor. It's tremendously damaging. It spider-webs out into incredible biotic destruction. And that's just garlic mustard."

Working to reclaim his Vermont woodlot, David Paganelli says that a lot of folks don't understand the threats. Some people have told him he should just sell the land. He feels they are missing the point. "What they don't realize is that this is just the tip of the iceberg. It's an invasion. I'm at one beachhead, but they're invading the countryside and breaking through everywhere," he said.

He suggested that, next time I was headed north on Interstate 89, I keep my eyes peeled just before Exit 10 in Waterbury for a big patch of bitterweet on the right. That patch, he said, may be a harbinger of things to come. Along Interstate 91, just 10 or 20 miles into Massachusetts, he's seen miles of median where bitterweet has climbed right to the treetops and comprises over 80 percent of the visible foliage. "It looks like something you might see in the Amazon," he commented.

As Paganelli sees it, what we most need is a shift in perception. Invasive species are a big deal and all of us – foresters, landowners, loggers, state officials, and citizens-at-large – need to recognize the fact. "If a significant part of the Northeast or North America is degraded ecologically and in economic production capacity, that's huge," he said. Only when that reality sinks in will people be willing to invest the money, devote the state staff time, and implement the policy changes needed for an effective response. The expense and effort would, contends Paganelli, be cheap in the long run. (On his property, an essential factor in the battle has been cost-share funding from the Wildlife Habitat Incentives Program, or WHIP, administered by the USDA's Natural Resources Conservation Service.)

He has hosted three tours of the invasive species situation on his property and, in 2007, did a presentation on invasives for the Society of American Foresters. Afterward, one forester came up and said it gave him nightmares. Those nightmares are what Paganelli hopes to avert. As we sat talking in his woods, he looked up at the 12-foot-high wall of autumn olive behind us. "This," he said, "is what I'm afraid the future is going to look like."

PLANT BY PLANT, TOVAR CERULLI IS REMOVING INVASIVE HONEYSUCKLE FROM THE FEW ACRES HE AND HIS WIFE, CATHERINE, OWN IN NORTH-CENTRAL VERMONT.



1

THE LIST GOES ON

This article and accompanying chart only cover a handful of the major invasive plant threats to the forests of New England and New York. Others include:

1 Common reed (*Phragmites australis*)

– This wetland invasive, taking advantage of ditches alongside timber access roads, is one of the few invasives moving into Maine's North Woods. Limited efforts are underway to keep it from becoming more widespread in remote areas.



2

2 Himalayan jewelweed (*Impatiens glandulifera*)

– This fast-growing herbaceous annual can reach six feet in height, outcompeting native jewelweeds and other vegetation along streams and in moist, lowland forest soils.



3

3 Japanese knotweed (*Fallopia japonica*)

– This large perennial resembles bamboo, though the two are not related. Primarily a problem along rivers, where it destabilizes bank soils, knotweed is also a problem for many of the Northeast's floodplain forests.



4

4 Japanese stilt grass (*Microstegium vimineum*)

– Highly adaptive, stilt grass can spread in all but the deepest shade. It has been found in New York and has been moving north through the Connecticut River valley for over 20 years.



5

5 Pale and black swallow-wort (*Vincetoxicum rossicum*, *V. nigrum*)

– These herbaceous perennial vines don't tolerate shade but are infiltrating the oak savannahs of New York's Onondaga limestone escarpment and have become entrenched in parts of New England.

Invasive species are a problem for all habitats, not just woodlands. Many plants, including purple loosestrife and wild chervil, threaten wetlands, roadsides, and grasslands. Others, such as Eurasian water milfoil and water chestnut, pose serious aquatic dangers. More broadly, invasive species include not only plants but also many animals (particularly insects and fish) and diseases.

PHOTO CREDITS: FROM TOP: DAVID MANAGER III; RUTH KINZIE; NANA GRASS; NINSECK FOREST HEALTH & PROTECTION; TED BODNER; SOUTHERN WILD SCIENCE SOCIETY; BIRCHWOOD ORG; ELINOR OSBORN



By MICHAEL SNYDER

Can Your Woods be Too Tidy?

A LANDOWNER ONCE PHONED TO ASK ME TO VISIT HIS property to see all the good work he'd done extending his landscaping efforts from his yard into the surrounding woods. He was pleased with his work and eager for the county forester to see how well he had "cleaned up the woods" and "improved the health" of those woods by removing and chipping or burning all that "ugly dead and rotting stuff." He thought maybe we could use it as a demonstration site for his neighbors. So I went.

And sure enough that landowner had, indeed, made some dramatic changes to a few acres of woods bordering his well-manicured yard. But I was considerably less enthusiastic than he was, and I was at a loss for a gentle way to explain to him that his "tidying" had done nothing to improve the



CARRIE SANDIN

health of his woods – that, in fact, he may have done some real damage to its health. As he showed me around from stump to branch scar, noting with pride how easy it was to walk and see through these woods now, I didn't know how to say, "Well sure, but now there's so much less to see." All I could muster was a head nod here and an "I see" there. Then he gave me my big opening.

He told me that before doing all this work he used to see woodpeckers and warblers in the woods, but not anymore. This man truly valued the woods, and he enjoyed working in them – with the best of intentions – but somehow had failed to recognize the full value of all that so-called mess. He had missed the connection between dead trees and woodpecker food, between a dense shrub layer and nest sites for black-throated blues. The conversation that followed wasn't necessarily easy, but now it at least had a new context; he could see his woods in a new light. And by the end of our walk, he had a different work plan for the bit of woods he'd yet to work on the other side of his house.

If your only interest is in the neat and tidy, and you just can't abide a natural mess, there's really no argument. You certainly are free to "clean up" those woods. But if you're interested in the health of the land, too, and if your aesthetic sensibility has room for a bit of death, decay, and disarray, then you'll be glad to know there is a way to have it both ways.

It's a matter of blending forestry with traditional landscaping.

This sort of management hybrid is sometimes called woodscaping. It incorporates an understanding of forest ecology – a sense of how the forest functions fully – into landscaping activities. It stresses values like species diversity, the importance of retaining some dead and dying trees, and the need to keep vegetation in several vertical layers instead of just one canopy level. It is

particularly effective when applied in those transition zones between a traditionally landscaped yard and the woods beyond. Yes, of course it's nice to see into the woods from the yard, and there's nothing wrong with cutting some understory vegetation or pruning some dead branches or even removing a particularly messy tangle of downed woody debris – all of which may be obstructing your view or your walk from your yard

into your woods. You just try to leave *some* of these things, recognizing that they are all part of a healthy forest.

This hybrid approach can involve all kinds of management activities; the possibilities are nearly endless. It includes thinning to remove diseased or unsightly trees and enhance the growth of remaining specimen trees. Or perhaps pruning some branches to improve sight lines and tree stem quality. Removed vegetation might then be lopped and scattered neatly on the forest floor. This is important for moisture retention, nutrient cycling, and habitat enhancement for many insects, amphibians, and mammals and is far healthier than burning and chipping. Woodscaping might also include planting trees and shrubs to add diversity or visual appeal. It might mean not weed-whacking a patch of ferns or not brush-hogging an area of whips and brambles.

This modified landscaping approach can involve any or all such activities, but it does so with an attitude. It is an attitude of understanding – or at least a desire to understand – that your woods, even at the yard's edge, are more than something you look at. They are living communities of creatures, each playing important – if sometimes unknown – roles with far-reaching implications for land health in your yard and beyond. These places don't have to be neat and tidy to be healthy.

MICHAEL SNYDER IS THE CHITTENDEN (VERMONT) COUNTY FORESTER.



Above: Marsh along a New Hampshire river. Left: Bittern in a marsh



CHARLES H. WILLEY ©

Don't Get Bogged Down!

BY ROSE PAUL

Some people call any wet, mucky place a bog, or maybe a swamp. They hardly ever think to call it a fen. Which it may well be, unless, of course, it's a marsh. Or possibly a seep.

How do we sort out this world of wetlands?

The first thing to do is take a look at the water. Is it flowing or stagnant? If it's flowing, you have yourself a **marsh**. Plain and simple. Marshes usually occur adjacent to ponds, lakes, slow-moving rivers, or at river mouths. The constant movement of water increases the oxygen content in the water, brings an inflow of nutrients, and promotes decomposition. Marshes develop a fine, black muck soil that is high in well-decomposed organic matter. A variety of grasses and sedges, including the familiar cattail, thrive in marshes. There are almost never any woody plants growing in a marsh, because they cannot grow in standing water.

There actually is a second type of wetland that has flowing



NEED THEBREMEN



STEVEN D. FACIO

Above: Shadbush in a shrub swamp

water in it, though compared to a marsh, it's usually very small: a **seep**. The flowing water in a seep comes from underground, where cracks in the bedrock direct flow toward the surface. A seep can persist throughout the year and often forms the headwaters of a perennial stream. One feature of a seep is the constant temperature of the groundwater year round. This allows vegetation such as grasses and sedges to get an early start in the spring, providing food for animals such as bears and deer.

If the water in your wetland is not flowing, then you don't have a marsh or a seep, and you need to ask yourself a second question: are there woody plants growing in it? If there are, then you're talking about a **swamp**. Swamps always occur in low spots in the forest that have wet soils, but not so wet that woody plants can't grow there. They are only intermittently wet, during spring flooding and heavy summer storms. Swamps can be small dips in the landscape, taking up an acre or so, or they can occupy many hundreds of acres. Trees like black ash, green ash, red maple, and swamp white oak are well adapted to the seasonally wet conditions of swamps.

If your stagnant-water wetland has few or no trees growing in

it, then you're left with one of three possible choices: a bog, a fen, or a **vernal pool**. The vernal pool is the easiest to identify, because it's small and only seasonally wet. Essentially, it is a swamp without trees. Vernal pools are lined with bedrock or dense gravel called hardpan, which can hold water well into the summer months. They typically lack inlets and outlets, gathering water instead solely from snowmelt and rainfall. In the spring, they teem with amphibian life. Frogs and salamanders depend on them for breeding, egg-laying, and larval development. Because they dry out each year, vernal pools lack predators, such as small fish, that would normally prey on such a bounty of food.

Finally, if your wetland is wet all year, has stagnant water, and has few or no trees growing in it, you're down to two options: a bog or a fen. **Bogs** are the most nutrient-poor of the wetlands. With little to no inflow or outflow, decomposition happens slowly, acids build up, and nutrients are scarce. Most of the water and minerals in a bog come from rainfall and airborne dust. Faced with that scarcity of nourishment, bog plants have developed creative ways to absorb nutrients. For instance, acid-loving dwarf shrubs have partnerships with fungi in their roots that make soil



NED THEBERGEN



KATHRYN LUND JOHNSON

nutrients more available, while carnivorous pitcher plants, sundews, and bladderworts go after their food more directly, trapping and dissolving little insects. The most abundant plants in a bog are sphagnum mosses and acid-loving dwarf shrubs called heaths, including cranberries, leatherleaf, Labrador tea, and bog laurel.

Life in the **fen** is much easier than in a bog. Water does flow, albeit slowly and imperceptibly, flushing out the acidic byproducts of decomposition. Fens are fed by an upwelling of groundwater that is laden with calcium and other minerals. A rich fen looks like a lush, wet grassland and is dominated by sedges. Rich fens have many more species of plants and different mosses than bogs. High spots called hummocks are home to some of our native wetland shrubs like alternate-leaved buckthorn, shrubby cinquefoil, and the white-leaved hoary willow.

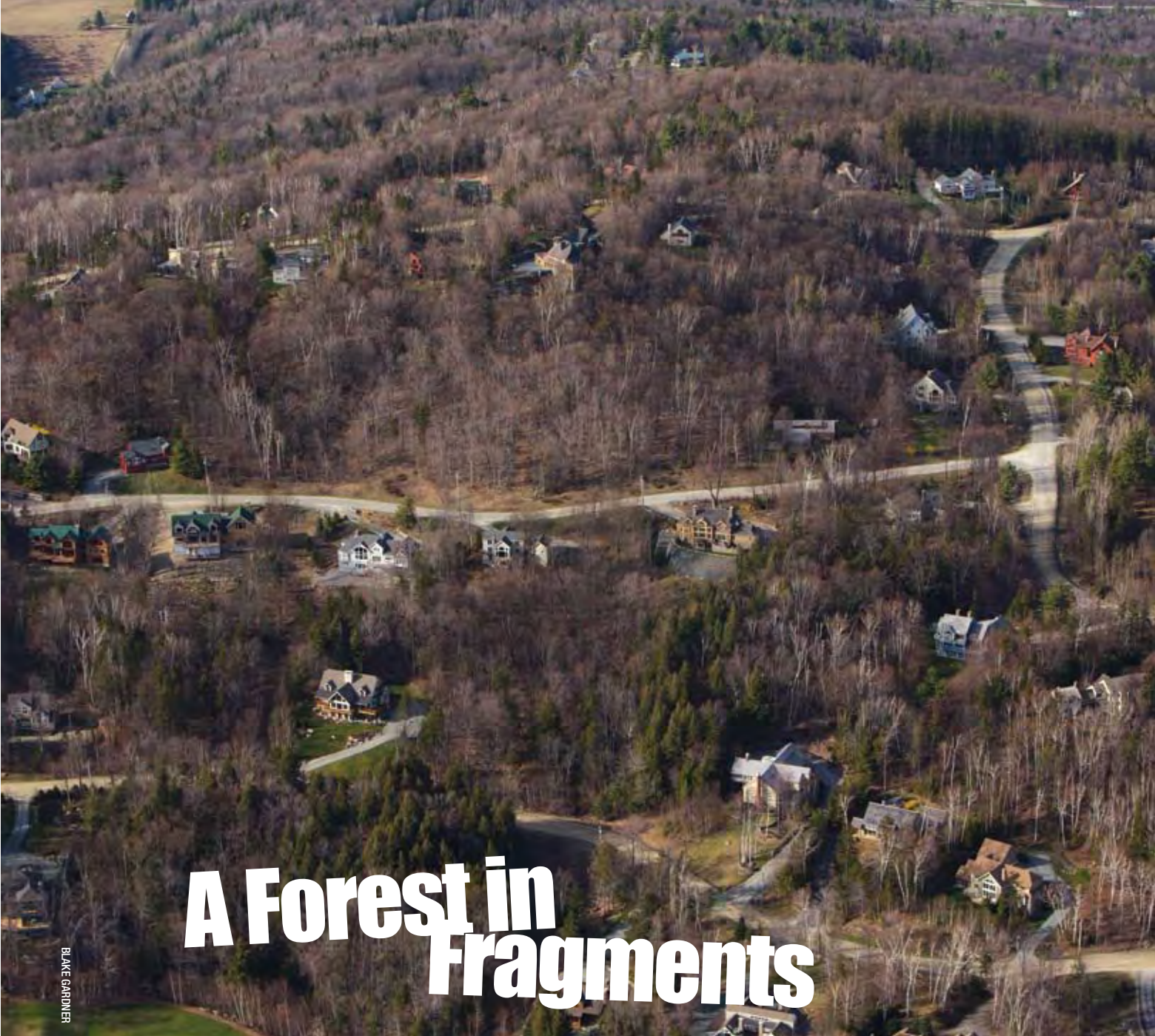
New England's most famous fen was in Boston's Back Bay, near the aptly named Fenway Park. But be careful not to identify wetlands solely by their proper names. Eshqua Bog, for example, a much-visited wetland in Hartland, Vermont, that is well known for its showy lady's slipper orchids, is not a bog but a fen. It's just so tempting to call everything a bog!

Top: Floating bog ringed by spruce and tamarack. Inset: Round-leaved sundew, a carnivorous bog plant. Below: Vernal pools dry out in the summer.



STEVEN D. FACIO

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BLAKE GARDNER

A Forest in Fragments

Smaller Parcels Can Cause Large Problems

By JAKE BROWN

Visit your local Town Clerk's Office and, in most towns, you'll find a parcel map that shows the boundary lines of every property in town. Over the last couple of decades, the lines on those maps have become increasingly dense, and the trend is accelerating. Large parcels are divided into two or more smaller ones as owners respond to changing circumstances, such as: parents give a child a parcel to build a house; children who inherit land jointly choose to divide it rather than own it with their siblings; college tuition or medical expenses lead owners who are strapped for cash to tap into the largest asset they own and sell off a building lot.

As Vermont's landscape is converted into smaller and smaller

parcels, Vermonters are spreading out across the landscape into pockets that haven't been inhabited since the state was first settled, when nearly every corner was inhabited by hill farmers.

Comprehensive data on landowners and parcel size are hard to come by, but U.S. Forest Service surveys of people who own an acre or more of forestland show that the trend was well underway in the 1980s and 90s, when the number of private landowners in Vermont jumped from about 61,900 in 1983 to about 80,000 in 1993. According to the same data, the number of Vermont landowners owning small parcels of forestland (one to nine acres) doubled during the same period.

According to research done recently by Deb Brighton, a Vermont-based property tax and land use consultant, 3,869 new

parcels smaller than 25 acres were created in Vermont between 2003 and 2007.

Looking at the situation another way, Vermonters are developing land at a faster rate than our population is increasing. A study by Smart Growth Vermont showed that between 1982 and 2002 the increase in developed acreage – counting only houses and associated infrastructure – was nearly twice as high as the rate of population growth in the state. That means we are developing the countryside, rather than cities and villages.

What's the Problem?

“A growing problem in Vermont, as well as nationwide, is parcelization of the land into smaller ownerships,” said Put Blodgett, the president of the Vermont Woodlands Association. “This fragmentation of the forested landscape has serious consequences for both the timber-harvest base and wildlife habitat. It is not an easy nut to crack as more people are looking for the privacy and security of owning a chunk of woodland.”

Blodgett mentioned both parcelization and fragmentation. One is a cause, the other an effect. Parcelization refers to the division of land into smaller and smaller lots over time, typically through the process of subdivision. Fragmentation is the effect on the land when parcelization leads to development. The land becomes broken up by roads, houses, and related infrastructure such as power lines. One problem of fragmentation is that it tends to push out those species – bear and bobcat among them – that need large intact tracts of land for survival. Another affected species is the white-tailed deer, which in the northern parts of the state need relatively large “yards” of softwoods for winter protection. Development can also lead to water pollution in rivers and streams because impervious roads and rooftops shed rain and snow and can sweep pollution into waterways, compromising aquatic species. In short, unfragmented forests are essential to much of Vermont’s proud wildlife heritage.

Another environmental concern is that when forestland is converted to non-forest cover – houses, roads, or commercial development – it no longer stores carbon dioxide, exacerbating global climate change.

The fragmentation of land also has financial implications, because smaller parcels of woodlands are more difficult to manage for timber, fuel, and other forest products.

In general, the parcelization and fragmentation of Vermont’s landscape present challenges to conserving the rural character and economy of the state. Forests provide important renewable wood products, including fuel and high-quality sawlogs for construction, furniture, and other valuable markets. Forests help maintain healthy watersheds, which means clean drinking water, crisp and clear swimming holes, and good trout fishing. And, of course, Vermont’s forests offer a vast array of recreational opportunities, including hiking, birding, skiing, hunting, and snowshoeing.

Unfortunately, though, for the first time in a century, we are starting to lose our forest base. Between 1880 and 1980, Vermont was steadily reforesting after the majority of the state had been cleared for farming. Now, satellite imagery data show that Vermont has lost a half percent of its forests on an annual basis

between 1992 and 2002, according to analysis of the photos done at UVM. And, the U.S. Forest Service predicts that a significant number of new houses will likely be built on private forests in Vermont between now and 2030.

The good news, however, is that there are still many large blocs of relatively intact forestland in Vermont, and there are ways to accommodate new houses and development within them while at the same time protecting the values forests provide.

If you do want to build on your property, plan with the viabil-

“A growing problem in Vermont, as well as nationwide, is parcelization of the land into smaller ownerships.”

ity of the forest in mind. Before breaking ground, have a natural resource professional do an inventory of your property (your county forester can provide you with contact information). Find out where the wetlands, steep slopes, intermittent streams, and delicate soils are; make note of unusual trees, cultural artifacts like stonewalls and cellar holes, and significant wildlife habitat. Once you have a full inventory, map the special areas that you want to protect. With that in mind, site your building project. If you are thinking of subdividing your land, consider clustering house sites while keeping the majority of land intact. Many towns, through their zoning regulations, provide density bonuses for clustering homes in large developments and maintaining open space.

Choose a building site as close to existing roads and utilities as possible, keeping roads and driveways short. When building roads, be sure to avoid steep slopes. Keep clearing to a minimum, as a forested landscape protects land from erosion better than an open landscape. As you plan, examine the natural drainage pattern of the land before construction. Leave grassy swales or other natural drainage areas intact. If your roads cross streams, even intermittent ones, install culverts or bridges so that you don’t drive through the streams. For wildlife habitat, bridges are preferable to culverts, and if you do install culverts, be sure they are big enough to handle high flows of water. Also be sure to leave vegetated buffers between any construction and streams.

At the construction site, keep the work area tightly defined in order to limit soil compaction in areas far from the house site. Compacted soil can’t absorb water well, and the ensuing runoff can cause erosion and silt pollution. Consider specific low-impact development techniques to manage stormwater around your building, including forgoing gutters and letting rain sheet off your roof into a vegetated area like a “rain” garden, using native vegetation to slow and stop stormwater runoff on your property, and building your driveway or walkways with permeable material that lets water soak in rather than run off.

Subdividing forestland is sometimes unavoidable. That doesn’t mean that the problems associated with forest fragmentation are inevitable.

JAKE BROWN IS THE COMMUNICATIONS DIRECTOR/LEGISLATIVE LIAISON AT THE VERMONT NATURAL RESOURCES COUNCIL, WHICH CONVENED THE FOREST ROUNDTABLE TO BRING DIVERSE INTERESTS TOGETHER TO TRY TO SOLVE THE PROBLEMS OF FRAGMENTATION AND PARCELIZATION.

The parcelization and fragmentation of Vermont's landscape presents challenges to conserving the rural character and economy of the state.

Avoiding Fragmentation

The problems of fragmentation are largely a function of how landowners develop their land. Landowners have the power to minimize fragmentation, and there are a variety of steps that can be taken to maintain the viability of Vermont's forests, regardless of management objectives. Landowners can:

- Enroll in Current Use. If you own 25 or more acres (27, if your homestead is part of the parcel) of woodland or farmland, consider enrolling it in the Use Value Appraisal Program, also known as Current Use (see story on page 20). The program, which taxes land at its use value instead of its development value, makes it more affordable for owners to keep large parcels intact. In exchange, the landowner agrees not to develop or subdivide the land; in the case of forestland, landowners are required to manage the land according to a forest management plan approved by the county forester. Land can later be taken out of the program for development, but the owner must pay a land-use change tax. The state reimburses towns for property tax revenue they forgo as a result of land that is enrolled in the program, so municipal tax rates are not affected by the amount of land that is enrolled in the program. Current use has been widely credited with helping keep Vermont's working lands viable. Your county forester can help you decide whether this program will be suitable for you and your land.
- Join with your neighbors. If you sense that your neighbors are interested in similar forest management goals, consider joining together to coordinate activities. Landowners can jointly apply for federal or state funding to work on their land, share in road and timber management improvements, market forest products, and develop wildlife management conservation plans.
- Donate or sell development rights. Another way to conserve your land is to donate or sell the right to develop your land to a third party, such as a land trust. Depending on the value of the rights transferred, there can be measurable tax benefits. Generally these agreements are permanent, so while they serve an important purpose, they should only be entered into with due care and after careful review by an accountant or attorney.
- Talk about the future. It's wise to discuss your goals for your property with your family, including your wishes for the land beyond your ownership: your desires, your heirs' interests, potential estate tax obligations, and the economics of land ownership should all be discussed. Annual family meetings to discuss the property can be very helpful in keeping forestland intact.



GERRY LEMMO

Black bears need large tracts of unfragmented forest.

Silk Purse or Sow's Ear? How to Recognize Value in Your Trees

BY STEPHEN LONG

The tree was a corker. It was a sugar maple, with a large, straight bole, and it stood out among its neighbors like a heavyweight boxer at a convention of jockeys.

I was walking a central Vermont woodlot with Jonathan Wood, who was then a forester and log buyer for a hardwood sawmill (he's now the commissioner of Vermont's Department of Forests, Parks, and Recreation). He was evaluating a small parcel of company-owned land, and he had agreed to show me how he estimated the volume and the value of the trees. We had barely gotten started walking the sidehill stand of northern hardwoods when we came upon this beauty.

Wood's eyes lit up as he wrapped his diameter tape around it. "It's a big tree, but it's not shedding its bark yet. That is tight, vigorous, stuck bark. It's being pushed. That tree is putting on some growth."

The tape told us that it measured 23 inches in diameter at breast height (DBH). Then, he walked around the tree, making sure that all sides lived up to the face we'd seen. Finally, he looked up.

"Look at the crown on it: that's a feature crown, that's the boss hog right there. I don't want to get too excited, though. It might be the only one on the lot like it."

Indeed, we only found a couple more trees of that size and quality, but there were plenty of nicely formed, vigorously growing, 16- and 18-inch-DBH sugar maples and white ash. They grew among many that would never make the grade as sawlogs; the best use for these of poorer quality would be firewood or pulp, and many would be removed in the timber sale that Wood was contemplating.

What makes a tree valuable?

All trees are not created equal, and the price paid for an 8-foot log can range from pennies to hundreds of dollars, depending on the tree's form and species. In this article, any reference to a tree's

or a log's value is to the mill price (what a mill will pay for a delivered log) and not the stumpage price (what a logger will pay a landowner for a standing tree). The reason for this will become very clear when the discussion turns to the cost of logging.

A tree's economic value comes from its usefulness as the raw material for a product. The more valuable the product that can come from it, the more valuable the tree. In today's market, the most valuable product that comes from a tree is veneer, the thin sheet of wood used as the outside skin on furniture, paneling, and other laminated surfaces. It shows its pretty face while hiding the composite board or other inexpensive material that is glued beneath. A veneer log's form needs to be as close to a pure cylinder as possible, and veneer mills purchase only large-diameter hardwoods (for top prices, they require at least 16-inch diameters). Too much taper (shaped like a cone, rather than a cylinder) is unacceptable, as is any curve, which in the trade is referred to as sweep. Veneer is peeled in a continuous sheet from the outside of a rotating log, so any knots, wounds, or seams show up repeatedly as the log turns. These defects are the visual analog of a skip in a record album, for those of you who remember that phenomenon. Veneer buyers are paying between \$3,000 and \$5,000 per thousand board feet* (MBF) for the best grade of sugar maple, and perfect black cherry can bring even more.

The next most valuable product is clear lumber used to make furniture. Branch stubs or knots (the remnants of branches overgrown by the bole) are the main limiting factor, along with wounds, seams, and – in light-colored hardwoods like sugar maple where the value is in the white sapwood – too much heartwood. The larger the clear board that can be sawn from it, the more the sawmill will pay for the tree. The next tier of value is in shorter, narrower clear boards – flooring, for instance – and they can come either from the smaller cuttings from the large logs or from smaller logs.

So, the prime sawlogs are large – at least 16 inches in diameter – and as free of defects as possible. Highest prices (currently \$1,000 to \$1,500/MBF for sugar maple and \$450 to \$850/MBF for red oak) are paid for logs that have four clear sides, a term that reflects the sawmill's process of squaring off cylindrical logs. Prices

* Volume of logs and boards is measured in board feet. A board foot is defined as a one-foot-square piece of wood one inch thick. Estimates for board feet in logs (and trees) are made using a log rule, such as the International 1/4-inch rule, which translates the diameter and length into a quantity of board feet.

Below: Jonathan Wood uses his diameter tape to measure the boss hog. Right: the different forms that sugar maple can take: these photos were taken only a couple of hundred feet from each other. The handsome trees on the top are growing well on deep soil. The ratty specimens on the bottom suffer in part from being on thin, drought-prone soil.



STEPHEN LIONS



VIRGINIA BARLOW



JOSEPH ADAMS



VIRGINIA BARLOW



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A collection of defects in trees

Clockwise from upper left: This open-grown tree didn't shed its lower branches until they were large.

Trees are often unable to wall off (compartmentalize) fungal cankers, which then grow larger and larger.

As trees with narrow forks grow, there's bark (not wood) between the forks, and they often split apart. Note the seam below the fork.

Sugar maple borer wounds often are in the most valuable part of the stem.

drop for smaller diameters and for logs with only three clear sides; a log with two clear sides brings even less because the sawyer will get fewer valuable boards from a log with this many defects.

It's not that these defective logs are useless. They are purchased every day as pallet logs, and they are made into wooden spools, crates, ties, and, yes, pallets. But a single 16-inch-diameter, 8-foot-long veneer log can bring \$255 (85 board feet at \$3,000/MBF) while the same size pallet log might bring \$5, and if the tree is so poorly formed that its best use is pulpwood or fuelwood, then it is worth only pennies.

The next major factor in determining value is species. No matter how perfectly cylindrical your hophornbeam might be, it's not going to make a log buyer reach for his wallet. Bruce Jacobs, president of Fountain Forestry, spoke with me in his office in Pittsford, New Hampshire. Fountain manages forestland for clients throughout the eastern U.S., many of whom seek its foresters' advice in making investments in timberland.

Jacobs said, "The species we want to see on the property are sugar maple, black cherry, and red oak. Then there are several secondary ones that we look for: white ash, yellow birch, and possibly white birch, all of them on the second tier of valuable timber. There should not only be a mix of high-value species but also those that grow fast, which is why we would tend to favor cherry over sugar maple. We're looking at species whose wood-quality characteristics are going to have a pretty secure place in markets down the road. There's always going to be a demand for the high-end hardwoods.

"We would tend to throw white pine in with that group, too. It's a species that doesn't reach as much value as cherry or maple, but it does grow very rapidly, it achieves its highest value on a quality basis as opposed to just volume, and it goes to a diverse arrangement of markets. It's a good component to have."

The key to all of these species is that for each of them, there are a number of different grades and thus prices, based on the log's form and size. In addition to the value increase associated with sheer volume, hardwoods graduate into higher classes of products as they grow, and the jumps in value – based almost entirely on diameter growth – can be dramatic. Jacobs said that there are as many as seven grades that a hardwood can go through. So while a relatively small sugar maple removed in a thinning operation might bring only \$200-\$300/MBF, the trees left to grow have the potential to reach the prices noted above for veneer and large sawlogs.

Contrast that with a spruce log. The yield per tree and per acre for spruce is going to exceed the hardwoods, both because it is usable down to a 4-inch diameter (at the small end) and because

it can grow successfully at greater density per acre. But no matter how good that spruce is, it's a commodity, not a treasure. Current prices for spruce logs run in the \$200 to \$250/MBF range.

Said Jacobs, "The problem with softwoods other than white pine is that there's very little grade differential – it's either a sawlog or pulp. Our softwoods – spruce, fir, hemlock – go to the structural timber market so there's no grading: a two-by-four is a two-by-four."

Noting that sugar maple in the last decade has overtaken red oak as the most valuable hardwood in the Northeast, I asked Jacobs what's to keep beech, for instance, from being the next trendy wood. The difference, Jacobs said, is in the physical characteristics, the workability, and the quality of the wood itself. "Sugar maple can be made into high-quality products a lot easier than beech can. It can make furniture, veneers, flooring. You have three or four woods that have very high-quality characteristics. Whichever one happens to be performing best is a matter of fashion – how it looks, whether it's a dark wood or light wood."

Measuring volume

Along with form and species, the other factor in timber value is volume, which can be estimated in a standing tree through careful measurement of the tree's diameter and merchantable height. There are a number of tools for measuring the tree's DBH, including the Biltmore stick and diameter tape, both of which make adjustments that help translate the tree's roundness into a reliable diameter measurement in inches. Jonathan Wood prefers the diameter tape because it is more accurate than the Biltmore stick.

There are, however, a couple of features of the Biltmore stick that experienced foresters might not require but that are very handy to a landowner new to volume measurement. A Biltmore stick includes a log scale and a tree scale with the corresponding volumes printed in line with the diameters, so you can read the diameter and instantly read how many board feet are in a log or a tree of that diameter.

Estimating the number of 16-foot logs in a tree is the Biltmore stick's other use because most of them incorporate a tool called the Merritt hypsometer. The name belies its decidedly low-tech function – it's a glorified yardstick, and in fact a yardstick can be substituted. Here's how it works. Stand exactly one chain (66 feet) from the tree and hold the stick 25 inches from your eye and vertically in line with the tree so the stick's bottom lines up with the top of the stump that would remain if the tree were cut. Then follow the trunk with your eye up to the point where the tree forks, heavy branching occurs, or it otherwise becomes unusable for sawlogs. Keeping that point in mind, look at where on the hypsometer that point lies, and the hypsometer will tell you how many 16-foot logs there are. In substituting a yardstick, do everything the same way. Every 6 inches of stick corresponds to a 16-foot log.

In determining the number of logs, Wood and most other foresters with comparable years of field experience rely on what they call "ocular estimates." I'm never quite sure how firmly a forester's tongue is in his cheek when he uses the term because, of course, it simply means to eyeball it. Wood said that at the

start of each timber cruise, he does use an objective measurement to get his eye calibrated to the heights and tapers in that particular stand, but once he's comfortably calibrated, he goes ocular. A word of caution: if you haven't estimated the height of as many trees as he has, you should stick with the stick.

The lesson to be learned from spending time in your woodlot with a Biltmore stick is how volume gets compounded in larger-diameter trees. Many mills have reduced their utilization standards and will now purchase hardwood logs with as small as an 8-inch top, so more of the stem can now be sold. The boss hog sugar maple in Jonathan Wood's company woodlot rose a full 40 feet before it had tapered down to 8 inches. Its volume (measured on the International 1/4 inch rule) would be approximately 450 board feet. A 12-inch maple that grew nearby would reach the 8-inch limit of marketability at around 24 feet, and its volume would be a relatively puny 70 board feet. Adding inches in diameter puts on geometric growth in volume.

If you own only an acre or so, it would be perfectly reasonable to measure every tree that has reached pole size (4 to 9 inches in diameter) or larger. But that's impossible on larger lots, which is why foresters have developed ways of estimating volume by measuring it on a smaller percentage of the land. Called a timber cruise, it involves setting up a series of plot points, tallying the trees' diameters and merchantable heights at each point, and then using the samples to make assumptions about the volume per acre.

Logging chance

As Jonathan Wood and I walked his woodlot, and he was taking plots and making notes for his volume estimate, he was also silently taking in the variables that would affect what he refers to as "logging chance." How easy or difficult would it be to cut the trees, move them to a landing, and get them trucked out of there?

Said Wood, "There's more to value than just what's in the tree. It's the process of removing it that's the most expensive part. So the more that operation costs, the less you'll get for your trees. [It's crucial to] have a knowledge of the limitations of your woodlot: whether it's wet, whether [the logging] has to be done in the winter, whether it's rocky or ledgy, whether there's an established road system, whether it's too steep. Those aspects are critical to what you can get the job done for."

A number of additional factors influence the cost of logging. Of particular significance is the volume per acre to be removed. The lighter the cut and the more dispersed the timber, the more it costs the logger to do the job, and there is a threshold below which it's not worth it to a logger to have his equipment delivered to the site. A long skidding distance – 1/2 mile or more – can also make a job costly. Uphill makes it worse. If, on the other hand, the log truck can drive into a centrally located landing, leaving short runs for the skidder, the operation will be much more efficient – and less costly.

Distance to market also affects cost. If a trucker is delivering to a mill less than 25 miles away, the cost could be as little as \$50/MBF. But most landowners will probably end up paying closer to \$90/MBF, a figure that reflects a longer hauling distance and the high price of fuel.

The underlying principles are fairly simple. The more difficult the job of removal, the less you'll be paid for your timber. The bigger the wood, the more attractive the job is to a logger. These principles hold true regardless of the way the arrangement with the logger is structured. Industrial jobs usually will be contracted at a flat rate per MBF to cut and skid the wood. Most loggers who work for small landowners, on the other hand, prefer the more entrepreneurial approach of buying stumpage and then selling logs. Often, the logger and landowner will divide the checks from the mill, usually on a sliding scale that gives the landowner a higher percentage on the more valuable logs and the logger a higher percentage on the lower priced. Keep in mind that one tenet of good forest management is that poor-quality wood is removed so that well-formed trees can grow. On a woodlot that has been managed poorly or not at all, the ratio of pulpwood to sawlogs can be as high as 5 to 1. Because the logger's work is essentially the same whether it's pulp or veneer that he's producing, adjusting the percentages stabilizes the rate per MBF at a reasonable price for the entire job. On jobs with a lot of pulp, the logger will need to get a higher percentage on the sawlogs to compensate him for losing money on the pulp.

Because of their experience, a logger and a forester will be able to negotiate and quickly come to an agreement on the cost of logging a particular lot. Landowners who do their own negotiating need to understand as much as a logger or forester does about logging chance in order to be successful.

Said Wood, "A lot of landowners go into a situation where it's 50 percent for the landowner and 50 percent for the logger. But if they've got enough valuable wood, they might be able to negotiate a deal on a cost per thousand basis that will be simple, straightforward, and fair to both of them."

Landowners should expect that the absolute minimum cost for cutting and skidding wood is \$100/MBF. That's if the ground is flat, the skid distance is short, the timber is big and growing close together, and there's a lot of it. If any of these is not the case, the cost per MBF goes up. It can easily be as high as \$300/MBF, at which point the timber would have to be high quality to be worth the expense of removing it.

Said Wood, "There's many times where the costs of a lot are so high that the logger deserves 50 percent or more, where that's a reasonable price for the removal process. Knowing the difference is a critical component of what you can get for your timber and what you shouldn't get."

I love it when my forester refers to my woodlot as a goldmine. And there are 30 acres of nice sugar maples that might deserve that designation. But we both know that there are twice as many acres filled with hophornbeam, beech, white birch, red spruce, and hemlock. Maybe someday the white birch will bring a decent price. Maybe not. Like most landowners, my wife and I don't own this forestland as a timber investment. It's part of the home we've made in the woods. It's a place to walk, to hunt, to gather, to learn. But I get great pleasure in thinking that over time those sugar maples will be paying their own way.

STEPHEN LONG IS THE CO-EDITOR OF *Northern Woodlands* MAGAZINE

A Look at the Season's Main Events

By VIRGINIA BARLOW

SEPTEMBER

OCTOBER

NOVEMBER

First week

1 Young red foxes have scattered and may end up as far as 50 miles from their birthplace / The ripening white seeds of poison ivy are an important source of food for fruit-eating birds / This year's turkey vultures have dark heads; the red, naked head comes with maturity / Luna moth caterpillars have dropped from their feeding trees to search for a suitable place to spin a cocoon in which the pupa will hibernate

The berries of common juniper take two or three years to mature. Now grouse, bobwhite, songbirds, and moose are eating them / Canada geese are flying. So are milkweed seeds and their parachutes, for the pods have popped open / Beavers are submerging branches next to their lodge, to be eaten through the winter / Cold weather sends deer mice, Halloween lady beetles, and cluster flies indoors / Time to fertilize trees with high phosphorus/low nitrogen (or no nitrogen), if warranted

Shorter and cooler days in the fall decrease transpiration and water needs of trees, making it an excellent time to plant. Avoid crab apples and oaks and mulch heavily to protect damaged roots / The golden yellow needles of tamaracks are dropping. There is little yellow left in the woods, but many shades of gray and brown / Wood turtles are hibernating at the bottom of streams. Bullfrogs and green frogs have tucked into the mud at the bottom of ponds for the winter

Second week

2 The muskrat population is now high as they usually have two litters, with 5-8 offspring in each / The flesh of the giant puffball is delicious if found when it is snowy white. Off-color ones aren't so good / White-tailed deer begin to shed their summer coat and grow a new thick winter coat. The outside hairs are hollow and beneath is a dense undercoat / Asters and goldenrods are among the last flowers visited by honeybees / Tiger beetle larvae spend the winter in vertical burrows dug in loose, sandy soil

Look for the long, toothed evergreen leaves of pipsissewa, a handsome small plant of dry woods / Many birds eat chokecherries and pin cherries. Bears, raccoons, foxes, chipmunks, squirrels, and mice also consume them / Migrating yellow-rumped warblers are feeding on the white berries of gray dogwood. They will winter in the southeastern states / Bears are especially active in the fall, eating everything they can find to store enough fat to last for the next five months. Beehives are especially vulnerable during October

Most great blue herons have left by now and will winter along the coast in the southern states / Ground cedars, most common where there is a mix of hardwoods and softwoods, are releasing clouds of pollen / Grouse numbers are high now. The population will be knocked back over the winter by weather, food shortages, and/or predators / Chipmunks will keep coming out if it is warm / Garter snakes have balled up together underground in caves and crevices, making use of each other's metabolic heat

Third week

3 Flocks of flickers are everywhere and heading south / The larva of a small fly causes goldenrod ball gall. The larva of a moth causes elliptical goldenrod gall. Both are obvious at this time of year / Cooper's hawks are heading south, picking off mourning doves and smaller birds on the way / Praying mantises are depositing their styrofoam-like egg masses around twigs / Sensitive fern leaves are withered by the first frost, but the brown fruiting stalks will stay upright all winter and sometimes even longer

Flocks of juncos arrive from the north / Hawk nests are easier to spot, now that the leaves are down. They may be reused next year, so if you find one, make a note of its location / Most leaves are gone, but lilacs are still green, and blueberry bushes are bright red / The last woodcocks head south, as the ground starts to freeze and worms become unavailable / White pines are dropping half their needles (as they do every fall) / Tree sparrows may still be around, but most other small migrants have headed out

Porcupine eat bark after the leaves have fallen: aspen, basswood, and mountain maple are favorites / Frail, lightly marked tan moths are most often the adults of either the fall cankerworm or Bruce spanworm. Bruce spanworm moths are most abundant in sugar maple stands. The females are wingless and weigh about four times as much as the males, with eggs making up most of the weight

Fourth week

4 Each passage of a cold front sends more flocks of broad-winged hawks south / Crush a few leaves of sweet fern, a shrub of dry or sandy soils, to recapture the fragrance of summer / Turkey vultures will soon begin to move south. They have been caring for their offspring for 11 weeks, a long time compared to most birds / Migrating fox sparrows will eat millet, black oil sunflower seeds, and cracked corn cast on the ground or in a ground-level feeder

Catbirds are fattening up on almost any fruit or berry you can think of. They will soon leave our area to winter from the Gulf Coast south to Costa Rica / Bumblebee queens have mated, and those that survive the winter will each found a new colony in spring / Apple trees may not have colorful leaves, but they certainly have colorful fruit; look for fox, deer, porcupine, grouse, and many other birds eating the bright red and yellow apples

Autumn overturn is completed in lakes as the water temperature reaches a uniform 4°C (39.4°F) / The monarch butterflies that left in September will soon arrive at their wintering grounds in northern Mexico. They mostly are gliding, not flying – rising on thermals and then aiming south and west / The absence of all those spring and summer diseases and insects makes this a great time to do that pruning you never quite got around to over the summer

These listings are from observations and reports in our home territory at about 1000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.



Healthy Rivers



BY STEPHEN LONG

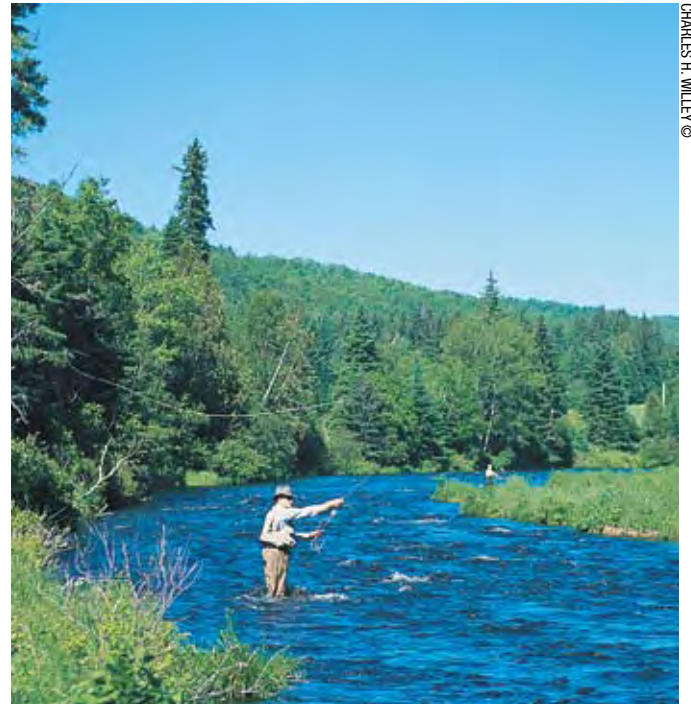
The health of America's rivers has come a long way since Cleveland's Cuyahoga River caught fire and the Connecticut River – though it never proved combustible – earned the dubious honor of being “the most beautiful sewer in the world.”

Think back 40 years when the cities and factories that lined the nation's waterways had spewed so much waste directly into them that people no longer looked at rivers as places to fish or swim. The gravity of the problem was so apparent and so appalling that, along with air that was increasingly unfit to breathe, it gave birth to a national concern about the environment.

Today, water quality problems are much more subtle. Instead of coming from individual pipes, pollution is carried in runoff from adjacent land. Sedimentation, under the perhaps more dignified name of “nonpoint source pollution,” has become the major threat to our rivers and streams. A river is defined entirely by the land that it flows through.

As a devoted trout fisherman, I don't need much of a shove to step into the water, and I can't say with a straight face that I was doing research about water quality when I had my revelation about sedimentation. I was fishing.

It was a few years ago, during the course of a dry summer, when I began to notice a pattern of shifting conditions on my local river that affected my ability to entice a trout to rise to a fly. Between rains, the water would be low, clear, and – especially during the afternoon – bathtub warm. In the heat of August, the only time I could catch a wild trout was at first light when the water was at its coolest.



CHARLES H. WILLEY ©

Wide vegetated buffers help trap sediment and foster healthy fisheries.

Eventually it would rain, and it didn't take much of a down-pour to raise the water level of this lowland river and turn its color to chocolate brown. For two days, the water would be stained, the trout couldn't see to feed, and it was pointless to cast even the flashiest streamers.

On the third day, I'd catch trout. The water was still cool from its infusion of rainwater, and the clarity was off just enough to hide my line and leader and make a mayfly imitation look exactly like dinner. That summer, I learned to wait for the third day, and I

caught lots of hungry trout that way.

I accepted that cycle as a fact of river life until I realized that the same down-pour on the same

river five miles upstream did not discolor the water. It brought the river up enough to make wading difficult, but the water still ran clear. In that day on a headwater stream, I learned the basic truth of water quality, that the condition of the land determines the condition of the water.

The muddy color follows the release of billions of silt particles from the streambank into the water, enough of them to turn the river opaque.

When these fine particles settle into the river bottom's gravel, they function like caulk, sealing the gravel and rendering it incapable of incubating fish eggs. The silt also takes away the major food source for adult trout by making the streambed inhospitable for many mayflies, caddisflies, and stoneflies.

In his book *Natural Acts*, David Quammen wrote, “On their

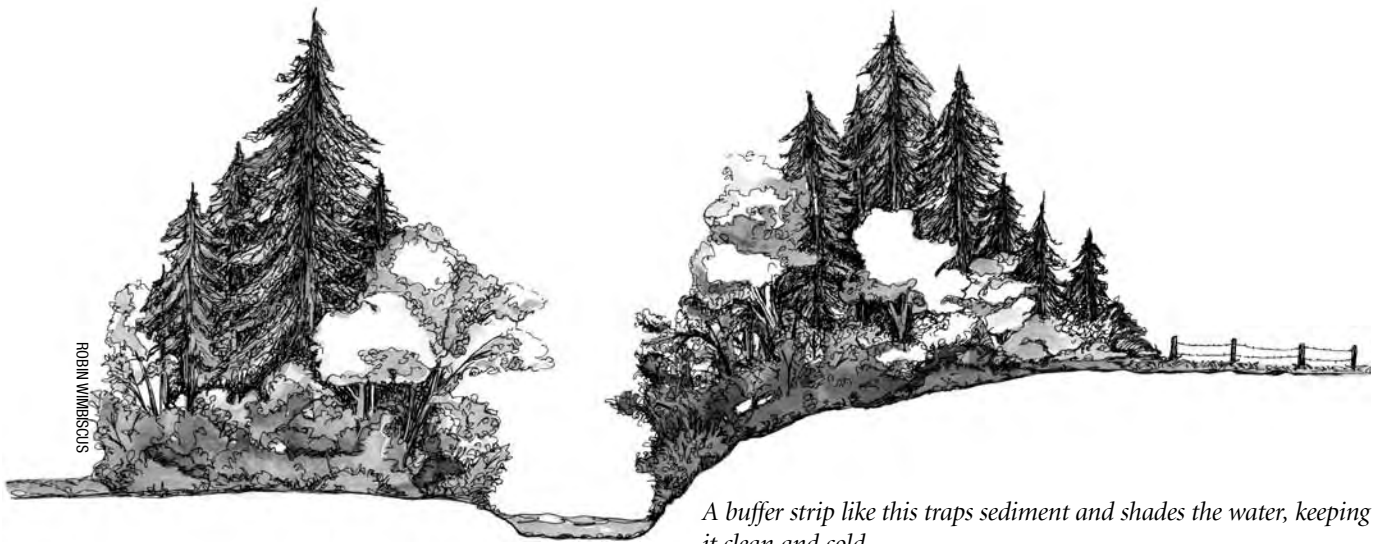
are Made in the Shade



CHARLES H. WILLEY ©

Left: These biologists are conducting a stream census by electroshocking. The fish are momentarily stunned, measured and counted, and then released unharmed.

Inset: Rainbow trout like this are sensitive to the health of their aquatic habitats.



A buffer strip like this traps sediment and shades the water, keeping it clean and cold.

best days, these [aquatic insects] rule as lords of the stream-bottom jungle; one bad day, one mistake, one loss of footing and they are in the belly of a trout.

“Thousands of bad days for millions of cold-water insects, and the result is what we often call, with some narrowness of vision, a good trout stream. But a good trout stream must first be an excellent insect stream, a superior haven for algae and fungi and bacteria, a prime dumping ground for dead leaves, a surpassing reservoir of oxygen and calcium. It will then also, and thereby, be a good osprey stream, a favorite among otters, a salvation to dippers and kingfishers and bank swallows and heron, mergansers and Canada geese and water shrews, mink and muskrat and beaver. Not to mention the occasional grizzly bear...”

Having spent many mornings and evenings between the banks of a trout stream, I can corroborate Quammen’s catalog of the riverine ecosystem. While fishing rivers in the Northeast, I have waded within casting distance of wood ducks, mallards, and black ducks; I have seen predators at work – the osprey, mink, otters, heron, and the ubiquitous kingfisher; and I have watched a black bear swim across a swift current, climb up on the bank, shake like a dog, and then walk casually away into the brush.

Water, clear and cold, is the source of life. Unfortunately, a lot of the water in rivers throughout the Northeast is neither clear nor cold. But according to Mike Kline, a river ecologist who works as a planner for Vermont’s Water Quality Division, it’s not all bad news. “It’s important to realize that our rivers are in a state of recovery,” he said. “There have been dramatic differences in land use. Farmers are doing a better job at protecting water quality. It used to be anybody with a backhoe could go to the river and take out as much gravel as they wanted. They’re not doing that any more because it takes a permit. It used to be every city was dumping raw sewage into the rivers. That doesn’t happen any more either.”

Just as the main sources of water pollution have changed, so have the means of monitoring it. Said Kline, “Forty years ago, the way we measured water quality was in terms of the chemistry. But that has changed dramatically. Our rivers have recovered tremendously from those days. I look at water quality not just in

chemical terms, but in physical and biological terms as well.”

Kline has worked with a dozen watershed organizations, most of which were formed from citizens’ concerns about water quality. “When I meet with these groups, they’re invariably interested in testing. But I tell them, ‘Before you take one test tube sample, get in a canoe and paddle the river. Walk it, drive along it. See where the banks are eroding, where the trees are gone. How many pools are there, how many rapids or cascades? The allure of the test tube is strong and it’s hard to overcome, but there’s more to river health than dissolved oxygen and *E. coli*.’”

I suppose, too, that there’s more to river health than the presence of a reproducing population of wild trout, but Kline assured me that my use of trout as a gauge of river health wasn’t as parochial as it might seem. “Trout are a good indicator species,” he said. “They have a set of habitat requirements that make them the proverbial canary in the coal mine. They are the top predator, and their absence would be like the woods being without a predator like the catamount or coyote.”

Counting trout

Rich Kirn, a fisheries biologist with Vermont Fish & Wildlife, is responsible for managing central Vermont’s brook, brown, and rainbow trout. He spends a lot of summer hours wading in rivers, but instead of a flyrod, he fishes with an electroshocking wand, surveying trout populations.

I joined Kim and his colleagues when they conducted their electroshocking census of my local river. The electrode on the wand causes an involuntary impulse called galvanotaxis that impels the fish to swim toward it. The biologists and their assistants net the fish: dace, sculpin, suckers, and trout. If it’s a trout, they make note of species, weight, length, age, and whether stream-born or hatchery-reared.

It was a hot August day, the water was low, and the results were... uh... shocking.

In one 600-foot stretch of the river with a nice combination of riffles and pools that should have been loaded with trout, there were only two spots that held trout. The first was the confluence

with a tiny brook 12 inches wide that pumped a steady stream of cold water into the head of a bend pool. Lined up tight to the bank like children at a drinking fountain was a pod of wild brookies, 10 of them in all – not surprising since the water temperature elsewhere in this stretch was 73°F, not quite lethal to trout but approaching the danger zone. More than a day or two at water temperatures above 77°F and brookies will go belly up. Rainbow trout and brown trout can handle slightly warmer temperatures, but the preferred temperature for all of them is within a few degrees of 60°F.

In the next pool upstream, there was a similar number of brookies along with an eight-inch brown and some hatchery rainbows camped out in a three-foot-deep pool in the shade and shelter of a blowdown spruce. The trout had found the only relief they could, the shade of a blowdown and the cold water of a feeder brook.

As Kirn returned the brookies to their pool and the cold water of the feeder brook, he remarked that if it weren't for the canopy over the brook and the mature spruce that had fallen into the river, there might not have been a single trout in this stretch of the river.

“Leaving a buffer strip is the single most important thing landowners can do to improve or maintain trout habitat,” said Kirn. “If you have a canopy over your brook, leave it there. If it's gone, let it grow back. I'm talking about even tiny brooks not big enough to hold trout. The shade keeps the water cool, not just in the brook but in the river that it flows into. This river depends on it. Once the water warms up, no amount of shade is going to cool it down. It takes cold water entering the stream to bring the temperature down.”

Cold water is not the only benefit provided by riparian buffer strips. Brush and trees also help to stabilize the stream bank by binding the soil with their roots. Without streambank vegetation, each shift in water level dislodges silt from the banks, which gets deposited on the river bottom somewhere downstream, the exact destination determined by the speed and volume of water and the steepness of the grade it flows through.

Another critical part of a buffer strip – the leaf litter – filters and traps sediments being carried toward the bank in runoff. Sediments can contain phosphorus, nitrogen, silt, petrochemicals, heavy metals, and other toxins from sources such as residential and commercial development, agricultural land including both cropland and pasture, logging, and roads and ditches.

River managers today are at an odd disadvantage because the threat to river health is not as readily apparent as it was 40 years ago. Back then, the spewing pipe was a stark image that brought clarity to the issue, if not to the water. Everyone could embrace the cleaning up of industrial and municipal waste. Today, the problem can seem as clear as mud, because almost any 10-acre parcel has at least some water standing or flowing through it. Today's challenge is one facing almost every single landowner. The buffering of our streams will take – if not a grassroots effort – a tree roots effort.

What does a buffer strip look like?

Stand on the streambank, turn your back to the stream, and walk away from it. Take five long paces (a left and a right), which will carry you 25 feet from the bank. The ground between you and the stream should be covered with brush and trees. There

shouldn't be any roads or trails, temporary or permanent, within that 25-foot strip. Take another five paces and you have the 50-foot minimum width of protective strip according to specifications for both the Green Mountain National Forest and the “Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont,” known as the AMPs. Equipment can operate in this outer half of the buffer, but the goal should be to maintain a continuous forest cover. Where the terrain draining to the stream is pitched steeper than 10 percent, the strip needs to be wider.

If a lawn or a hayfield encroaches into the space, it's time to cut the engine and let this section of lawn go wild. If necessary, flag the edge of the buffer strip to remind overzealous mowers about the no-cut zone. We have inherited from our European ancestors a love of the park; with its neatly trimmed grass and the occasional round-crowned shade tree, the park brings comfort to those who need to know that the wilderness has been tamed. It fails, however, to do anything for the stream or the wildlife that depend on it.

Livestock also help to tame the land, and they, too, serve to remove the vegetation that is so vital to rivers. If you have been pasturing livestock within this 50-foot strip, it's going to take a sacrifice and some fencing to keep them out. The Natural Resources Conservation Service is in the business of helping landowners in this situation. They have funds available and can help to design an area where livestock can get water without having free access to the regeneration within the buffer strip.

It doesn't take long. If you do nothing more than simply allow nature to take its course, early successional poplars, dogwoods, willows, or other quick starters will be as tall as the grass by the end of the summer. If the laissez-faire approach doesn't appeal to you, plant some quick-growing shrubs or trees. Willows and dogwoods can be transplanted at anytime, and they'll do a nice job of holding the bank while larger trees get established.

Beneath them, longer-lived species like yellow birch and hemlock will come up.

If your buffer strip is already forested, then you are more than halfway there. The task then is to make sure that it provides continuous cover now and continual cover for generations. Manage your buffer strip as an uneven-aged stand, with a goal of maintaining three age classes of trees: saplings, pole size, and mature. If the stand is crowded and has sparse regeneration, thin lightly. If, when removing trees, the leaf litter is scraped down to mineral soil, seed it with conservation mix or mulch it with hay.

The future of our rivers

It was a major shift in thinking, a national awakening to environmental reality, that brought about the changes to our water quality in the last 40 years. It will require a similar shift in understanding, and an equally widespread commitment to effect the full recovery of our rivers. Unlike the West with vast public land holdings, land in the Northeast is owned primarily by individuals, so the responsibility – and the opportunity – is theirs. Incrementally, tributary by tributary, brook by brook, the water can run clearer and the river system can be full of life.

STEPHEN LONG IS CO-EDITOR OF *Northern Woodlands* MAGAZINE

Smart Planning

Preparing for the Eventual Transfer of Your Land

BY ANNETTE LORRAINE

If you, a conscientious landowner, could glance into a crystal ball to look at your land 100 years from now, what would you hope to see? Well-managed forestland? Woods that still feel wild? In any case, chances are you wouldn't want to see that the land had suffered a liquidation cut or been subdivided and developed. Many landowners who have invested love and labor into their land would like to see that legacy continued. As an owner, you have some control over making that happen.

Putnam (Put) Blodgett, of Lyme, New Hampshire, is one such landowner. "I hope the forest can be a touchstone for my family to some of their roots," said Blodgett, who remembers his father harvesting timber on his family's Bradford land using a team of oxen and a two-man crosscut saw. Although Blodgett eventually sold the family farm, he held onto 600 acres of the family forest. Blodgett recognizes the benefits of private ownership and good management of forestland, and has vigorously promoted them as president



HEIDI DORR, VERMONT LAND TRUST

DAVE BROWN

**“I surveyed the landscape of my life
and wondered what to do.”**—Steve Wright



of the Vermont Woodlands Association. With an investment of more than one lifetime in his 600-acre woodland, it is no surprise that Blodgett wondered how to best secure his family's legacy.

Put Blodgett is far from alone. As a group, private woodland owners are aging. More than 60 percent of current private woodland owners in the U.S. are over age 55, and over half of those are already retired. Inevitably, those forests will be changing ownership soon. Because women's life expectancies exceed men's, older women may initially become the next wave of woodland owners before the next generation.

Every time land changes ownership, the woodland is at risk. New owners may not share the previous owner's knowledge or values or appreciate the importance of continuity in management. Even if they do share the same values, heirs who inherit the land may be compelled by estate taxes or other debts to liquidate the timber, subdivide, and sell. If a landowner dies without a will, state laws may compel the subdivision or sale of a parcel to provide equal distribution to all heirs, regardless of those individuals' different circumstances or past contributions.

Escalating land values

A while back, Ron and Sylvia Ferry of Montpelier, Vermont, examined their estate planning needs. After rearing their three children on their 83-acre farm and woodland, they turned their attention to the future. "Our biggest asset is this land; we won't have much money when we go," said Sylvia Ferry, describing their all too common "land-rich, cash-poor" situation. The Ferrys purchased their land in 1958 at a price that seems absurdly low by today's standards. Nevertheless, when it comes to calculating capital gains taxes on land holdings like a woodlot, that purchase price is their basis. If the Ferrys were to sell their property, the capital gains tax would be high because of the dramatic difference between the purchase price and today's fair market value.

Capital gains, estate, and gift taxes are major concerns for many who wish to leave or give their land to heirs. Because the value of land throughout the Northeast has increased so much in the last 25 years, such taxes are assessed to many people who would have been immune before. Often, local folks gasp at the prices newcomers pay for backcountry real estate – only to find out those seemingly outrageous values now apply to their own land as well. It's no longer only the obviously wealthy who need to worry about estate planning. Landowners who reach this level from their real estate values rather than from liquid assets must ask themselves how their heirs are going to come up with the cash to pay the taxes, or how they can reduce or avoid such tax liability.

Like many married couples, the Ferrys will be able to benefit from the unlimited marital deduction. They can give away or leave as much as they like to each other as spouses, without having to pay estate, gift, or capital gains taxes. But this is a one-time benefit used at the first spouse's death, so the surviving spouse cannot remain complacent. Uncle Sam will extract his due from the subsequent transfer to the next generation unless adequate

"Our biggest asset is this land; we won't have much money when we go."—Sylvia Ferry

estate planning measures are in place.

So what can landowners do? One essential step is to obtain estate planning and business advice from a professional, preferably one who has an understanding of family and partnership dynamics and land-based businesses. A simple will or trust may be an easy remedy. Some owners who have a partner or a specific child interested in the land opt for a partnership agreement or limited liability company with a built-in buy-sell agreement; the buy-sell agreement allows a surviving partner to automatically buy out another partner's share in the event of death or disability. For privacy and some continuity, some landowners opt to place their land in a trust with specific instructions to the next trustee. To avoid estate taxes, some landowners choose to transfer their land to their heirs in incremental gifts before their death, or to put their assets in certain types of irrevocable trusts. There are many estate and business planning tools. A landowner must be willing to sort through and examine their benefits and drawbacks.

Some landowners jump to what seems like the simplest option. They think that by adding a child or non-spouse partner to a deed as a co-owner with right of survivorship, their transfer issues will be solved. Instead, that can be disastrous. Only surviving spouses benefit from the marital deduction; a surviving non-spouse co-owner might still face estate and capital gains taxes. And by already being on the deed, the surviving owner will not get the capital tax benefit (stepped-up valuation) of an inheritance rather than a gift. In an inheritance, the basis gets "stepped up" to the fair market value at time of death from the much lower basis of the original owner – a big boon for heirs that is lost in co-ownership. Another drawback to this simple deed solution: if one of the living co-owners incurs too much debt, they could both end up losing the entire property. Estate planning is not necessarily a do-it-yourself project.

For people pondering estates and estate taxes, it is crucial to obtain up-to-the-minute professional advice. If you did your estate planning years ago, it is crucial to review your plans periodically in light of new tax laws. Federal estate tax rates, exemption limits, and estate value parameters are changing yearly. While it is impossible to predict where they will end up, we know that some estate tax rates have been as high as 55 percent with an exemption on \$1 million in assets.

The Ferrys took a thoughtful approach in their estate planning: they wrote to each of their three children asking what they wanted as far as the future for the house and the land. Each one wrote back, separately expressing a desire for the land to remain intact in the future as a working farm and woodland. So the Ferrys opted for a supplemental tool: they entered into a conservation agreement on their land to prevent its future subdivision or conversion into house lots.

As helpful as wills, trusts, and business entities are, they make no guarantees of high-quality land management. A permanent conservation agreement (also known as a conservation easement or restriction) is currently the only option that can assure land will stay undeveloped and its management will follow certain standards. As a bonus, conserving land from subdivision and development lowers its fair market value, thus lowering the potential for capital gain, estate, or gift taxes upon transfer.

“I hope the forest can be a touchstone for my family to some of their roots.” —Put Blodgett

In 1978, Steve Wright purchased 80 acres of woodland in Craftsbury, Vermont, because, as he put it, “I wanted my sons to do something to stay warm.” After his sons grew up and left the state and their firewood duties behind, Wright said “I surveyed the landscape of my life and wondered what to do.” He realized he could sell his place for a nice profit. He saw nearby former dairy farms being subdivided, with fences, houses, and “no trespassing” signs going up. Still, Wright decided that with his land there was nothing better for him than to be able to “grab a gun, call the dog, and walk out the back door to hunt.” He said, “I want to be carried out with my toes pointing up, and keeping the land conserved and intact feels like a good way to leave the party.” Wright and his next-door neighbors collaborated to place permanent conservation agreements on their lands. In addition, Wright opted to provide for permanent public access – not a requirement of conservation agreements but a generous additional gift to all people, present and future, who like to wander the woods as he does.

The typical way for a landowner to conserve land is by donating a perpetual conservation agreement to a nonprofit land trust. In this scenario, a landowner signs a contract with an organization whose sole purpose is to permanently restrict development and monitor management of the land. At the same time, the landowner retains ownership of the land and is free to sell or leave it to heirs as desired.

The conservation agreement must be conveyed to a nonprofit organization that the Internal Revenue Service deems qualified to hold and enforce those rights in perpetuity. These are usually called land trusts or land conservancies. Landowners can claim income tax deductions for voluntary donations or bargain sales of conservation agreements (as provided by Section 170(h)(4) of the Internal Revenue Code) when the agreements accomplish certain goals, such as the conservation of working farms, forestland, or wildlife habitat, so long as there are significant public benefits. To qualify for federal tax benefits, a landowner must obtain a detailed appraisal to verify and calculate the drop in value due to the conservation agreement. At tax time, that difference in value is considered to be a charitable donation. Land trusts can provide more detailed information.

It is important to note that conservation agreements place restrictions on the property that will affect every future owner of that property; for instance, the land can never be subdivided and developed (although limited exceptions may be negotiated beforehand), nor used for mining or storing trash. However, most land trusts allow – and often promote – timber harvesting with good forestry practices. This is appealing to conscientious woodland owners, like Put Blodgett, who want to see their working forest remain a forest beyond their ownership.

Theoretically, a decrease in property value should also reduce property taxes. However, governmental policies for assessing conservation lands differ from town to town. There is no guarantee that extinguishing develop rights through a conservation agree-

ment will lower property taxes. In the case of land enrolled in Vermont’s Use Value Appraisal program (“current use”), however, conservation land is most likely already being taxed at its lowest possible rate.

So what does this all amount to in the vision of one’s land for the future? With careful planning, it is possible to preserve one’s financial resources, one’s land, and one’s land ethic for future generations. Landowners like Ron Ferry who have conserved their land, feel satisfaction knowing that “the land is more ours than it ever was before, because we know it will be preserved.”

ANNETTE LORRAINE LIVES IN PEACHAM, VERMONT, AND WORKS IN MONTPELIER AS A REAL ESTATE ATTORNEY AND LAND CONSERVATION CONSULTANT.

Thinking Ahead, Stepping Forward

1. Communicate with Partners, Heirs, or Likely Buyers.

Start a conversation. Will they continue to value the land as woodland? Are they knowledgeable about forest management or willing to learn? Are they prepared to invest their time and resources into it as you have? If not, you may want to look into securing a permanent conservation easement before you relinquish control of your land.

2. Review Your Estate Plan.

If you don’t make your wishes known in a will or trust, the government will distribute your assets for you. The results may not be pretty. Find out how vulnerable your estate is to taxes. Make arrangements to transfer your woodland and other assets the way you want, and in ways that save money. Simply adding an heir to your deed as a co-owner is NOT a good plan; unless the co-owner is your spouse, it will likely cost that co-owner a lot more in future taxes than it would otherwise with different transfer arrangements. Once you have a plan in place, review it annually in light of changes in family circumstances as well as tax laws.

3. Coordinate Your Business Planning.

Owning and managing woodlands is a business that subjects you to taxes and other liabilities now. Talk with your accountant or attorney to determine whether it helps to create a formal business entity like a partnership, limited partnership, limited liability company, or corporation. Some of these entities dissolve with your death, while others continue without interruption.

4. Inspire Future Good Management.

If you die or become incapacitated, someone else will manage the land, but you can provide some influence over that future process. You could set aside designated funds in trust to encourage and support your successors to hire professionals and pay for good land management. Or research and consider private contractual arrangements now. Certification programs or cost-share programs advance good management practices for fixed periods of time. Conservation agreements with qualified land trusts are designed to be perpetual. Conservation agreements may also provide various tax benefits both now and in the future.

You can decide what balance will work best for you and your successors by considering how each option will affect your levels of:

- Control
- Flexibility
- Liability
- Continuity
- Taxes



Fields Among the Forests

Keeping Open Land Open



By CHUCK WOOSTER

Can you name the most heavily forested region in the United States? The answer might surprise you: the Northeast. The broad swath of land that extends from the Tug Hill Plateau in New York eastward across the Catskills, Adirondacks, Taconics, Green Mountains, White Mountains, and the mountains of Maine all the way to the Atlantic is the largest expanse of forest in the country. The region is more than 80 percent forested.

That means that if your piece of land happens to include an old field or meadow, you have something of a rare treasure on your hands. Open fields can add greatly to a property's value, thanks to the views they afford of nearby hillsides or distant peaks. Open fields are also great places to take a walk, watch the sunset, or fly a kite. On top of all this, open fields provide critical habitat for many of our most beloved species of wildlife. So there are a lot of good reasons for keeping them open.

Doing so, however, can be something of a vexation. Leave the field alone for too long, and you'll wake up one morning with a young forest on your hands. But try to tackle your field with the lawn mower, and you'll be out there for the rest of your life.

So what to do?

You have three general options for keeping fields open, depending on how you decide to look at your old field.

First, you can view your field as an agricultural resource. It's thanks to animals, after all, that we have open fields in the first

Opposite page, top: when trees get too large for a rotary mower (brush hog), the next step up is a forestry mower (bottom). This one is mulching a six-inch-diameter pine. This page, left to right: grazing sheep is an effective method of keeping your land in fields. Bobolinks, which make a series of mechanical twitters, frequent fields with tall grasses.

place in this part of the country. If your field is reasonably flat and fertile, a local farmer may be interested in cutting the hay once or twice per year. This works out well from the farmer's perspective – free hay for the cutting – and from your perspective as well, since you're keeping your field open without so much as lifting a finger. Don't expect to be paid for the hay: the financial benefit in this for you usually comes from having the farmer keep your field open for free. Ask for a buck or two a bale, and you'll soon discover the farmer mowing your neighbor's field instead.

Alternatively, you can run a few animals on the field yourself. Sheep, the original livestock inhabitant of much of the region's fields, thrive here, as do horses, goats, and beef cattle. (Dairy cows do too, of course, but that's likely to be beyond the scope of what you're after.) In a way, running animals on your own field helps keep someone else's field open, too, as the animals eat your grass all summer and someone else's grass (in the form of hay) all winter. You'll want to speak with your county extension agent for more details on what it entails before deciding to get into the grazing business.

If your avocations don't run toward the agricultural, a second way to view your old field is, well, as an old field. All you need to do is cut the grass once per year, and the field will remain a field forever. Hire your neighbor with a tractor to come and cut it, which typically costs about \$50 per acre. Some people balk at the idea of paying someone to mow their field – shouldn't the land be able to pay its own way? Sure, but if you've already skipped over the part about owning a flock of sheep, this have-the-neighbor-do-it solution could be for you. There's no simpler way to go. Think of it as the annual maintenance fee on your "million-dollar" view.

But a more fun way to go might be to buy a tractor of your own, outfitted with a rotary mower (often referred to as a bush hog or brush hog). Previously owned, two-wheel-drive agricultural tractors that are perfect for field mowing can be had for a song (okay, a few thousand dollars) these days, and, in addition to delighting all the boys in the neighborhood, can be outfitted with a snow plow for winter driveways. Simply cutting the grass without removing it for hay has the additional advantage of returning fertility to the soil and improving the land instead of carting the



KINDRA CLINEFF/INDIAQCLINEFF.COM



STEVEN D. FACIO



From top: this field is mowed every year; saplings in this field will soon be too large for brush-hogging; this field has grown up too much to be brush-hogged and is on its way to becoming a forest.

fertility away to feed someone else's animals.

Whether you mow with your tractor or someone else's, you'd do well to wait as late in the season as possible. Though some landowners like to keep the grass short all summer for the "neatly trimmed" look, doing so comes at a great price for local birds and animals. Before mid-July, your field is likely to be home to red-winged blackbird chicks, young bobolinks in their nests, a host of sparrows, and maybe even a fawn or two, not to mention native insects (one of which, the firefly, is so beloved that people often forget it's an insect). Waiting until sometime between August and

November will still accomplish the task of keeping the field open while sparing the local wildlife.

The third way to view your open field is as a wildlife nursery. If you only knock the grass down only every third year or so, you will still be maintaining the view while also allowing coarser grasses and tree seedlings to take hold in the field. This type of habitat, called "early successional," is preferred by all of the above species, plus woodcock, snipe, a host of warblers, and hawks on the hunt. Deer will love the winter browse, and don't be surprised to see fox and coyote hunting rodents year-round.

This type of habitat is so rare and ephemeral (remember, 80 percent of the land in our area is forested) that federal cost-share money is often available for landowners who agree to adopt this every-third-year mowing strategy. That's right, the government will pay you to keep your field open for wildlife habitat. The current program is called the Wildlife Habitat Improvement Program, or WHIP, and you can find out more information about it from your county extension agent. In general, landowners need to sign multi-year contracts to participate in the program, which ensures that the habitat will remain available to wildlife for years to come.

Though the field-as-wildlife-nursery approach has two great advantages (the abundant wildlife and the federal money), there is one disadvantage to keep in mind: your field won't be suitable for haying anymore because the grass and seedlings will be too coarse for animal feed. Reclaiming such a field for agriculture in the future will require some combination of animal grazing and tractor work, combined with re-seeding. If you never intend to return your field to the agricultural economy, that's not a problem. But if you're waffling on running that flock of sheep, it's worth mowing every year until you make up your mind.

A final variation on the wildlife-nursery approach would be to let the field grow in until it starts to have tree saplings that are about as thick in diameter as your wrist. Then mow it. If the tractor can bend it over, the brush hog can sever the stem. You might be able to go six or eight years between mowings if you go this route, which is even better for wildlife and even lighter on your wallet. Once the saplings grow fatter than your wrist or so, however, a tractor with mower will be unable to bend them over. At that point, you'll either be committed to a young forest or facing a very hefty bill to have specialized land-clearing equipment come in to reclaim the field.

Regardless of which of the three approaches you choose for maintaining your field – agricultural resource, old field, or wildlife nursery – you're doing a great service by keeping it open. The mix of forest and field is precisely what gives the pastoral Northeast its unique character and distinguishes it from areas with steeper terrain, where far more dramatic mountain ranges end up being hidden from view behind thick forest canopies.

That the pastoral aesthetic is an essential part of our landscape is clear after even a quick browse through the "regional" section of your local bookstore: there are sure to be a half-dozen or more luscious picture books that feature rolling pastures, pocket fields tucked in among protective forests, or river-bottom holdings windrowed with hay, with each photograph crying out that this is how home is supposed to look. Come to think of it, they're right!

CHUCK WOOSTER IS THE ASSOCIATE EDITOR OF *NORTHERN WOODLANDS* MAGAZINE. HE KEEPS SHEEP, GROWS VEGETABLES, AND MANAGES WOODLANDS ON 100 ACRES IN CENTRAL VERMONT.

It Pays to Be Patient

BY DAN PARENT

After I finished marking a woodlot, I walked it with the landowner. Looking around at the trees I had designated to be cut, he asked me why I hadn't marked a certain 11-inch sugar maple. With the maple market so hot, I'm sure he was questioning whether or not he was receiving all the value he could from his timber sale. I began a long explanation about how the value of a tree increases dramatically with size, ending by pointing out that if we let that tree grow another 20 years, it could very well quadruple in value. The gentleman said that he understood all that, but continued, "I'm 75 years old now, and I don't think that it will matter much to me how valuable the tree is in 20 years!"

So maybe not all of us can wait 20 or more years for our timber to mature, but those who can will find that a tree's value increases geometrically over time. From a low-valued pulp tree to the "gold-mine-on-the-stump" veneer tree, cutting timber too early can be a very costly mistake. Let's take a look at the different hardwood products typically grown in our forests, and their value relative to size.

Until a tree reaches approximately 7 inches in diameter, it has little or no commercial value. Logging costs exceed the value of the tree. Once a tree crosses this 7-inch threshold, however, it is considered large enough to be used as pulpwood. Pulpwood typically returns about \$5 per cord to a landowner. Since it takes about 25 trees of this size to make a cord, a 7-inch tree is valued at about 20 cents.

Once the tree has passed the 11-inch diameter mark, it can be considered sawlog material and really starts to accumulate value. Small sugar maple sawtimber can fetch nearly \$500 per thousand board feet (MBF), or roughly \$250 per cord. Our 11-inch maple contains 80 board feet of sawtimber, so it would be valued at about \$40.

Quality maple sawtimber in the 14-inch and up size class can bring nearly \$1,000 per MBF, or \$500 per cord. An 18-inch maple has 190 board feet or .38 cords, for a value of \$190 for a single tree. Quite a jump in price from our lowly 7-inch pulp tree.

The cream of the crop, of course, is the veneer log. These logs must be of exceptional quality and are usually at least 14 inches in



VIRGINIA BARLOW

Under good conditions, with thinnings along the way, this sugar maple can average 1/4-inch to 1/3-inch growth in diameter per year. At that rate, its increase in diameter from 7 inches to 18 inches will take 33 to 44 years.

diameter. A sugar maple veneer log can bring \$2,000 per MBF, thus our 18-inch maple tree, if of sufficient quality to be graded as veneer, would be worth \$380. While not every tree can be grown to such high quality, active long-term management for the best trees can significantly increase the percentage of these high-quality trees in the forest.

While it takes years for trees to accumulate volume, growth rates can be greatly enhanced through careful thinnings, minimizing the wait. Thinning the forest removes many of the low-quality trees that will never have value beyond pulpwood, while opening up the best trees for more rapid growth. As the high-quality trees pass through the different product classes, size increases can mean significantly higher returns when the time comes to harvest them.

Size of Tree	7 inches	9 inches	11 inches	18 inches	18 inches
Product	Pulpwood	Boltwood	Small sawtimber	Quality sawtimber	Veneer log
Volume	0.04 cord	0.09 cord	0.16 cord (80 BF)	0.38 cord (190 BF)	0.38 cord (190 BF)
Value	\$5/cord	\$15/cord	\$250/cord (\$500/MBF)	\$400/cord (\$800/MBF)	\$750/cord (\$1500/MBF)
Amount to Landowner	\$0.20	\$1.35	\$40.00	\$152.00	\$285.00

Prices change. The prices listed in this article represent a mere snapshot of the northern New England market.

DAN PARENT IS A CONSULTING FORESTER.

WILDLIFE IN A CHANGING CLIMATE

HOW WILL GLOBAL WARMING AFFECT VERMONT'S SPECIES MIX?

BY MADELINE BODIN

You've heard the predictions. As the earth warms, Vermont's climate will shift. Some suggest that in 60 to 90 years, the climate of Vermont will more closely resemble the climate of Pennsylvania today, or even Virginia. But does that mean that Vermonters will look across their fields and see dozens of bucks grazing at the forest edge? If we have Pennsylvania's climate, will we also have its wildlife?

"The devil is in the details," says Shawn Haskell, a wildlife biologist who chairs the deer team for the Vermont Fish & Wildlife Department. "It's easy to say that the world is going to get warmer, so therefore species with northern limitations are going to move north. But it's not quite that simple."

Climate change is only one of many human impacts on the environment. Some of these impacts – development, for instance – have a strong enough local influence on wildlife that the larger and less acute influences, such as climate change, are overshadowed. In other words, increased paving can be more of a threat than increased temperature. And climate change itself is not uncomplicated. It doesn't simply mean that Vermont will get warmer; it also means that weather patterns will change. Some places in Vermont at some times might even be consistently colder. Precipitation patterns will change. All of these things will affect wildlife in different ways.

Take white-tailed deer, for instance. They are at the northernmost part of their range in Vermont, so logically, a warmer climate would make Vermont a more hospitable place for deer. But Haskell says that's not quite the case. He points to at least one climate change model that predicts the eastern U.S. will become wetter as the climate changes. That could mean more snow.

"Deer are not limited by cold, they are limited by snow depth and the duration of winter," he said, adding that when the snow is deeper than 18 inches for more than two months, many deer die.

The coyote is another generally southern species that doesn't fare well with deep snow, says Kim Royar, wildlife biologist and chair of the Vermont Fish and Wildlife Department's fur-bearer team. But coyotes are just fine when the snow is packed, she notes, which is why they use snowmobile trails. A slightly warmer winter with a little wet snow would not be harmful to coyotes.

Lots of deep, fluffy snow could be beneficial to two northern predators that haven't had much luck in Vermont in recent decades: the lynx and the American marten, a member of the weasel family. Both are well-adapted for life on a thick layer of dry snow. Also, the marten does better in its competition with another large mustelid, the fisher, which does not handle that

type of snow so well. But of course, if that winter precipitation falls as rain or sleet, a seemingly likely scenario with warmer winters, it is the fisher that will benefit.

A lack of winter snow could also have dire consequences for snowshoe hare, says Royar. These hares turn white in winter, which offers excellent camouflage, but only if there is snow. The hare's winter coat stands out against the brown landscape during a snowless winter, making it easy prey.

Not just the type of precipitation, but the timing of its arrival, can have a big impact on wildlife. Jim Andrews, a herpetologist and coordinator of the Vermont Reptile and Amphibian Atlas, says that many of Vermont's amphibians, particularly salamanders, breed in vernal pools. "Even if we had the same amount of rain over a year, but it fell at different times, or in different places," Andrews said, "those pools, and the amphibians that use them to breed and grow to their adult phase, would be in trouble."

Vermont's salamanders are adapted to the precipitation patterns of the last few thousand years. Almost any change is bad news for them, even a seemingly good change, such as late spring rains that could extend the longevity of the vernal pools. Andrews's notes that longer-lasting pools means a different mix of species in the pool, including, perhaps, dragonfly nymphs or fish that might prey on the larval salamanders.

Amphibians that breed and grow in ponds, lakes, and rivers – including bull frogs and green frogs – will likely do just fine in spite of changing precipitation patterns since those water bodies are more stable, Andrews says.

Precipitation isn't the only hidden factor influencing climate change's effect on Vermont's wildlife. Disease also plays a role. Epizootic hemorrhagic disease kills white-tailed deer in large numbers where it occurs. It's a constant presence in the southeastern U.S., but until about 15 years ago, it was rarely found north of Maryland, Haskell says.

The disease is transmitted by a midge, a small, flying insect. This midge thrives in warm weather, and frost kills it. Last year the disease was found in New York for the first time, Haskell reports. Warmer weather is likely to increase Vermont's chances of having the disease appear in the state, with consequences for the deer population.

Climate change or local change?

Sometimes, the change in a species' distribution is clear, but it's hard to peg the cause on climate change. For decades, Vermonters have seen northern cardinals and tufted titmice at their bird feed-



MATT PALMER



1 2



GARRETT CONOVER



MATT PALMER



SUSAN C. MORSE



5

Some like it hot...

As average temperatures rise in Vermont, we may see more of these species, if limiting factors such as disease and habitat loss don't come into play.

- Fisher
- Coyote
- White-tailed deer
- Hackberry emperor (butterfly)
- Tawny emperor (butterfly)
- Spicebush swallowtail (butterfly)
- Milk snake
- Bull frog
- Green frog
- Gray tree frog
- Spotted turtle
- Box turtle
- Tufted titmouse
- Northern cardinal
- Turkey vulture
- Black vulture
- Carolina wren
- Red-bellied woodpecker

...But many do not

We may see fewer individuals of these species as average temperatures rise.

- Moose
- Lynx
- Marten
- Snowshoe hare
- Arctic char (already extirpated from state)
- Landlocked Atlantic salmon
- American eel
- Round whitefish
- Mink frog
- Boreal chorus frog
- Cape May warbler
- Bay-breasted warbler
- Tennessee warbler
- Boreal chickadee
- Bicknell's thrush
- Spruce grouse
- Three-toed woodpecker
- Blackbacked woodpecker
- Yellow-bellied flycatcher
- Gray Jay
- Blackpoll warbler

- 1 Bicknell's thrush: the canary on the mountain top.
- 2 Pine martens are well adapted for life on a thick layer of dry snow.
- 3 In areas with lower snowfall amounts, the marten struggles to compete with the fisher.
- 4 A hare's winter coat stands out during a snowless spell, making it easy prey.
- 5 It's possible that the southward migration of moose might be slowed, but they are expected to maintain a strong presence in the north.

ers. They have watched turkey vultures soar over their highways. These are all southern bird species that were not found in Vermont 100 years ago. Could their arrival be due to climate change?

Some scientists say yes, but Rosalind Renfrew, a conservation biologist at the Vermont Center for EcoStudies and statewide coordinator of the Vermont Breeding Bird Atlas, has her doubts. It has long been thought that bird feeders have allowed the cardinals and titmice to survive north of their native range and that the expansion of paved highways and the resulting road kill have brought the turkey vultures. She'd like to see some studies that tease apart the influence of food resources and temperature change before she credits climate change for these southern birds'

presence in our state.

Two more recent arrivals in our state, the Carolina wren and the black vulture, could be here because of a warmer climate, Renfrew says. Carolina wrens don't eat at feeders as frequently as cardinals do, so bird feeders aren't as likely to be the cause of the wren's change in distribution. But for both the wren and the black vulture, there hasn't been research to show why their ranges have shifted northward. Temperatures have risen and the birds have moved north in the same time frame, but no studies have examined whether those two things are cause and effect.

Over the last several years, some Vermonters, particularly in the central and northern parts of the state, have noticed opossums for the first time. One hundred years ago, opossums were not found north of Virginia. The timing is right. Could the opossum's northward expansion be caused by climate change?

Probably not, says Bill Kilpatrick, the Howard Professor of Zoology and Natural History at the University of Vermont. Opossums were first found in southern Vermont in the 1920s. They've been moving north along the Champlain Valley ever since, and are found today in Quebec and Ontario.

"They are probably doing so by living in subsidy with humans," Kilpatrick said. Opossums are known to munch on cat and dog food that's left on porches, seeds from birdfeeders, and garbage. In fact, says Kilpatrick, research suggests that in Canada, opossums live only where they can get at those things.

Landscape development seems to be having an impact on trout, but a negative one. Kenneth Cox, a fisheries biologist with the Vermont Fish and Wildlife Department, knows that increasing water temperatures are harming Vermont's brook trout populations. But Cox also has data that suggest it is local changes, not global ones, that are causing the temperature increase.

While brook trout are sensitive to water temperature, Cox says that populations in southern states, where brook trout habitat is marginal, will feel the impacts of climate change before Vermont does. That's not to say, though, that Vermont brook trout aren't feeling the heat. Cox says suburbanization, and even urbanization, along streams that have historically supported trout means fewer trees for shade and warmer water temperatures.

But some scientists do see climate change as having a significant impact on some species. Recently Kent McFarland and Dan Lambert, biologists with the Vermont Center for EcoStudies, used computer modeling to determine what might happen to the rare Bicknell's thrush as temperatures rise.

McFarland says the Bicknell's thrush is only found in high-mountain fir forests from New York's Catskill Mountains to Quebec's Gaspé Peninsula. It can tolerate a narrow range of temperatures.

The scientists found that a mere 1°C rise in temperature (that's 1.8°F) would reduce the bird's available habitat by half. A 2°C rise would be enough to eliminate its habitat in Vermont. McFarland notes that even conservative estimates predict a 2.8°C rise in temperature this century. In some of the worst-case scenarios, such as a 5.9°C increase by the end of the century, the Bicknell's thrush will go completely extinct, the computer model predicts.

"This is the canary on the mountain top," says McFarland. Looking to future effects of climate change on Vermont's wildlife, he says, "It's the first thing [the model shows] really getting tweaked by climate change."

Other birds that share the Bicknell thrush's habitat could be expected to share its fate as well. Spruce grouse, three-toed woodpecker, blackbacked woodpecker, yellow-bellied flycatcher, gray jay, boreal chickadee, and blackpoll warbler also are predicted to disappear from Vermont's mountain tops under the 2°C temperature-rise scenario.

Scientists have also recently studied the impact of climate change on moose. Moose have been declining in part of Minnesota, and scientists there have been investigating the causes, reports Cedric Alexander, a wildlife biologist and chair of the Vermont

Fish and Wildlife Department's moose team. Scientists attribute the decline in Minnesota moose populations to warmer temperatures, along with parasites and malnutrition.

Alexander isn't anticipating similar declines in Vermont any time soon. He notes that the moose's current southern range boundary is roughly the border between Massachusetts and Connecticut. In decades to come, the moose population in southern Vermont might be affected, but Alexander suspects that moose populations in Vermont's colder Northeast Kingdom will remain stable for a long time.

Winners and Losers

What about those animals that might find a new home in a warmer Vermont? Those moves are complicated by other factors, too. Climate change is not the only human-created environmental disturbance most animals have to deal with.

Jim Andrews cites the case of the spotted turtle, which is found only in Guilford and Vernon, giving it a mere claw-hold in the southernmost part of the state. It is more common immediately south of Vermont, and, all other things being equal, it might expand its range into Vermont if the climate became warmer, Andrews said.

But, Andrews says, spotted turtles require a mix of wetlands and drier forests. This combination can be hard to find, since the conditions that create a wetland also tend to create wet forests. Hills or mountains can create drier upland terrain but also tend to be home to turbulent streams that don't make good habitat for slow-moving turtles. Complicating matters further, if the turtle needs to cross a busy road to get to its new home, or if there is a road within the habitat, the turtle is unlikely to survive. A turtle is simply too slow to avoid being hit by a passing car.

For Canada geese, the combination of development and climate change may work in the geese's favor. The suburbanization of parts of Vermont has set the table for non-migratory Canada geese, and climate change may be the thing that opens the door and lets them stay.

Farther south in the eastern U.S., a strain of residential geese that does not migrate is thriving. The clipped lawns of golf courses and office parks, and their associated lakes and ponds, make an ideal habitat for Canada geese, and without snow, they can stay in one place all year.

Bill Crenshaw, a wildlife biologist with Vermont Fish and Wildlife, says that he doesn't see the number of Canada geese in Vermont increasing because of climate change, but he believes that the geese that breed here will stay as long as there is ice-free water and grassy fields that are free of snow. If parts of the state are snow-free all winter, that could mean the geese will never leave.

Each of these scientists emphasized the uncertainty of our climate change predictions and thus the uncertainty of what the future may hold for Vermont's wildlife. There is so much we do not know. Only one thing seems certain: animal species are not going to neatly shift northward with warming temperatures. Even if decades from now Vermont has a climate similar to Pennsylvania's today, we will still see Vermont when we look out our windows. What that warmer, changed Vermont will look like, exactly, still remains to be seen.

MADELINE BODIN IS A WRITER WHO LIVES IN ANDOVER, VERMONT

A Look at the Season's Main Events

By VIRGINIA BARLOW

DECEMBER

JANUARY

FEBRUARY

First week

The white-crowned sparrows that stop at your feeder may remember it and stop again in spring. These hardy birds breed in the far north / Burdock is a biennial, and after its first year, the long taproot is edible. Plus, no burs next summer if you dig up the root now / Look in wet areas for the bright stems of red osier dogwood / American toads, gray tree frogs, and wood frogs produce glycerol, a compound that keeps them from freezing in their terrestrial hibernating chambers

Shaking the tall, straight stalks of mullein will release a shower of tiny, black seeds on the snow / Orion the Hunter is in the southern sky around 9 P.M. Follow the three stars in his belt to the left and you will come to Sirius, the brightest star in the sky / Ruffed grouse and grosbeaks are feeding on mountain ash berries / Birds don't agree with us on the subject of ragweed: its seeds are a valuable food source for many small birds, until snow covers the stalks

February 2: Groundhog Day / A blue jay's loud calls can be annoying, but these birds are sharp lookouts and will sound the alarm if any danger is sighted / The stalks of chicory have grooves all along the length. You can use them now to remember the flower's beautiful blue summer color / Listen for the loud drumming of single male pileated woodpeckers, advertising for females. Once mated, a pair will remain together throughout the year

Second week

Sweet cicely sprouts new leaves in autumn. The small leaves stay green all winter, ready to enlarge quickly in spring before tree leaves intercept the light / Sunflower seeds and peanut hearts are the best sources of protein for birdfeeder birds / December to March is a good time to look for bald eagles fishing in open water below dams. Bald eagles can live for over 30 years in the wild

During bad weather, mink will stay in their dens, usually near water – under tree roots in old muskrat or beaver bank burrows / Meadow voles breed almost all year round. Fortunately, they are eaten year-round, too, and are the major food now of hawks and owls / Brown creepers are searching for insect adults, larvae, and eggs, hopping upward in a spiral from the bottom of a tree. Then they fly down to the base of another tree

Sometimes crows gather in large groups at this time of year / Coyotes are sexually active. Five to nine pups will be born from mid-April to May / Deep snow makes life difficult for fox and deer, but it allows the snowshoe hare to reach a new supply of tender shoots / Cattail flower heads disintegrate throughout the winter, releasing their 125,000 or so seeds / Foxes will cache food caught during good hunting days in pits they dig in the snow. Then it is covered over

Third week

Wild cranberries are the same species as the cultivated ones. The berries are still on the plants, in bogs and fens / Red-breasted nuthatches are territorial in winter; a pair will defend about 10 acres / As many as 18,000 common garter snakes occupy some winter dens in Canada / Look for evergreen wood fern and Christmas fern in the woods, and for rock polypody on rocky outcrops when the snow is not too deep. These species stay green through the winter

Mourning doves are gobbling up almost every kind of seed from birdfeeders, but on their own they mostly eat tiny grass seeds / The juicy red fruits of highbush cranberry stay on the shrub – until a flock of cedar waxwings finds them / Downy and hairy woodpecker pairs are executing courtship displays and beginning to establish and defend territories. Home ranges are larger, and may overlap with other pairs

Chickadee flocks are breaking up; listen for the two-note territorial song of the male – *feebee* – the first note higher than the second / Acrobatic aerial courtship displays by ravens are under way. Rolling, tumbling, and soaring are accompanied by the loud territorial call, a resonating *quork* / Maple sugar makers are on the alert. Sap will start flowing in earnest any time now / Sometimes the fruits of wild grapes turn into raisins and stay well into winter, a plus for wildlife

Fourth week

Hemlock seeds don't attract a wide variety of birds but are eaten by chickadees, siskins, and crossbills / Snow usually does not deter moose: their long, skinny legs can plow through 30 inches of it without a problem / When birch or conifer seeds are available, purple finches may winter on their breeding grounds / The flying squirrels that may be coming to the birdfeeder are sociable and commonly sleep together in groups of 10 or more

As the woodpile is dismantled, look for signs of last summer's activities – mouse nests, chipmunk middens, beetles, or snakeskins / The big sticky buds of balsam poplar have a wonderful smell, which is intensified if you crush them / A Cooper's hawk may be keeping an eye on your birdfeeder, looking for small- and medium-sized meals, as big as blue jays and mourning doves / Bear cubs are born. Each of the two or three babies weighs in at 0.4 to 0.7 pounds

Time to clean out your bluebird houses / Wild turkeys seem to get braver as their food supplies dwindle. They may venture into yards and orchards for spilled birdseed and fallen fruits / Skunks come out to look for mates, and sometimes can be heard squabbling in the night. Baby skunks, usually six or seven, are born two months after mating occurs / Moose mothers keep their offspring with them throughout their first winter

These listings are from observations and reports in our home territory at about 1000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.

Pruning for Profit

BY VIRGINIA BARLOW

Many people appreciate the park-like appearance of a stand of trees in which the lower branches have been removed.

Trails lined by pruned trees invite us to take a walk, and for some of us, sawing off dead branches seems to satisfy a primordial impulse.

Pruning for profit is a different matter. People have been pruning fruit trees and rose bushes for centuries, but few take the time to prune crop trees in order to produce clear, knot-free wood. It will take years to realize a profit, but in some cases, clear boards are so much more valuable than knotty ones that the cost of pruning is repaid with interest when the trees are harvested and sold.

A study by researchers at the Yale School of Forestry confirmed that the cost of pruning white pine could yield a compound interest return of as much as 13 percent, even when the trees were not harvested until 30 years after pruning.

Making money on your pruning investment depends on starting with reasonably good trees. You will also need to have a *loooong* time horizon (for some of us, it might fall into the category of estate planning), for it takes at least a couple of decades for a tree to cover the cut branch stubs with enough wood to yield clear lumber.

It is no use pruning unless you are willing to free the pruned trees from competition, so thinning the stand enough to promote consistent, good diameter growth goes hand in hand with pruning. Otherwise, your grandchildren will be in rocking chairs by the time your pruned trees reach maturity.

It has often been said that the wood from rapidly grown trees

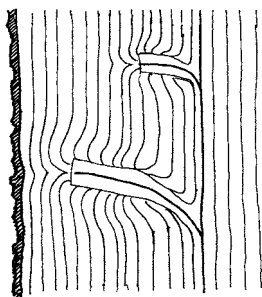
is inferior to more slowly grown wood, but the Yale study found no evidence for this belief. The wood from pruned trees that they grew as fast as they could, including one that had an average diameter increase of over 0.6 inches per year, was fine.

The trees to be pruned must be chosen carefully and pruned properly, because pruning the wrong tree will not repay your investment, and pruning the right tree improperly can do more harm than good.

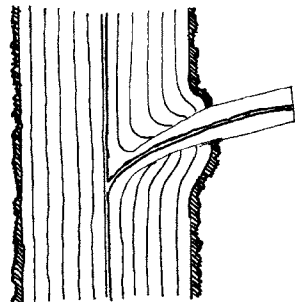
What species to prune

Good white pine, if you have it, is the best place to invest your pruning hours. White pine lumber ranges from magnificent clear cabinetmaking wood to ratty boards with loose knots. Pine is quite rot-resistant, and the dead branches (it is these that make loose knots) stay on the tree for a long time. Pruning can't cure all a pine's ills, but it can turn good into wonderful.

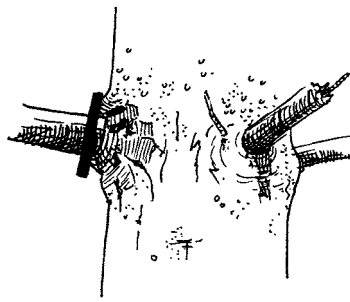
You won't get the rapid stem-diameter growth needed to maximize the pruning investment, however, unless the crowns of your pruned pines have room to expand in diameter at the rate of about one foot per year. Most other softwoods don't respond to thinning as well as white pine, and the difference in price between knotty and clear for other softwood lumber is not as dramatic.



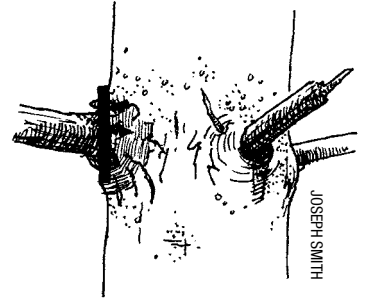
1. Pruning dead branches yields more clear wood. Shown above is a pruned stub and underneath, an unpruned branch.



2. In the barrier zone that forms just inside the collar, the tree deposits chemicals that stop the advance of decay-producing microorganisms.



3. RIGHT: Cut as close to the stem as possible without injuring the branch collar.



4. WRONG: This pruning cut is too close to the stem and cuts through the branch collar.

JOSEPH SMITH



NED THERRIEN

Try to prune to a height of 17 feet.

From left: Close-up of a pole saw used for pruning limbs; small bow saws are handy in a tangle of branches; a pole saw is used to prune difficult-to-reach white pine limbs.



PHOTOS BY NED THERRIEN



Choosing your tree

Prune only crop trees. These are the healthiest, most vigorous, and straightest trees of species that make good sawtimber. You'll want to prune between 35 and 60 beautiful trees per acre. This corresponds to a spacing of 27 to 35 feet between pruned trees.

A good time to prune pine is after the first thinning, when the trees are about 6 inches in diameter. This way there will be no logging damage to newly pruned trees, and they will grow quickly. You can start earlier. An initial pruning when the trees are about 3 inches in diameter, provided you leave plenty of greenery, gives the tree plenty of time to acquire a good, thick shell of knot-free wood. It may be prudent to delay pruning white pines until they are at least 16 feet tall. If the white pine weevil injures the leader after that, you at least will have one good, full-sized sawlog.

How to prune

Trees may be pruned any time of year, but late in the dormant season is the best. They have a good spurt of growth in the spring, and part of this effort will be directed toward growing over any injury.

When a branch dies, it is highly vulnerable to decay organisms. Since dead branches are routine for almost all trees, they have evolved ways of dealing with this. In the process of shedding a branch, the tree summons defensive chemicals to the base of the branch that limit the spread of decay. The living branch-bark ridge or collar is part of the process of walling off decay. Cutting into this collar when you prune disrupts the process. Furthermore, you are inflicting a new wound, which is a new opening for infection.

It used to be thought that injuring the branch-bark collar stimulated "healing." Thanks to the work of Alex Shigo, formerly chief scientist at the Durham, New Hampshire, office of the U.S. Forest Service, "healing" is out. Plants don't have this ability; they can only wall off or compartmentalize, limiting decay to tissues formed prior to the injury.

Cutting small, live branches outside of the branch-bark collar is acceptable. The branch-shedding system will work to wall out rot-causing fungi, but you are courting infection and decay if you cut off

live branches more than 2 inches in diameter, even in a healthy, fast-growing tree. Besides, pruning large branches is time-consuming.

Chances are you will mostly be cutting off dead branches. Cut as close as you can to the collar without injuring it. Long branch-stubs take many extra years to cover with clear wood. Applying a wound dressing rarely, if ever, does any good, because bacteria and the spores of disease-causing fungi are very small, and no wound dressing can tightly seal a wound over a period of years. Spores are released by the millions, and the cut tree surface you cover with dressing may already be covered with spores.

How much to prune?

If possible, prune as high as 17 feet above ground level in order to have a standard, 16-foot log on a one-foot stump. However, pruning to any height over 9 feet will result in a knot-free merchantable log since 8 feet is the minimum length for logs. Twelve feet is another common log length in New England, and pruning to 13 feet will allow for a one-foot squirrel platform. Pruning can be done in stages, perhaps first with a saw on a short handle and later with a pole saw.

Remove all dead branches that you can reach safely. When pruning live branches, don't remove more than one-third of them. And always leave one-third to one-half of the tree's height in live branches when you are done. Remember, live branches hold the tree's green leaves. If too many are cut, diameter growth will slow down. You need to balance tree growth against tree quality. One other caution: if your forest ends at a field or road, don't prune the outside trees. The lower branches keep the sun and hot drying winds from penetrating into the stand.

Even though you will have to wait from 25 to 50 years to recoup your 10- or 15-minute-per-tree investment, this effort can produce some of the highest long-term returns available in timber production. And sometimes having an excuse to snowshoe into the woods on a sunny February or March day with your pruning saw can yield a pretty good return immediately.

VIRGINIA BARLOW IS THE CO-EDITOR OF *Northern Woodlands* MAGAZINE



What About Pruning Hardwoods?

By Michael Snyder

Pruning hardwoods can make good sense. And dollars too. Pruning is done to produce high-quality, clear lumber. The clear wood that results from pruning – be it on softwood or hardwood – has more dollar value than does knotty wood from unpruned trees. The difference is that pruning hardwoods takes a heck of a lot less work than pruning softwoods.

With pine, for example, you might be pruning 20 to 40 branches per tree. What's more, foresters generally recommend that pine pruning be done in conjunction with a thinning. That's because trees that have just lost all those branches may lose a bit of their competitiveness and need to be freed from surrounding competition. Though it's fine to peck away at it, thinning and pruning through an entire pine stand can take some serious time.

Hardwoods are so much simpler, and the payoff can be even better. Most likely you'd only need to prune three to five one-inch branches per tree. A few easy strokes with a pruning saw, and you're on to the next tree. That's not to say that neatness doesn't count. It's particularly important to make good, clean cuts that don't wound the tree's bole or branch collar. Still, it is quick work, and, because you're not removing a large proportion of each tree's leaf area, you don't necessarily have to thin in association with your pruning on hardwoods.

Orleans County (Vermont) Forester George Buzzell has made something of a personal study of hardwood pruning on his own woodlot. He makes a good case for pruning not just to improve crop trees but also to improve the value of trees that are to be removed when releasing those crop trees.

He pointed to an 8-inch yellow birch and proclaimed that it was not a crop tree. "It will be cut in the next thinning to release these maples," he explained. "But if pruning off those three, one-inch branches now will make it at least one grade higher when it's cut in the thinning, then I'll prune it." As Buzzell put it, "Jump from two to three clear faces on that little beauty and you've jumped a grade."

Because standard hardwood log grades are based on log size and the presence or absence of visible defects such as branch scars, proper pruning really can make a big difference. When you remove small branches from vigorous trees, the trees can quickly grow over the resulting small scars and then produce clear wood. According to Buzzell, "Price spreads between hardwood log grades have become so great that

pruning to improve grade can't be ignored."

To make the point, he described the pruning work he has done in his own woodlot. "In a total of four hours, I pruned 320 yellow birch trees over 12 acres," he said. That's 27 trees per acre. Buzzell conservatively estimates that each pruned tree will have a minimum volume of between 50 and 75 board feet when removed in the subsequent thinning. If his pruning raised the quality of each log by one grade and that grade-jump resulted in a value-jump of \$200 per thousand board feet, then, at 50 board feet per tree, his four hours of work might eventually bring him a gain of \$3,240 over what he would have received in a thinning of unpruned wood. "You're well advised to consider adding all the grades possible – it's a value-added activity."

It can also add to your fun, your exercise, and the aesthetic quality of your stand. Many landowners are eager to get out and work in their woodlots but lack the equipment and experience to tackle many forest improvement operations. Pruning is one valuable operation that is easily done with a minimum of equipment and training.

If this makes sense to you, consider a few general hardwood pruning guidelines:

- Prune with a human-powered pruning saw. Chainsaws are too likely to wound the tree or worse.
- Prune as close to the branch collar swelling as possible without cutting into it.
- Prune anytime from late summer through just before maple tapping time. Daytime is best.
- Prune branches no bigger than your thumb. OK, two thumbs max.
- Prune up to 12 or 18 feet, but don't overdo it.
- Prune yellow and paper birch, red and white oak, black cherry, and white ash.
- Prune maple with extra care. Stick to small branches, and prune only a couple in any one year.
- Don't prune if doing so will create more tree damage than benefit. When in doubt, don't.

MICHAEL SNYDER IS THE CHITTENDEN COUNTY FORESTER.

Field Work

At work in the mill yard with Colleen Goodridge

By KATHLEEN HENTCY

GOODRIDGE LUMBER SITS ON A SHELF OF LAND wedged between a high ridge to the south and a deep ravine to the north in the town of Albany, Vermont. The Bayley-Hazen road cuts through one side of the mill site, forming the driveway to the mill and to Colleen Goodridge's house. In places, cedar logs piled higher than 20 feet lie between the road and the ravine. In other places, log piles take up both sides of the road. A small pile, probably less than 15 feet high and about 75 feet long, takes up some of Goodridge's front lawn.

A shed that holds 100,000 board feet of lumber stands between Goodridge's house and the nearest neighbor to the east – toward Route 14. The shed is about three quarters full, and the yards on all sides of the shed are piled with cedar lumber, V-groove paneling, posts, and "D" shaped cabin logs. The "D" describes the log's profile – three sides of a rectangle with the natural round left on one face.

"We've maxed out our space," Goodridge says. In all, Goodridge Lumber saws a little more than a million board feet in a year and their products are shipped to customers throughout the northeast.

The driving force behind this thriving business is 55-year-old Colleen Goodridge, a woman of medium build, straight black hair that stops a few inches below her ears, and an easy smile. While some hardworking people have a nearly frantic, driving energy, Goodridge burns steady and strong. She walks and talks at a normal pace, but as she says, she "vibrates" when sitting still. She's answering the phone and conducting business by 6 a.m. every day but Sunday, and works until 9 p.m. Although she's never gotten heavily involved with sawing, she does every other job in the mill, from paperwork to planing, driving the big forklift, and grading and scaling the incoming logs.

Goodridge, however, credits the success of the mill to support from her former husband's family, her parents and sisters and brothers, and her sons.

"The reason I am what I am is because of all of them," she says. "Especially my boys."

Her "boys" – Doug, 35, Mark, 32, and Brian, 27 – run the mill with their mother, even though she always made it clear that she did not expect them to stay at the mill. She encouraged them to pursue the kind of work they wanted. So far, they've all chosen to stay in the business, Doug as the sawyer, Mark as planerman and mechanic, and Brian as the yardman (a yardman unloads and sorts logs, organizes lumber stacks, and delivers the finished product).

Their uncle, Mike Grondin, also works full-time at the mill. In all, there are seven full-time workers at Goodridge Lumber – Mike, Colleen, her three sons, a nephew, and one other full-time employee. And while they make the "sideline" products, such as



cedar siding, most of their time is spent milling the materials for "D" log homes. Last year, they made 19 log homes, up from their average of 15. While that kind of increase might make some people reach for more, Goodridge and her sons have decided to limit their growth.

"The demand is great, but we've decided to stay small and do a good job, rather than expand and need more room, more people . . ." her voice trails off as she looks around.

"Develop your markets, keep an eye on new developments, this is our stance," she says.

Goodridge, who is a director at both the Vermont Forest Products Association and the Northeast Loggers Association, looks at her industry with a long-term view and is committed to sustainable harvesting and elimination of waste.

"We make use of everything that comes in here," she says. The slabwood from the logs, for instance, is cut into short pieces that woodworkers use to make birdhouses and other small products. The waste from that milling is then chipped for mulch.

And when laser technology became available, they adopted it by installing a new saw carriage with laser lights to guide the sawyer. The lights increase sawing accuracy and save as much as a board per log, she says. In the same vein, they installed a sash gang saw from Sweden with multiple thin blades that have a kerf of less than 1/8-inch (the circular saw in the mill has a 1/4-inch kerf). The Goodridges routinely re-saw pieces that show any hint of rot, cutting out the bad spots and milling new, smaller pieces.

On the paperwork end, Goodridge has taken computer classes and has a sister who works part time to help with the computer and bookwork. "It's foolish to do everything by hand when we've got this technology," she says.

They use a small computer – a hand-held log scaler – in the mill yard for scaling logs and entering data. This technology provides the office with a detailed scale sheet useful to both the logger and the sawmill.

This business that relies on computers and laser technology began 26 years ago when Goodridge and her then-husband bought a rusty mill for \$500. At the time, they planned to build their own log house. But they ended up selling the logs for their house in order to buy parts for the mill. Once they got the mill working, they set it up under a lean-to in a field below the present mill, and sawed railroad ties. They used the power takeoff of their neighbor's tractor to run the mill. The neighbor helped with the sawing, but he also farmed.

“When he needed his tractor, we were out of business,” Goodridge says. In 1975, the Goodridges spent \$5,000 on a tractor of their own.

“That was big money back then,” she says, shaking her head at the memory of their first intentional step into the milling business.

In 1979, they built a shed near the current mill. That building collapsed in the winter of 1982 under heavy snow, and in 1983, they completed the building they use today. They milled dimensional lumber, including some cedar. By the late 1980s, however, they decided they couldn't cut the volume of dimensional lumber they would have to in order to stay in business.

“We found it was too hard to compete with logs going to Canada, coming back as dimensional lumber,” Goodridge says.



In 1987 they switched to milling only cedar, focusing on log cabins and houses. Through the years, with three boys growing up, Goodridge was always centrally involved in the business, just as, while growing up, she had been involved in the running of her parents' dairy farm in Irasburg.

“There was no such thing as ‘men's work,’ or ‘women's work,’” she says. “If there was a job that needed doing, you did it.”

Still, she was the primary caregiver to her children. But that didn't stop her from working in the mill when she wasn't at her job teaching pre-school. “I had the boys out here in playpens when they were little, so I could work,” she says.

Then, in 1992, the Goodridges split. Her husband took the logging and trucking part of the business, and Colleen, who might have sold the mill and moved back to her hometown of Irasburg, took on running the mill full-time. Her sons were 10, 15 and 18, then, and Doug, the eldest, was learning how to saw.

Today, he sets the pace of the mill while his brothers supply him with the proper logs for the order to be filled.

As we walk from the front yard to the mill, Goodridge stops to discuss with Brian a planing job scheduled for that afternoon. Brian sits high atop a log loader, ear protection deadening the roar of the log loader's engine and the huge whine of the mill saw behind him. Goodridge looks up at him and speaks to him as if he's standing next to her in a quiet room. I have no idea what she's saying, and I am standing next to her. Brian answers her, and I can't hear him, either. Goodridge nods and we continue on our way.

Later, she will go into the mill and carry on a similar conversation with Doug, Mark and Mike. Together they decide to postpone the planing job until the morning when they will have lumber from today's milling that will also be planed. A separate generator must be started up to run the planer, and this way they will only start it once.

This kind of cooperative decision-making gratifies Goodridge. As we watch part of the milling work, Doug stops the saw and motions to Mark, who leaves his station to help figure out a minor mechanical problem.

“Isn't that great? When brothers can work together like that?” Goodridge says to me.

A few days after my visit, Goodridge faxes me two pages of her thoughts stemming from our conversation. She writes about her church and community involvement, and about the commitment she and her sons have to conserving Vermont's forests. She notes that school groups frequently come to the mill, which she welcomes as a way to educate the public about a responsible milling process as well as all the steps and people – from logger to trucker to grader to millowner – necessary to produce lumber.

And, she says, “I feel privileged to work with my three sons running Goodridge Lumber. “Not only am I their mother and business partner, but we are also best friends.”

It would be easy to conclude that Goodridge's sons form the core of her life, or that the mill does. But at her center is more than both of those things. It is the combination of a mother, her sons and their extended family working together as a team in a business based on a renewable resource.

Maybe that's why Goodridge vibrates when she sits still.

KATHLEEN HENTCY LIVES IN WALDEN WHERE SHE ENJOYS DAILY WALKS IN HER OWN SLICE OF NORTHERN WOODLANDS.

*Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offense.*
from "Mending Wall" by Robert Frost

It takes a certain amount of generosity to let strangers use your land. Such beneficence conflicts with our impulse to be wary of outsiders, to protect home and hearth.

Nonetheless, the tradition of public access has deep roots in Western culture: without the ancient Greeks' strict code of behavior governing the relationship between guest and host, Ulysses might never have made it back home to Ithaca.

Here in Vermont, the tradition of community access to land goes back many centuries. The Western Abenaki granted one another the right to hunt, fish, and gather wild edibles anywhere in their territory, including on land that was cultivated by another. The concept of individual ownership of a particular piece of ground didn't exist here until the arrival of Europeans, who established property lines and bought and sold land. Still, public access to privately owned land for hunting and fishing became the law of the land among English colonists who had left a system in which all game animals were owned by the crown and could be hunted only by the nobility.

While public access became common throughout the colonies, Vermont was the only state in the union to spell out in its Constitution the right of all inhabitants to hunt and fish on the land of others as well as their own. It reads: "The inhabitants of this State shall have liberty in seasonable times, to hunt and fowl on the lands they hold, and on other lands not inclosed, and in like manner to fish in all boatable and other waters (not private property) under proper regulations, to be made and provided by the General Assembly." In doing so, Vermont's Constitution codified the tradition of public use of privately held land, thus ensuring that the tradition would continue.

For the next 150 years or so, a period when most of Vermont's population lived in small towns and when most Vermont residents were born in-state, the tradition did continue. There was no question that a neighbor should be free to fish in the brook or hunt deer or partridge in the hills. In the rural towns, it was literally true that everybody in town knew everybody else and every landowner knew which of their neighbors hunted or fished on their land.

But beginning in the 1950s, when Vermont became a popular and inexpensive place for a new wave of settlers, the tradition

of public access began to unravel. Even in the still sparsely settled rural corners of the state, people don't necessarily know their neighbors and don't necessarily understand the reciprocity of the open land tradition. Wariness and distrust have become an unfortunate aspect of the American national character, not just in Vermont; we simply don't trust each other as much as we once did.

Many landowners are, therefore, reluctant to have people

POSTED!

Examining the Tradition of Public Access to Private Land

BY STEPHEN LONG

they don't know on their land. Newcomers, particularly those who arrive from cities or suburbs, can easily be unaware that the land they have purchased has, in all likelihood, been open for generations to hunters, hikers, horseback riders, birders, and snowshoers.

Still, despite the shifts in demographics and attitude, the majority of Vermont's private landowners do not post signs on their land forbidding access to it. And with the relative scarcity of public land in Vermont – only 13 percent is owned by the city, state, or federal government – it's crucial that the thousands of landowners who own the land maintain their spirit of generosity and leave their land open for recreational use.

There are indications, however, that more land is being posted every year. There continues to be a steady influx of new people





Four generations of private property.

into Vermont, and each property transfer has the potential of becoming just one more nail in the posted sign. Parcel by parcel, Vermont's long tradition of open recreational land is in danger of disappearing.

A personal perspective

After the close of November's deer hunting season a few years back, I was taking my under-exercised English setter for a walk. We don't take the dog into the woods during rifle season, so he burned off the frustration of the recent dearth of walks as we traveled a path that we had taken for years. With the leaves now down, I could easily watch his progress as he zigzagged from one side of the trail to the other, through woods that during the summer are so dense I can only follow his progress by hearing the jangle of his tags.

I was a hundred yards away when I spotted the fresh new posted signs, and from that vantage point, I could follow them as they hugged our west boundary line up to the top of the hill. Brilliant yellow in an otherwise gray woods, the unwelcoming signs were a jarring image.

POSTED
PRIVATE PROPERTY
HUNTING, FISHING, TRAPPING OR
TRESPASSING FOR ANY PURPOSE
IS STRICTLY FORBIDDEN
VIOLATORS WILL BE PROSECUTED

The freshly posted land had been on the market for a couple of years, and the line of signs confirmed the sale; the signature was not that of the neighbor with whom I had walked our boundary line two years before.

This was my new neighbor saying hello.

Landowner liability

It's not only newcomers who post their land. One local retired farmer – a fifth generation Vermonter – told me why he began posting his land. "I've got no problem with people using my land," he said. "I just want to know who they are. If people stop up to the house and ask, I'll tell them to go right ahead." His reason for posting: the threat of liability if someone were to be injured while on his land. He believes that by posting his land, he is reducing his liability.

He's not. Vermont statute makes it very clear that posting neither reduces nor increases a landowner's liability. And there's little cause for alarm, because Vermont's liability laws do an excellent job of protecting landowners against claims for damages, and a standard homeowner's insurance policy covers the land as well as the buildings.

Landowners who allow recreational use of their land are protected from liability through five different laws: a general recreational law that covers noncommercial recreational activities; a general trails law that protects owners whose trails are part of the Vermont Trails System; and separate laws for snowmobiling, all-terrain vehicle (ATV) riding, and bicycling, which protect landowners for those specific activities. These laws shield a landowner from liability for any injuries suffered on their land unless he was actively negligent and caused the injury.

Alternative wording on posted signs.

Not your idea of fun?

Let's face it. In the eyes of many people, not all recreational uses are created equal, and some activities are more likely to bother a landowner than others. Many people who post their land do so not to bar general access but because they do not want to play host to a particular activity, with ATVs and hunting at the top of the list. It would be hard to imagine a sign that read "No Birding."

ATVs include motorized dirt bikes and three- and four-wheelers. ATVs must be legally registered with the Department of Motor Vehicles, and the only public land they can travel on are those roads so designated by towns. As for private land, ATV drivers are limited to their own land or land on which they have previously been granted written permission. In other words, unless you the landowner have granted permission, it is illegal for an ATV rider to travel on your land.

Because of the uneasy tension between illegal ATV riders and private landowners across the state, many ATV owners are forming clubs, based on the successful model provided by the Vermont Association of Snow Travelers (VAST). Over the years, VAST has waged a phenomenally successful campaign to gain snowmobilers access to private land. With 80 percent of its more than 4,200 miles of trail on private lands, VAST depends on the good will of landowners. To date, approximately 7,000 landowners have agreed to allow members of VAST to ride across their land.

VAST's success owes much to the spirit of neighborliness. While VAST is a statewide organization, its 35,000 members must first join one of 138 local or 14 county clubs. As a result, all landowner contacts happen at a very local level. When VAST needs to ask a landowner's permission to develop and maintain a trail, it is a matter of a local club member knocking on his neighbor's door.

Besides being delivered by a neighbor, the pitch is a good one: in addition to the laws covering the landowner's liability, each county club maintains a \$1 million liability policy to cover any possible damage; adverse possession is not an issue, so allowing use of the land in no way diminishes the owner's title; and the club pledges its awareness that use of the land is a privilege and not a right.

The landowner need do nothing more than sign the agreement, which allows use of the trail by any member of VAST. It eliminates the need for each of 35,000 snowmobilers to ask permission of each of the 7,000 landowners.

It's a good model for organized ATV clubs to follow, though it's hard to imagine such a large network of trails open to ATVs. Snowmobilers have two advantages over ATVs: snowmobilers are out on the trails in the winter, when there are fewer people to take offense. More importantly, they do very little damage to the ground because they travel over the snow. When the snow is gone, the trail is gone.



COURTESY VERMONT FISH AND WILDLIFE DEPARTMENT



Vermont was the only state in the union to spell out in its Constitution the right of all inhabitants to hunt and fish on the land of others as well as their own.

16 days in November

Hunting, of course, is the activity that people associate most readily with posting.

In the public's eye, hunting season means the rifle season for deer, the 16 days that begin on the second Saturday in November. Though less visible, there are other hunting seasons going on during ten months of the year, with June and July the only months without a designated season.

The sign in this picture is not a legal posted sign. To be legal, the sign must be at least 11.5 inches wide and 8 inches tall.



Posting Land, Legally and Otherwise

Because the right “to fish and fowl” on private lands is ensured by law in the Vermont Constitution, there is a very specific process by which private landowners can legally deny that access. The requirements are spelled out below, but let’s first look at some alternative wordings to the traditional posted sign that reads: “Hunting, fishing, trapping or trespassing for any purpose is strictly forbidden.” Maybe you don’t want to be quite that restrictive.

You might consider posting your property with signs that say “Hunting by Permission Only.” This method of posting puts the landowner in direct contact with the people using his or her land. People who have asked and received permission to hunt on someone else’s land are usually more inclined to report acts of abuse they witness. “Hunting by Permission Only” also sounds a lot nicer than “No Trespassing” or “Keep Out!”

When you’re mostly concerned that hunters don’t come near your house or other buildings, “Safety Zone” signs can be posted in a 500-foot circle around a residence. Posting can be tailored to fit any circumstance, and a landowner can specify the terms on which they’ll allow the public to recreate on the parcel: “No Motor Vehicles,” “Foot Traffic Only,” “No Bowhunters” are some options.

Whatever the sign reads, a landowner who decides to post must adhere to the following legal guidelines:

- Signs must be at least 11.5 inches wide and 8 inches high. The letters on the sign must be a contrasting color to the background.
- Signs must be prominently displayed at the corners of the property and around the boundary. These signs can be no more than 400 feet apart.
- The landowner’s name must be legibly displayed on the sign and it must be dated each year. It is up to the landowner to maintain the signs.
- Posted property must be registered each year with the town clerk. There is a \$5 posting fee.

In 2007, more than 83,000 hunting licenses were sold in Vermont, the majority of them to deer hunters. For people who haven’t been raised within a hunting tradition or who come from urban or suburban backgrounds, the presence of that number of people in the woods armed with high-powered rifles is alarming. The crack of a rifle echoing through the hills and hollows can sound dangerously close, even if it’s a half-mile away. Many of the people who post their land against hunting do so because they fear for their safety.

However, hunting accidents are a rare occurrence in the state. According to the Vermont Fish and Wildlife Department, there were 57 hunting accidents between 1997 and 2007, seven of which were fatal. Each year in Vermont, many more people are injured on downhill skis than by hunting firearms.

Nevertheless, it is impossible for statistics to overcome emotion and image, and burned into the collective memory is the horrible image of Douglas Bartlett of Whitingham, Vermont, shot to death while berry-picking in 2005.

Over the years, the state’s hunter education instructors have sought to address the safety of the sport. In Vermont, all hunters must pass a state-certified hunter safety course before they’re allowed to purchase their first hunting license. Exceptions are granted only to those who have been previously licensed to hunt in another state. The course is long on firearm safety, but it does also include instruction in responsibility and ethics, medical self-help, wildlife identification, and an introduction to wildlife management.

Damage continues to be done to the sport’s image, however, by hunters who leave their trash behind, tear down posted signs, and otherwise abuse the privilege of hunting on private property. Worse yet are the road hunters, who clog up the back roads, four to a truck, scanning fields for deer. By the nature of the pursuit, the good hunters are invisible, and for every hunter on the road there are perhaps a dozen in the woods quietly and ethically pursuing their sport.

While Vermont’s constitution does grant its citizens the right to hunt game on all unposted land, every hunter should be aware that it also provides the mechanism for other citizens to keep them out.

Just ask

Asking for permission to use someone’s land is not a quaint custom that, like chivalry, has gone out of fashion. Indeed, it is more crucial now than ever before.

With the break-up of tight-knit communities, we are becoming ever more anonymous, and the more anonymous we become, the less we are constrained by conventional courtesy. But anonymity has its price, and the person who parks by the side of the road and hikes onto a stranger’s land without asking permission never becomes more than a slightly ominous presence in the woods.

How much more civilized it would be to drive into the dooryard and have a chat. It might not be easy to ask a favor of a stranger, but if you do, it’s unlikely that any landowner will turn you down. And when you go to the trouble of getting to know your neighbor, you will have made one small step in strengthening the community.

STEPHEN LONG IS THE CO-EDITOR OF NORTHERN WOODLANDS MAGAZINE.

Seeing the Forest for the Birds



BIRD-FRIENDLY MANAGEMENT RECOMMENDATIONS:

Audubon Vermont has nine recommended forestry practices designed to protect and promote the state's 39 species of responsibility. Some of the practices appear to be contradictory; the goal is not to use all nine practices all the time but rather to determine which are the most appropriate in each setting.

1. Create and enhance vertical structure
2. Limit management activities during the breeding season
3. Keep forested buffers along streams
4. Retain overstory trees when harvesting
5. Retain deadwood
6. Soften edges between habitats
7. Minimize linear openings
8. Maximize forest interior
9. Retain early successional forest habitat

JOHN DOUGLAS/FLYING SQUIRREL

BY CHUCK WOOSTER

Steve Hagenbuch looked up from a thicket of glossy-leaved shrubs and said, “Given the buckthorn problem here, I think single-tree selection might be the best approach. Group selection will let in too much light.”

This is getting good, I thought – here’s a bird guy using forestry terms to make a management recommendation based on an ecological problem. On my land. For free.

Steve Hagenbuch is a field specialist with Audubon Vermont. Together with the organization’s conservation and policy director, Jim Shallow, we were standing on a wooded hillside that my wife and I own in the Connecticut River valley just south of White River Junction, Vermont. And despite the old adage that “free advice is worth every penny,” I had already banked a bundle of good ideas about how to manage our land with birds in mind.

Birding with a purpose

Hagenbuch and Shallow were walking my woods with me this past August as part of a program that Shallow referred to as “birding with a purpose.” The catchy phrase isn’t meant to denigrate the delights of garden-variety birding but rather to entice landowners to consider birds, and hence the larger ecological picture that includes birds, when managing their land. “Vermont is 85 percent privately owned,” said Shallow. “So the goal for us at Audubon is to use birds to reach the landowners who are making the decisions on the ground.”

The roots of Audubon’s program stretch all the way back to passage of the North American Free Trade Agreement, the 1994 trade deal that eased restrictions between Canada, the United States, and Mexico. In order to gauge the pact’s effect on bird populations across the continent, scientists from the three national governments partnered with academic, private, and non-governmental researchers to launch the North American Bird Conservation Initiative (NABCI) in 1998.

One of the first findings of NABCI was that the greater Northern Forest (Maine, New Hampshire, Vermont, and upstate New York, along with western Massachusetts and adjacent Quebec and New Brunswick) is a heck of a good place for seeing birds. The only other place on the continent that hosts a similar multitude of species is the northern tier of Michigan, Wisconsin, and Minnesota, along with adjacent Ontario. These are the only two areas in North America where birders routinely spot 60 or more species during annual breeding bird surveys.

“The diversity of species is so high here because we’re at the overlap of the northern edge of the southern breeding grounds and the southern edge of the northern breeding grounds,” said

The open, park-like understory of this dry-oak forest is uncommon in Vermont yet good potential habitat for the scarlet tanager.

Shallow. Though species diversity drops overall as you move from the tropics to the poles (tiny Ecuador hosts more species of birds than all of North America, for example), that drop is not uniform. Thanks to overlapping breeding grounds, the Northern Forest is a notable hot spot.

With this finding in hand, the National Audubon Society zeroed in on the greater Northern Forest as part of its “Important Bird Areas of the United States” program, an effort that had been launched by BirdLife International in the 1980s. Step one began a few years ago, when researchers from four Audubon organizations in the Northeast (New York and Vermont, which are state programs of the National Audubon Society, and New Hampshire and Maine, which are independent Audubon organizations) began assembling the “species of responsibility” lists for each state. These are the bird species for which a high percentage of all the breeding populations in the world reside in a given area, such as, for instance, Vermont. In other words, responsibility species for Vermont would face serious decline worldwide should their Vermont habitat be compromised. There are 39 such species identified in Vermont, ranging from the Bicknell’s thrush (90 percent of all breeding pairs frequent the state) to the Canada warbler (with 14 percent).

The other three partner states are still developing their lists of the species of responsibility, and ultimately, each state’s list will be somewhat different. Shorebirds are important in Maine, for example, because of Maine’s extensive shorebird habitat, and thus will likely make up a good portion of Maine’s species of responsibility list. The goal of the program is not to protect rare birds so much as it is to keep common birds common.

Step two was for the four organizations to create a map of the crucial bird habitat within the four states by merging the range maps of the species of responsibility along with land use and vegetation maps. The greater Northern Forest totals some 30 million acres; the point of the map is to zero in on the much smaller areas that play the most important roles.

Finally, Audubon Vermont has just launched step three of the program; going out to walk the land with individual landowners in the critical areas to make management recommendations and see how the program plays out on the ground. Which is how Hagenbuch and Shallow and I came to be standing in the woods above our house last August, talking about buckthorn and single-tree selection.

Chemotherapy?

The buckthorn patch that elicited Hagenbuch’s earlier comment was tucked in the midst of a maple and hemlock forest located on the hillside above our farmhouse. I had opened a small clearing here four years ago under the vague notion that small openings in an otherwise maturing forest like this were beneficial



Clockwise from top left: Steve Hagenbuch, Chuck Wooster, neighbor Rachael Cohen, and Jim Shallow review Wooster's forest-management map before heading into the woods; Chuck Wooster and Jim Shallow discuss management options for controlling the glossy buckthorn sprouting in the foreground; red efts signify a healthy amphibian and invertebrate population – essential for ground-nesters like the ovenbird.

for wildlife. Since I'd cut the trees for firewood, it had seemed like a win-win situation at the time.

But now the clearing is being taken over by buckthorn – an invasive, exotic species that thrives in sunlight and is a scourge in this part of the Connecticut valley, crowding out native understory plants. Hagenbuch, therefore, recommended that I only cut the occasional tree for firewood in order to prevent large patches of sunlight from reaching the ground and encouraging the buckthorn.

Hagenbuch added that firewood harvesting is best done outside of the breeding season, if possible, which is roughly between April 15th and August 1st locally. This protects both the canopy-nesting birds and the ground-nesting birds. I mentioned having followed the progress of a clutch of grouse a few springs ago that had been born on this very spot, nestled between the root flares of a hemlock tree.

Shallow then pointed out the remarkable abundance in the leaf litter of red efts – the juvenile form of the red-spotted newt. There were so many, following the previous night's rain, that it was difficult to avoid stepping on one unless you paid close attention. The ground was spongy underfoot and thick with duff and organic material. "A closed canopy is key for maintaining moisture levels, which support invertebrates and amphibians, which in turn support ground-nesters like the ovenbird," said Hagenbuch, tying the newts to the birds and lending further support to his recommendation to avoid cutting heavily here.

Which brought up the problem of what to do with all the buckthorn. "When it comes to invasives, it's almost like treating cancer," said Shallow. "Sometimes you have to resort to chemotherapy."

This was, for me, awkward advice to accept, because I raise

meat and certified-organic vegetables on our farm. Besides the problem of explaining to the organic certifier why I have herbicide lying around, I'm of the opinion that, if the proposed solution involves synthetic chemicals, it's worth trying to re-think the problem. There is recent data showing that glyphosate, the chemical most often used to control buckthorn, is notoriously rough on amphibians, especially in wet conditions like our hillside. On the other hand, my previous attempts at controlling the buckthorn here by cutting it with a chainsaw were only creating an ever-thicker carpet of stump sprouts. In the end, I made a note to investigate painting the glyphosate directly onto the stump of the freshly cut buckthorn instead of spraying it across the foliage, potentially allowing the buckthorn to be controlled without unduly affecting the amphibians.

Too many birds?

We continued climbing the hill and came into a more open section of the forest – a south-facing, park-like hillside with grasses and sedges carpeting the ground beneath red oak and hophornbeam. This is one of my favorite places on our land, a natural savannah referred to as a "dry oak forest," a very uncommon habitat type in Vermont.

"You should definitely monitor for the scarlet tanager here," said Shallow, looking around with obvious delight. As it happened, the scarlet tanager was a bird that I knew, by sight if not by sound. But mention of the tanager brought me back to something that had troubled me from the beginning of our walk: the 39 "species of responsibility" that Audubon Vermont had identified. That's many more birds than most people can identify, including budding naturalists such as myself.

As it happens, I needn't have worried. "Thirty-nine is indeed a lot of birds to know," said Shallow, "so we've boiled it down to the Birder's Dozen – birds that are relatively easy to see and hear and that also represent a full range of forest types. If we can get people to monitor for just these 12 birds, we'd be off to a great start." Relief! My homework had just been reduced by two-thirds.

Shallow then reached into his pack and produced a small Palm Pilot computer. "I've put a chip in this thing that has hundreds of bird songs on it," he said with enthusiasm, turning the unit on. "We

used it just the other day to verify a chestnut-sided warbler's song." I raised my eyebrows at this technological development, unsure of whether its presence in the woods was an advance (like the GPS) or an intrusion (the cell phone). Fortunately, Hagenbuch deadpanned, "For some of us, this crosses the line." After a good laugh all around, Shallow swapped the Palm Pilot for his binoculars, and we continued across the hill.

Parks or patches?

We came to where an old butternut tree had partially fallen over at the edge of the savannah, creating a thicket of saplings and herbs growing in the hole in the canopy. Compared with the savannah, with its easy sightlines, there was something cluttered and uninviting about this thicket.

"Unfortunately, our psyches seem to be hard-wired to prefer an open, clean, park-like forest," said Shallow. "But it's okay to have junk and standing dead trees. It may not look pretty, but for the birds and other wildlife, it's really what you want to have." I mentioned that the only time I had been successful hunting deer up here on the hillside had been right here, next to this butternut. Never in the wide-open savannah.

"The one- or two-tree disturbance, like we're seeing here with this butternut, is the most common type of forest disturbance," continued Shallow, "much more so than a hurricane or fire. If, as a land manager, you can mimic these small disturbances, it's ideal."

Fully half of the species in Vermont's Birder's Dozen depend on either small gaps in the tree canopy or on the structural diversity that comes from having gaps in which young trees, shrubs, and herbaceous plants can grow in the sunlight. But how big should these gaps be? At what point does an opening turn into a clearcut – itself a different type of habitat?

"A quarter-acre is the maximum needed for introducing structure and diversity into a forest," said Shallow, while reiterating that one- and two-tree openings were equally valuable, especially in places like the mixed woods we had visited earlier, where controlling buckthorn and maintaining moisture spoke against larger openings.

"On the other hand," said Hagenbuch, "the minimum patch size needed to bring in the chestnut-sided warbler is close to two acres, so less than that is not going to do it." Clearly, every situation is different, and no single approach to management works everywhere. Lower down, where the buckthorn was spreading, opening the forest canopy was creating more problems than it was solving. But up here on the hill, in a relatively even-aged and middle-aged forest free from buckthorn, adding small openings would seem to be in order. Hagenbuch had brought up a whole new topic: the question of creating very young forest.

Clear benefits

I had been dreading the next stop on our forestry tour from the moment the idea of the tour had first surfaced. As we crashed down a steep slope of loose shale under gnarled old hemlocks, I braced myself for the scene ahead. My wife and I were in the final stages of having a heavy thinning job done on a 25-acre stand of red oak and white pine, including a two-acre section that had been clearcut altogether to reclaim an old pasture. How was I going to explain this to two guys from Audubon?

Our forester had recommended the thinning be done to cor-

rect a "cut the best, leave the rest" logging operation from 50 years ago – mostly stump-sprouted red maple and old bull pines – and make way for the promising white pine and red oak trees that were dominating the understory. But the scene was still a mess, with limbs, stumps, and logging equipment scattered about. I would have hesitated to bring my mother here at this point, let alone two Audubon types.

So I was surprised by what happened next. Hagenbuch and Shallow strode out into the clearing with enthusiasm. "Anywhere you have a chance to create early successional habitat these days, it's good," said Hagenbuch. "A 50- to 75-foot-wide strip of brush along this new pasture would provide great habitat. What you'd do would be to let it all grow in for the next 10 years and then cut back a third of it every five or so years thereafter. You'll be creating a perpetually young forest here. There might even be federal wildlife-management money available to help pay for it."

They liked it! Not only that, they had solved a lingering problem I'd been having with the reclaimed pasture. Because it was on a knoll, the sides were going to be too steep to mow easily. Now the solution was obvious: mow the top and let the steep sides grow in to brush and saplings. This would solve my management problem while simultaneously benefiting two of the species on the Birder's Dozen, the woodcock and the chestnut-sided warbler (for a complete listing of the Vermont Birder's Dozen, visit <http://vt.audubon.org/PDFs/FSFinalBirdersDozen.pdf>).

Shallow turned my attention to the shape of the new pasture, which was straight and abrupt on one side and wavy and less-defined on the other. Though I had the impression that a well-defined edge was preferable, since it minimized disruption to the interior forest, Shallow was quick to advocate a "feathered edge" approach. "A sharp edge is a great vector for predators, since, with their excellent vision, they can see long distances."

Instead, Shallow advocated an undulating field edge, with 20-foot patches cut back into the forest to create brushy habitat and a gentler transition between field and forest. Most of our predatory bird populations are in reasonably good shape these days, thanks to the banning of DDT and intensive efforts at their reintroduction. The same can't be said of all songbirds, including the white-throated sparrow, whose *poor Sam Peabody, Peabody, Peabody* song is a calling card of the North Woods. The white-throat is yet another member of Vermont's Birder's Dozen, and the one most likely to benefit from managing fields with a feathered-edge approach.

Encountering a snag

For the final stop on our forestry tour, we crossed over the reclaimed pasture and climbed a hillside where a heavy thinning had been done the previous winter. Our logger had encountered a problem with many of the bull pines that had been marked for removal: red rot, a fungus that hollows out the heart of the pine tree and makes it worthless for timber. As a result, huge, eight-foot, partially hollow trunks lay scattered here and there over the hillside, interspersed with six- and eight-foot-tall stumps that had been left behind by the mechanical cutter. I apologized for the unsightliness and told them I planned to cut all the stumps flush in the coming weeks.

"Oh no," said Hagenbuch. "Leave them. They're snags. We're always trying to get landowners to think about maintaining snags."



JIM BLOOM



ROY PILCHER

Clockwise from top left: A few indicators of good habitat in Vermont include the chestnut-sided warbler, a canopy-dweller; the blue-headed vireo, a bird of early successional woods; and the white-throated sparrow, which uses the forest edge.

sections of our property. “Group selection like this has been shown to lead to a much higher diversity of bird species overall,” said Hagenbuch. “But these may not all be desired species – like introducing cowbirds and robins into the interior – so you need to take each case separately. It’s very site-specific.”

Robins we have in abundance but cowbirds, fortunately, we don’t, so here was a place where the heavier thinning seemed to have been appropriate.

Keeping the mosaic in mind

As we walked out of the woods and headed across the field toward the farmhouse, Hagenbuch summed up the day. “Some might ask, ‘why manage the forest at all? Since we’re more than 80 percent forested as it is, why bother?’” There are two reasons. First is that some of our key species rely on younger forests, and these are going by the wayside. We’ve controlled so many of the natural disturbances like fire that the lack of management will lead to the continued decline of our younger forest types. Second is that, here in Vermont, we want our land to provide economic sustainability, which means that there is pressure to manage it. Given that it’s going to be managed, therefore, how can we provide guidelines for the land managers who are going to be making the decisions?

“A mosaic of uses and management strategies is the key to having the full range of species,” he added.

My eyes had certainly been opened, especially to how much the small things matter. I had been thinking of our 95 acres as small in the grand, statewide scheme of things – with relatively few management options and, as a result, a limited ability to influence the number and type of birds (and other wildlife) that live here. Now I think otherwise.

All habitat is local. We may not, for example, have vast American woodcock habitat, but with a little attention to brush and saplings, we can certainly have some. We will also never have an abundance of white-throated sparrows, but with attention to field edges, we may well have a few. It isn’t the quantity that counts on a holding like ours: it’s the quality and the diversity.

A few snags here and there, the occasional small opening in the canopy, a decent section of brush and saplings, a softer line between field and forest...I can see us hosting nearly all of Vermont’s Birders Dozen on our place. The harder part is going to be sharpening my birding skills and learning to recognize all 12. But once I do, I doubt I’ll hang up the binoculars. There are, after all, 39 species of responsibility.

CHUCK WOOSTER IS THE ASSOCIATE EDITOR OF *NORTHERN WOODLANDS* MAGAZINE AND EDITOR OF *THE OUTSIDE STORY: LOCAL WRITERS EXPLORE THE NATURE OF NEW HAMPSHIRE AND VERMONT*, NEWLY PUBLISHED BY NORTHERN WOODLANDS.



JIM BLOOM

Even at eight feet tall, these stumps as they rot are likely to provide potential housing and food for woodpeckers and all manner of cavity-dwelling critters. Full-sized, standing dead trees would be even more beneficial. “Increasing the number of snags is really important,” said Shallow. “We’re recommending six per acre as a minimum. Girdling can be an easy way to do this, and the folks at Fish and Wildlife have guidelines about which trees are best to girdle.”

On at least this last point, I was on solid ground. The previous owners of our farm had a policy of cutting firewood only from standing dead trees, and as a result there wasn’t a dead tree to be found within 200 yards of the farmhouse when we moved in seven years ago. We’d put a moratorium on cutting dead wood at that time, and I’m pleased to report that I heard the knocking of woodpeckers for the first time this past spring while sitting on the porch.

Around the stumps and snags, shrubs and herbaceous plants were already sprouting in the gaps between the oak and pine that had been left behind. What had been a dark and quiet understory was now humming with insect life. I wondered about whether we should have more of this type of logging done on other

By JIM HOURDEQUIN

ILLUSTRATIONS BY BARBARA CARTER

Taking the Spring Out of Spring Poles

The best way to manage spring poles is to avoid them. They pack a tremendous amount of force and often respond to release in unpredictable ways. It's often possible to avoid spring poles by:

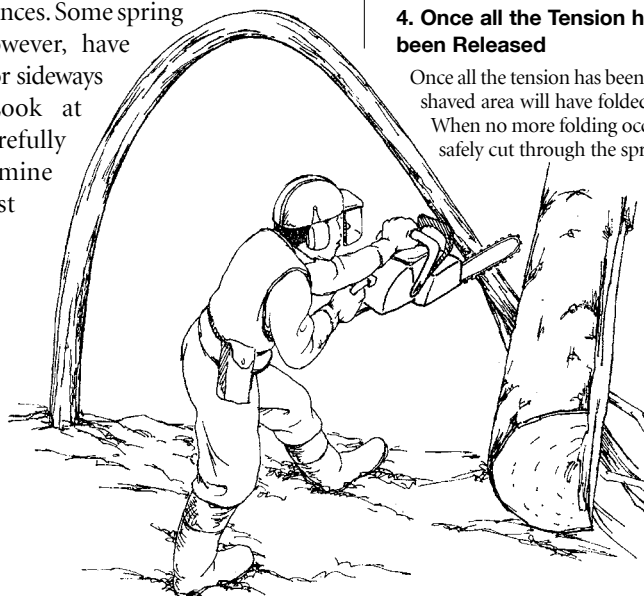
- Using precision felling to avoid saplings
- Clearing out a landing zone when a tree must be felled into saplings
- Skidding trees out of sapling areas before delimiting

When You Must Release a Spring Pole:

Sometimes spring poles are unavoidable. Many people learned to release spring poles by making a series of small cuts from above. However, cutting from above may cause the tree to break apart suddenly if the cuts are too deep.

The safest method is to attack the problem from underneath. Shave wood away from the bottom of the bend, releasing the tension slowly and minimizing the risk of the tree breaking apart suddenly. Don't cut too deep or you'll pinch your saw.

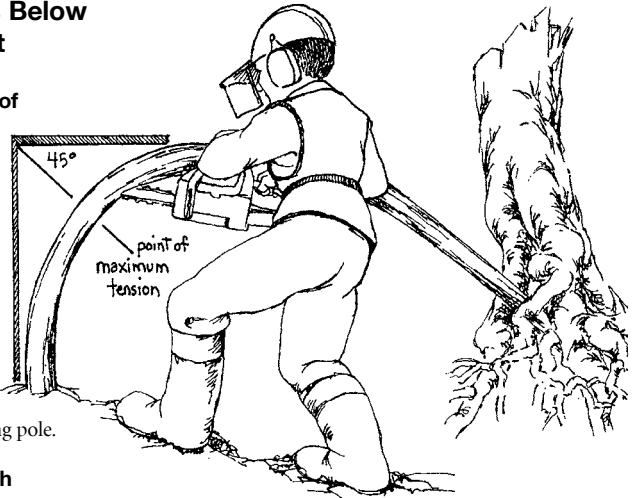
Here are some suggestions on how to deal with spring poles in the simplest circumstances. Some spring poles, however, have multiple or sideways bends. Look at these carefully to determine the safest solution.



If Spring Pole is Below Shoulder Height

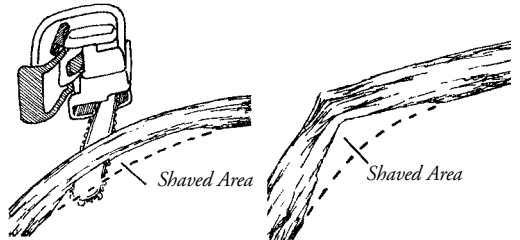
1. Locate the Point of Maximum Tension

To locate the point of maximum tension, imagine a vertical line extending up from the base of the tree and a second line running horizontally across the highest point on the spring pole. From the intersection of these two lines, imagine a 45-degree angle to the spring pole.



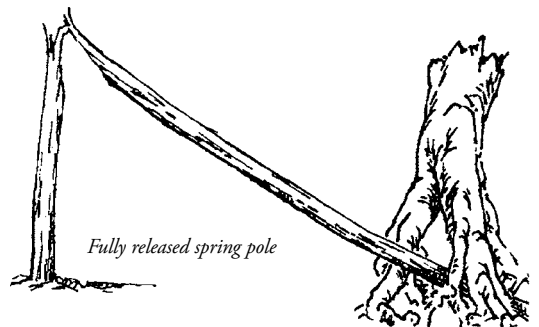
2. Shave Underneath to Release Tension

Stand as far back as possible and use your saw to shave wood off the underside of the spring pole around the point of maximum tension. Don't cut into the spring pole, though, since the compression of the wood will pinch the saw.



3. Keep Shaving Until all of the Tension is Released

As wood is shaved, the fibers on the back side may begin to break apart. The top of the spring pole will begin to relax toward the ground as fibers on the inside begin to bend.



4. Once all the Tension has been Released

Once all the tension has been released, the shaved area will have folded in on itself. When no more folding occurs, you can safely cut through the spring pole.

If Spring Pole is Above Shoulder Height

1. Clear any Branches Underneath the Pole

Stand under the spring pole and trim any branches and brush that may be in the way.

2. Release the Top

You can release the spring pole by cutting off the top. If you've been careful to remove all brush or limbs that are in the spring pole's path, it should fly harmlessly above you.



BUILDING BETTER FOREST ROADS

BY MADELINE BODIN

There is a good road in Bellows Falls, Vermont. Actually, it's a network of roads providing access to Dr. Walter J. Griffiths's woodlot. The woodlot is on a hill above the village and is managed for red oak. The roads are not steep. They were designed to keep the grade to a minimum. They are crowned so rainwater and snowmelt runs off to the sides, not down the middle. They are well drained, with culverts sized correctly for the amount of water that flows through, even in spring. Depending on the season, they are heavily – and politely – used by hikers, bikers, and cross-country skiers from the village below.

Summer finds most of the road network in cool, deep shade. There are a few places where the roads are open to the sky and sun, much like in the surrounding landscape. Bears, moose, and coyotes cross these roads. Raptors keep watch from the trees beside them.

Until recently, a good road meant only that it was good for drivers, cars, and other vehicles. Road engineers have learned a lot about how to design this type of road in the last 50 years. It's only very recently though, that any attention has been paid to making a road good for both vehicular travel and the natural world. A good

road, as far as the natural world goes, is one that keeps in place as many of the existing natural systems as possible and has the least impact on the plants and animals that live nearby. Not only does Griffiths's road allow access for vehicles, it also ensures continuity of the natural systems.

Highways and other big roads are usually built by states or cities, but there are several reasons for landowners to build new roads on their own property. Two of the most common are for access to a new house and to allow trucks to get from an existing road to a log landing and back. Skid trails can also be road-ish, so many of the rules of good roads apply to them also.

One of the best sources for advice on how to build a road with minimal impact on the natural world is your state's water quality laws. These laws aim to minimize two of the biggest impacts that small roads have on the landscape: erosion and sedimentation.

When snowmelt or heavy rains meet a poorly designed road, the water can wash away parts of the road, its ditches, and the adjacent banks. The resultant sedimentation pollutes streams and changes the nature of the streambed, filling in gravel beds – where fish such as trout lay their eggs – and the holes where fish keep cool.

All of the northern New England states and New York have laid out “best management practices” for logging jobs. These practices are designed to preserve water quality, and many, if not most of them, address the building of temporary and permanent roads and provide information, such as the size and placement of culverts, helpful to anyone planning a road.

A copy of these best management practices (or acceptable management practices, depending on the state) is available free from your county or district forester. Some states’ booklets are more detailed than others, but all provide a reasonable place to start.

Tradition also provides some good advice, particularly about the temporary roads used in logging. For example, logs were traditionally hauled out in winter, when the ground is frozen and the fragile topsoil is protected from the trucks’ and skidders’ tires by a layer of snow or ice. And even though logging has become a year-round profession, there are some woodlots that simply have to be worked only in winter.

Tradition, however, also celebrates some now-questionable road-building practices. “Sunlight is nature’s gravel” is one old saying that suggests the wider the corridor, the drier the road. While bigger may be better for keeping some roads passable, the resident plants and animals would benefit more from a road cut the width of a lane rather than a boulevard.

It’s only in the last 10 or 15 years that the science of road ecology has sprung up to provide road engineers and other road builders with scientific information on the impact roads have on natural communities. Road ecologists can give some direction on how to build roads that have the least impact on the natural world while still remaining safe for humans.

While there has long been research on the effect of roads on various animals and natural communities, it is only recently that these scattered studies have been brought together to create a body of knowledge about roads in general. In part because the field of road ecology is so new, this body of knowledge is not systematic.

For example, there have been studies on the relative impact of logging roads in the Pacific Northwest, but not in the Northeast. There have been studies on roads’ effects on black bears in New York’s Adirondacks and in western North Carolina, but not in New England. Sometimes generalities have been drawn from extensive research, sometimes from just a handful of studies, and sometimes the results from one small study are all we have.

While it’s still in relative infancy, the science of road ecology has shown that some of the biggest impacts that narrow, lightly-traveled roads through forested areas have are erosion and sedimentation. Besides minimizing those, the two most important pieces of advice the science of road ecology has for builders of small forest roads are, first, to maintain the tree canopy over the new roads as much as possible, and second, to close no-longer-needed roads to vehicle traffic and return them to their natural state as quickly as possible.

Actually, “Don’t build a road if you don’t have to” is the first piece of advice from Richard T.T. Forman, a professor of landscape ecology at Harvard University and a leader in bringing together diffuse studies into the coherent science of road ecology. “Minimize road length to save nature and save money,” he says.

On those necessary roads then, the narrower the road and the smaller the break in the tree canopy, the better. The more qualities your road shares with the surrounding forest, the less impact it will have on the surrounding natural community. The shade the canopy provides is a key quality.

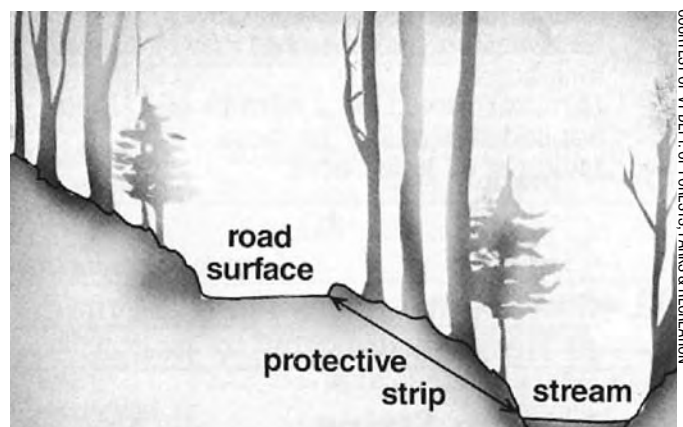
When the forest canopy is broken, a new type of community called a forest edge is created. Edge habitats are by no means bad. They are as important as any other natural habitat and are home to many popular animal species, including many game species. It is just that in most places, even in northern New England, roads are slicing forests into ever edgier pieces. While species that prefer edge habitats thrive when a road breaks the forest canopy, some forest-interior species can suffer.

“Certain species of birds are very vulnerable at the edges of forests,” says Scott Jackson, a road ecologist and wildlife biologist with the University of Massachusetts Extension, Amherst. Some of these edge-sensitive species are susceptible to nest predators such as chipmunks, raccoons, and crows – all edge species.

Once upon a time, land managers tried to create as much edge habitat as possible, sometimes by purposely maintaining otherwise temporary roads built for logging. Forman believes a road should be maintained for driving from here to there. Creating edge habitat, he says, should be done thoughtfully, not as an inherent part of road building.

Habitat fragmentation is a problem that is related to the “edge effect.” A forest crisscrossed with gaps in the canopy created by roads can discourage some species of birds, such as the hermit thrush, from nesting in the area. “These birds seem to be able to size up the forest patch and decide if it’s big enough for them to nest there,” says Jackson. When there is a gap in the forest canopy, such as the gap made by a road, they may look elsewhere, and with more roads, there is simply less habitat for these species.

Roads also create barriers to animal movements. Highways give an obvious example of how a road can create a physical barrier to animal travel. We’ve all seen roadkill. But roads also create a mental barrier which has effects that aren’t seen. You don’t see the bear that didn’t try to cross the road, but it still didn’t get to the other side.



A “best management practice” keeps an undisturbed area of vegetation between a road and any stream, pond, or wetland.

Big animals don't seem to have any trouble crossing small woods roads (although some may avoid areas where there are many roads), but research done on forest roads in the Northeast suggests that some small animals do have trouble.

Phillip deMaynadier, who now works for the Endangered Species Group of the Maine Department of Inland Fisheries and Wildlife, did his doctoral study on whether forest roads created a physical or psychological barrier to the movement of frogs and salamanders. He found that a larger, well-traveled logging road in his study did have an impact on the salamanders (but not the frogs) that lived near it, while the smaller road had no recordable effect.

First, there were fewer numbers of salamanders (deMaynadier studied redback, blue-spotted, and spotted salamanders and red-spotted newts) near the edges of the wider road, which deMaynadier feels may have been an edge effect. Second, adult salamanders were less likely to cross this road while migrating to their hibernation sites and much less likely to cross during their normal home-range wanderings.

The difference between the roads, says deMaynadier, was canopy cover. The center of the bigger road had only 17 percent canopy closure while the smaller road had a 42 percent canopy closure. In other words, it didn't take much more shade, or even total shade, to make the narrower road "invisible" to salamanders.

While deMaynadier didn't study the annual spring migration that brings so many amphibians onto even busy roads for a honeymoon massacre, he did study the fall migration toward hibernation sites and believes the two are similar. He found that the number of salamanders crossing the larger road during fall migration was 32 percent less than expected from the movements of other salamanders in the study.

To minimize the impact of any forest road, deMaynadier recommends leaving large-crowned hardwood trees next to it, first because they provide more canopy shade than conifers, but also because they provide an annual dose of leaf litter, which further helps the road blend in with the surrounding forest.

deMaynadier notes that his study points out the importance of not building roads within 500 feet of a vernal pool – the average migration range of vernal-pool-breeding salamanders like the ones in his study.

Why go through the trouble of building a road that salamanders are willing to cross? First, says deMaynadier, salamanders

make good sentinel species, exposing problems in a natural community before larger, more glamorous animals are affected.

Also, says Jackson, salamanders and other small animals are near the bottom of a food web that connects all the living things in the forest. Just because they are small, slimy, and largely unseen doesn't diminish their role. A road that is good for salamanders is good for the animals that eat salamanders, the animals that eat those animals, and so on.

Once you've built a lovely road it can be hard to say goodbye, but that is exactly what road ecologists such as Forman and Jackson recommend you do when a temporary road, such as one to a log landing, has served its purpose.

Might you do less harm to the surrounding area if you re-use the same road the next time around? Jackson says maybe. If you've done an excellent job on planning, drainage, and the rest and you are sure you will want to travel the same route the next time around, then the benefits of maintaining the road to use again may outweigh the drawbacks.

One significant drawback is increasing human access. "If not number one, I would put it near the top of the list," Forman says.

It's hard to deny the principle that a road means more people. If you must hike to your favorite pond, you are almost certain to be alone. Build a road to it, and all sorts of people start showing up.

"We *do* want people to get out into nature," says Forman. "Society fundamentally depends on nature. It's a good thing to get people out there." The trick is not to let every temporary road turn into permanent access to an otherwise remote area.

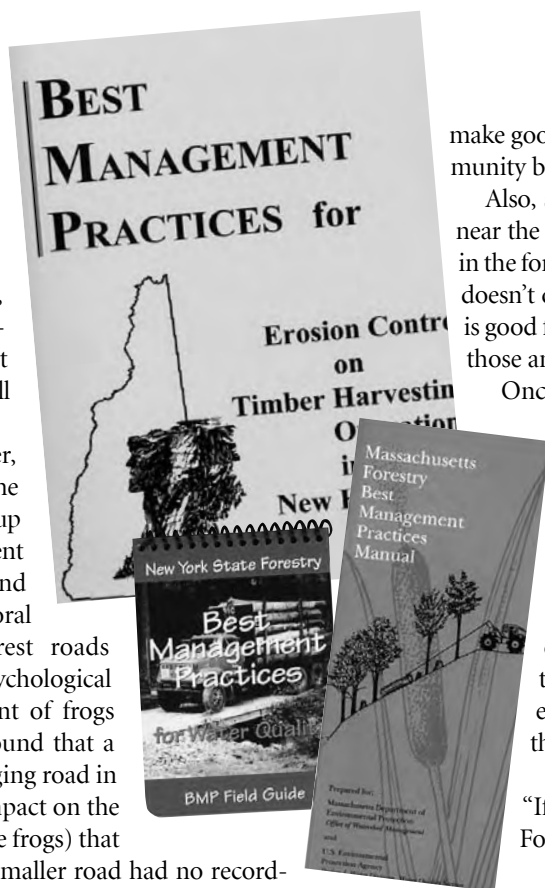
The solution, he says, is effectively closing temporary roads to vehicle traffic when their job is done. Forman acknowledges that, in this country at least, this is a politically sensitive issue. "In Canada they seem to know how to do it. I've seen wonderful examples," he says. "In the U.S. you say, 'close the road,' and there is a public outcry and people hire lawyers."

The other solution is to carefully plan where to build the roads in the first place. Roads built for recreational access should be at the perimeter of what Forman calls "the big, green blob," leaving the interior wild for the few hardy souls willing to travel beyond the road, he says. Similarly, other road networks can be planned with a goal of keeping large areas free of roads.

Forman is not against roads. In fact, he's all for them. He knows that many new roads will be built and believes that is a good thing. He just wants those roads to do the most good for people and the least harm to the environment.

There is a special joy in walking, or even driving, down a forest road and seeing plants and animals that are usually only found deep in the forest. Building a forest road that keeps even the salamanders and the trout happy will probably do a pretty good job of keeping you happy too.

MADLINE BODIN LIVES ON A STRETCH OF ROAD IN ANDOVER, VERMONT, WITH IMPRESSIVE CANOPY COVER.





By MICHAEL SNYDER

How small a woodland is too small for forestry?

It's not so much the size as it is the nature of the woodland – and the woodland owner – that determines where forestry ends and where suburbia begins.

With more and more people living on smaller parcels, and with advances in small-scale equipment, it might be time to rethink our view of small woodlands. As parcel size gets smaller, other factors grow in importance and can even break or make a woodland operation.

For years most foresters hereabouts seem to have quietly agreed that 25 acres is on the small end of serious forest management. Similarly, 10 acres has long been a nice round number for families wanting a sustained yield of firewood. But those minimums are always more about wood management. If we're talking about forestry as the more inclusive art and science of applying a stewardship ethic to manage for a more exciting range of values – including timber – then those rules-of-thumb terribly underestimate the skill and creativity of everybody involved: foresters, loggers, and landowners alike.

Of course, there are limits to what you can get out of any system, and woodlands are no exception. If they are to be sustainable, woodland operations cannot remove more than what the forest produces. Striking that balance is no less important on small lots, but it might be more difficult, especially if your primary interest is in producing commercial timber and you care less about other management ideas.

If all you really want to do is harvest and sell timber on a periodic basis – say, every 10 to 25 years – then there are just a few critical factors that will determine how small a woodlot will suffice. Tree size and log value are usually the most important factors that determine whether (and how much) a logger will bid on a small-area timber sale. Site factors that affect the physical difficulty of actually doing the job – terrain, skid distance, access, and landing size – are also important considerations. As on large jobs, it comes down to profitability. Does the value in the wood to be removed exceed the costs of removing it? If the logger can pay you for the wood and do the job as you both desire – with skill and care – and still make a reasonable profit over his expenses, then you've got a viable timber sale. The trick is that some of those logging expenses – like equipment moving costs – are fixed. That is, they are the same for small jobs as for big jobs. Such fixed costs further increase the importance of wood value per acre on small jobs.

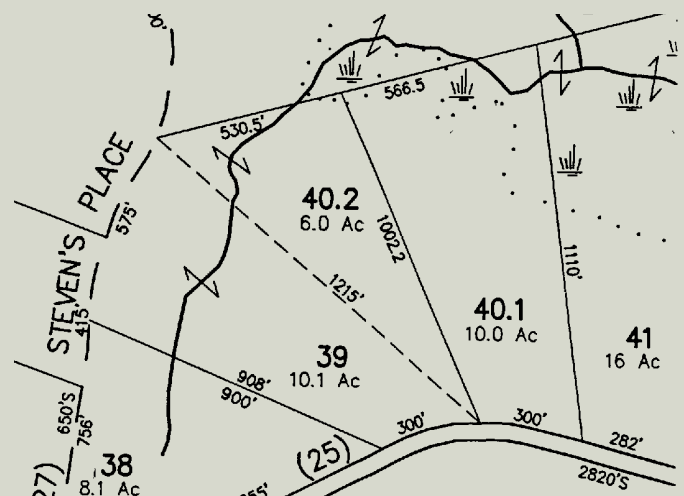
Even in this light, it's not unreasonable to think that lots smaller than 10 acres can be managed for timber in a traditional way – if the wood value is there. Actually, even if the wood value is not there today, you might be able to change that. Wood value per acre

is a significant factor on all sizes of jobs, but its exaggerated importance on small parcels certainly bolsters the argument for doing pre-commercial improvement work in promising but as-of-yet unfeasible stands on smallish properties. Some judicious crop tree release and pruning today just might increase the wood value per acre enough to make a commercial harvest feasible in 20 years.

But that's just timber management, and by the traditional timber sale at that. It can and has worked well for many. You can follow that course and still do right by the land, and even manage for other values like habitat and aesthetics to varying degrees. Minimum size, though, would still be shackled to the cold economic realities of the conventional timber sale. As parcel size decreases, there comes a point where there's not enough value present to entice a logger to find a way under the telephone wires, around your septic system, and over your lawn and still pay you for the wood he removes.

Don't despair. There's plenty more to forestry than timber management. And much of it can be practiced on exceedingly small lots as well as on large lots. You can prune trees, cut firewood, tap a few maples, plant and tend some Christmas trees, grow nuts, cultivate mushrooms, and truly enhance wildlife habitat, too. Even with less than an acre of forest you might manage to harvest some trees and saw out lumber for your own use and possibly for sale. These are all good and viable pursuits. Some of them are relatively straightforward; some might require additional savvy. Some might cost money. All will pay dividends. If you really want to practice forestry on your land, then only the limits of imagination – yours and your forester's – will determine how small is too small.

MICHAEL SNYDER IS THE CHITTENDEN COUNTY FORESTER





How to Grow an Oak from an Acorn

BY PATRICK BARTLETT

Nearly every step of the way from little acorn to mighty oak, the red oak is a prize to someone or something. Being that popular can be hazardous to an oak's survival. The acorns produced by Northern red oak (*Quercus rubra*) are a favorite food for many species of wildlife. Deer, turkey, bear, raccoon, fox, coyote, rabbit, squirrel, mice, crows, blue jays, and insects all find the acorn's meat irresistible.

When it matures, it is one of our most admired trees, and its valuable wood is sought by lumber buyers and furniture makers who use it as boards or as veneer.

In between, from the time it takes to get from seed to sapling, it is an uphill battle. It's not only the acorns that deer love – they browse the seedlings as well. They eat the leaves in the summer and feed heavily on the tender buds and twigs in the winter months.

Red oak adapts to very different sites throughout its wide range, which includes all of the northeastern U.S., and will flourish on hilltops in very shallow, rocky soils as well as down in the valleys in deep, rich soils. However, adaptable as red oak is, it can be very frustrating getting red oak seedlings to survive; foresters and wildlife managers know this all too well.

Collecting acorns and throwing them around on a hillside is basically a waste of time. These nuts have an aroma that gives them away to the animals that cherish them; most will be eaten in days. But if you wait until April or May to plant a germinating acorn, you will reduce the chance of it being eaten before it becomes a seedling.

The best way I have found for germinating acorns is to collect them in the fall. Forget the ones that have insect holes or cracks, and put the good ones in a sealable plastic bag with a wet paper towel. I store mine in a one-gallon, clear zip-lock bag in the vegetable drawer of the refrigerator. Once or twice during the winter, the paper towel should be moistened again. If you do not see condensation on the inside of the bag, then it's too dry. A cool basement or root cellar that stays around 40 degrees would work just as well. The key is to keep the acorns from freezing or drying out.

When planting time approaches, take the bag out of the refrigerator. Keep it sealed and at room temperature for about a week, and roots will begin to emerge. The acorns should be planted before the root gets to be one inch long. I just poke a hole in the



COURTESY OF PAT BARTLETT

Make sure your acorns don't have holes or cracks in them.

ground one inch down, place the sprout in with the root pointed down, then cover it over. The less you disturb the ground, the better. Squirrels will rob your sprouted acorns if they find them.

Getting these sprouted acorns to grow tall enough to be out of reach of deer is the next challenge. The first step is choosing a good site. Planting germinated acorns in patch cuts in poplar, spruce, or pine has worked well for me. The first spring after the cut has been done is the best time to plant.

I like to plant the acorns in the center of a group of spruce seedlings or under the limbs or tree tops that have been left on the ground after a timber sale. Planting acorns with a group of spruce seedlings that are 6 to 12 inches tall is like having a live, natural barrier from the deer, and spruce tops take years to rot and will protect the oak seedlings. I recommend leaving tops whole to impede the deer movement.



COURTESY OF PAT BARTLETT

Patrick Bartlett with successfully planted oaks in tree tubes

That's all there is to planting acorns, but if you want to help ensure their survival, you will want to find the 8- to 10-inch seedlings a year or two later, and provide a man-made shelter for the vulnerable seedlings. This is a more expensive approach, but it's worth it – and perhaps essential – if you have a deer-browse problem on your property.

A company named Treessentials makes a biodegradable, brown plastic tube to place over the seedlings. I have planted approximately 250 oak seedlings in these tubes over the past 10 years and have had good results. The 5-foot tube is the best one to use for deer protection. They also come with a net that slides over the top of the tube to prevent birds from becoming trapped in them. The net must be removed the year that you expect the tree to reach the top of the tube. The trees will generally grow 12 to 16 inches a year in the tubes.

In areas where deer use is heavy in the winter, the five-footer will not be high enough once your sapling emerges from the tube. In this case, I slide the tube up the stake as the tree grows. If a leader gets up to 7 feet tall, it should be safe from the deer. The tubes come with two plastic quick-ties for attaching them to a stake. Wooden stakes can be purchased with the tubes; however, I have recently started using half-inch rebar instead. I can use these stakes repeatedly in my forestry business, and it reduces costs for my clients. I cut a 20-foot section into three pieces. This stake won't rot and will be long enough so that you can slide the tube up when the tree emerges above the tube. The tubes normally fall apart after six years. After they're gone, the saplings will generally be weak and should be loosely tied to the stake. Once the sapling is one inch in diameter, it should be able to stand on its own.

The only problem you could have with the tubes is that bears

sometimes knock them over, and raccoons might climb them to see what's inside. You'll need to check on the tree tubes each spring for at least six years, so take that into consideration when you are planning where to plant – they need to be accessible.

If you didn't collect acorns last fall, or you want to speed the process along, you can purchase seedlings from a number of nurseries. Ask for 2-year-old seedlings. I recommend putting a tablet of slow-release fertilizer one inch down in the soil above the roots of the seedling. It is very helpful to pull in some leaf mulch and build it up around the seedling to help hold the moisture in the soil. After you do a few, it should take only a few minutes per tree. As with starting the trees from acorns,

the 2-year-old seedlings will need protective tubes to help them through the early years of growth. I have had 75 percent survival so far with oaks planted in these tubes.

Another way to protect seedlings is to cage them in with nylon or wire. I make my own cages from hardware cloth – just roll the cut pieces of wire into 8-inch-diameter tubes, and use the same rebar stakes. The trees will grow more slowly with this method (8 to 12 inches a year is common), but the saplings are a bit stronger than the ones grown in plastic tubes.

Whatever method is used, it is important to plant the seedlings where they will get plenty of sunlight. Oaks love the sun. If you are planting in a small patch cut, plant in the center and not under the canopy of edge trees. Patch cuts should be no less than a quarter-acre in size.

If you're lucky enough to already have a mature oak in your woodlot, you may be able to get some natural regeneration. Patch cutting one-half to one acre on the downhill side of an oak tree is the best way to encourage natural regeneration. Leaving the tops of the cut trees whole in the patch cut is important. They will slow the deer traffic through the area while the seedlings are getting established. After six to eight years, the tops of the cut trees will be knocked down by the snow, and with any luck, the terminal buds of the oak saplings will be out of reach of deer by then.

With many of the beech trees declining, we need to promote another nut tree for wildlife. By saving seed trees on woodlots where oaks are scarce and by carefully planting seedlings and acorns, it can be done.

PATRICK BARTLETT IS A PRIVATE FORESTRY AND WILDLIFE CONSULTANT IN WOODSTOCK, VERMONT.

State Government

Vermont Department of Fish and Wildlife (802) 241-3700 www.vtfishandwildlife.com

General fish and wildlife questions (*fish and game laws, habitat improvement programs, wetlands management*)

Fish and Wildlife Programs

Beaver Wetlands Conservation Program	Kim Royar	(802) 885-8855	kim.royar@state.vt.us
Community Wildlife Program	Jens Hilke	(802) 476-0126	jens.hilke@state.vt.us
Hunter Education	Chris Saunders	(802) 241-3720	chris.saunders@state.vt.us
Landowner Incentive Program	Jane Lazorchak	(802) 476-0128	jane.lazorchak@state.vt.us
Wetlands Protection & Restoration Program	April Moulart	(802) 241-1054	april.moulart@state.vt.us
Wildlife Habitat Incentive Program	Dave Adams	(802) 879-2330	dave.adams@state.vt.us
Wildlife Habitat Incentive Program	Marybeth Adler	(802) 885-8836	marybeth.adler@state.vt.us
Operation Game Thief (to report fish and wildlife violations)		1-800-75ALERT	
Rabies Hotline		1-800-472-2437	

Vermont Department of Forests, Parks and Recreation (802) 241-3678 www.vfpr.org

General forestry information (*including forestry laws, forest health, wood utilization, urban forestry, and cost-share programs*)

Forest insects, diseases, and fire management information (802) 241-3678

Vermont state lands, including planning and permitting questions (802) 241-3693

Urban and community forests and activities (tree planting, pruning, and care) (802) 241-3673

Vermont rules for logging practices and watershed protection (802) 241-3672

Project Learning Tree and other forest education programs (802) 241-3651

County Foresters (*forest management assistance, government programs information, and finding a consulting forester in your area*)

Nancy Patch	Franklin & Grand Isle Counties	(802) 524-6501	nancy.patch@state.vt.us
George Buzzell	Orleans County	(802) 334-2091	george.buzzell@state.vt.us
Ray Toolan	Lamoille County	(802) 888-5733	raymond.toolan@state.vt.us
Mike Snyder	Chittenden County	(802) 879-5694	michael.snyder@state.vt.us
Matt Langlais	Caledonia and Essex	(802) 751-0111	matt.langlais@state.vt.us
Russ Barrett	Washington County	(802) 476-0172	russ.barrett@state.vt.us
Chris Olson	Addison County	(802) 388-4969	chris.olson@state.vt.us
David Paganelli	Orange County	(802) 476-0173	david.paganelli@state.vt.us
Eric Hansen	Rutland County	(802) 786-3853	eric.hansen@state.vt.us
Jon Bouton	Windsor County	(802) 281-5262	jon.bouton@state.vt.us
Bill Guenther	Windham County	(802) 257-7967	bill.guenther@state.vt.us
Nate Fice	Bennington County	(802) 375-1217	nate.fice@state.vt.us

U.S. Government

George D. Aiken RC&D Council	Ken Hafner	(802) 728-9526	kenneth.hafner@vt.usda.gov
Northern Vermont RC&D Council	Beth Ann Finlay	(802) 828-4595	beth_ann.finlay@vt.usda.gov
Green Mountain National Forest	Kathleen Diehl	(802) 747-6709	kdiehl@fs.fed.us
Marsh-Billings-Rockefeller National Historic Park	Tim Maguire	(802) 457-3368	tim_Maguire@nps.gov
New Hampshire/Vermont Water Science Center	Keith Robinson	(603) 226-7807	dc_nh@usgs.gov
Partners for Fish and Wildlife Program	Chris Smith	(802) 872-0629	chris_e_smith@fws.gov

Non-Governmental Organizatons

Land Trusts

The following groups work with individuals, organizations, and communities to conserve land

Upper Valley Land Trust	(603) 643-6626	www.uvlt.org
Lake Champlain Land Trust	(802) 862-4150	www.lclt.org
Vermont Rivers Conservancy	(802) 229-0820	www.vermontriverconservancy.org
Vermont Land Trust	(802) 223-5234	www.vlt.org
The Nature Conservancy	(802) 229-4425	www.nature.org
Trust for Public Land	(802) 223-1373	www.tpl.org
The Conservation Fund	(802) 492-3368	www.conservationfund.org
Land Trust Alliance		www.landtrustalliance.org

Landowner Associations

The following groups provide outreach and education to private forestland owners

Vermont Coverts	Lisa Sausville	(802) 388-3880	www.vtcoverts.org
Vermont Family Forests		(802) 453-7728	www.familyforests.org
Woodland Owners Association of Windham County	Carol Morrison	(802) 257-7967	
Vermont Tree Farm Program	Kathleen Wanner	(802) 747-7900	
Vermont Woodlands Association	Kathleen Wanner	(802) 747-7900	www.vermontwoodlands.org

Watershed Associations

The following groups work with landowners to protect watersheds and Vermont's wetland communities

Addison County River Watch	Sheila Schwaneflugel	(802) 877-0054	schwane@adelphia.net
Battenkill Watershed Alliance	Cynthia Browning	(802) 375-9019	www.battenkillalliance.org
Black River Action Team (BRAT)	Kelly Stettner	(802) 885-1533	blackrivercleanup@yahoo.com
Connecticut River Joint Commissions	Sharon Francis	(603) 826-4800	sharon.francis@crjc.org
Connecticut River Watershed Council	David Deen	(802) 869-2792	ddeen@ctriver.org
Friends of the Mad River	Caitrin Noel	(802) 496-9127	friends@madriver.com
Friends of The Winooski River	Ann Smith	(802) 655-4878	fwr@sover.net
Huntington River Conservation Partnership	Aaron Worthley	(802) 434-7012	aaronw@gmavt.net
Lake Champlain Basin Program	William Howland	(802) 372-3213	whowland@lcbp.org
Lamoille River Watershed Association	Kim Jensen	(802) 888-9218	kjensen@pshift.com
Lewis Creek Association	Marty Illick	(802) 425-2002	martylewiscreek@gmavt.net
Missisquoi River Basin Association	Cynthia Scott	(802) 933-9009	mrba@pshift
Poultney-Mettawee Watershed Partnership	Marli Rupe	(802) 287-8339	pmnrpd@sover.net
White River Partnership	Mary Russ	(802) 763-7733	info@whiteriverpartnership.org

Foresters

Consulting Foresters Association of Vermont	George Weir	(802) 348-6666	george.weir@cfavt.org
Society of American Foresters – Green Mountain Div.	Leo Laferriere	(802) 496-2515	leol@gmavt.net
UVM Extension	Thom McEvoy	(802) 656-2913	tmcevoy@uvm.edu

Contact your county forester for a complete list of consulting foresters in your area (*see listing under Vermont Department of Forests, Parks and Recreation*)

Forest Products

Logger Education to Advance Professionalism (LEAP)	David Birdsall	(802) 235-2908	dwbirdsall@vermontel.net
Smartwood		(802) 434-5491	info@ra.org
Sustainable Forestry Initiative	Bill Sayre	(802) 223-3441	wrsayre@sover.net
Vermont Forest Products Association	Ed Larson	(802) 224-9177	larsonfour@earthlink.net
Vermont Maple Sugarmakers Association	Rick Marsh	(802) 763-7435	www.vermontmaple.org
Vermont Wood Manufacturers Association	Mike Rainville	(802) 747-7900	www.vermontwood.com

Agriculture

UVM Soil Testing Services		(802) 656-3131	www.uvm.edu/ps/ag_testing
Land Link Vermont	Siobhan Smith	(802) 656-8874	www.uvm.edu/landlinkvt
Department of Agriculture, Food and Markets	Kelly Loftus	(802) 828-3829	www.vermontagriculture.com

Land Surveyors

Vermont Society of Land Surveyors	Meg Shields	(802) 229-6358	www.vsls.org
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Nature Education and Conservation Organizations

Audubon Vermont	Doug Parker	(802) 434-3068	www.vermont@audubon.org
Bonnyvale Environmental Education Center	Bob Winston	(802) 257-5785	www.beec.org
Champlain Valley Clayplain Forest Project	Marc Lapin	(802) 462-2514	www.clayplain.org
ECCO for Lake Champlain	Tracy True	(802) 864-1848 x120	www.echovermont.org
Four Winds Nature Institute		(802) 353-9440	www.fourwindsinstitute.org
Friends of the North Branch Nature Center	Charles Darmstadt	(802) 229-6206	www.northbranchnaturecenter.org
Hulbert Outdoor Center	Andrew Williams	(802) 333-3405	www.alohafoundation.org
Keeping Track, Inc.	Bobbie Summers	(802) 434-7000	www.keepingtrack.org
Lake Champlain Basin Program	Colleen Hickey	(802) 373-3213	www.lcbp.org
Montshire Museum of Science		(802) 649-2200	www.montshire.org
Merck Forest and Farmland Center		(802) 394-7836	www.merckforest.org
National Wildlife Federation	Liz Soper	(802) 229-0650	www.nwf.org
Northern Forest Alliance	George Gay	(802) 253-8996	www.northernforestalliance.org
Northwoods Stewardship Center	Luke O'Brien	(802) 723-6551 x115	www.northwoodscenter.org
The Nature Museum at Grafton	Margo Ghia	(802) 843-2111	www.nature-museum.org
Vermont Association of Conservation Districts	Michelle Gudorf	(802) 586-7589	www.vacd.org
Vermont Institute of Natural Science	Linda Conrad	(802) 359-5001 x221	www.vinsweb.org
Vermont Natural Resource Council	Johanna Miller	(802) 223-2328	www.vnrc.org
Vermont Reptile and Amphibian Atlas Project	James Andrews	(802) 352-4734	jandrews@middlebury.edu

BY MARY HAYS

When a man I'd never met came to help widen our driveway a few years ago, I was shocked to hear him refer to Kit's Orchard. He was giving his partner a complicated set of driving directions: two miles past this place, four miles past that place, the places being named after people long gone. One of the places had belonged to my family and I said so. He wasn't familiar with the family, he said, but there was a place up in back there where he'd often gone hunting as a boy. Everybody called it Kit's Orchard, he said, though he'd no idea who Kit was. I explained that she was my mother's aunt. "Well, we just called it that," he said, as if it were a coincidence.

As we talked about it, I imagined each of us conjuring up the same images from our childhoods: an unexpected clearing in the woods, twisted apple trees, sunlight, silence. In that moment, I felt a dazzling kind of intimacy with this stranger.

As a piece of property, Kit's Orchard has changed hands since I spent time there. It has probably been 50 years since Aunt Kit walked there, a hundred years since Kit's mother walked there. In our family we always called it the Upper Orchard, differentiating it from the smaller orchard close by the house, a more public spot used for family events, a place where you might go if you wanted to be easily found.

The Upper Orchard, by comparison, was a solitary place where you could hide. It was a refuge, and at 14 I was a refugee, escaping the horrors of family life. I was not only treated like a child, but frequently assaulted with reprimands over my bad manners, impatience, self-indulgence, disrespect, vanity, talking-too-loud, and never-putting-things-away. I was, in short, 14 and altogether humiliated by my circumstances in life.

My favorite time to climb the hill was just before sunset, after the cows had gone home. A neighbor's Holsteins grazed there in the daytime, clumps of them resting under the umbrella-shaped black walnut tree, once in the morning, once in the afternoon. I was afraid of them, and if I was ever in the pasture when they were there, I kept a careful distance. It seemed to me that they watched me with an unreasonable intensity, that they were putting two and two together and they didn't quite like what it added up to.

Over the years the cows had worn a narrow dirt path that zig-zagged in long loops up the hill, and I followed this. Then came

the steep part of the hill, then the stone wall, the scratchy fir trees, the wellhouse, the shadowy, leaf-strewn path through the maples and birch, and at last, the sudden light of the orchard.

I don't know what ancestor, or what pre-ancestor, planted the 20 or so apple trees, but they were old. They still bore, though many of their limbs drooped to the ground, barren and stiff. The apples were tart, delicious, wormy. You had to nibble warily, the way I imagined the deer nibbled before they bounded away at my approach.



But I didn't go there to eat, and I didn't go there to watch wildlife. I went there to be acknowledged, to be *heard*, though I had only the vaguest notion of what presence I was communing with, and complaining to. God, perhaps, given form by the strangely shaped trees, the soft wind on the hill, the stones that stayed put forever, the small creatures that moved in secret – perhaps even the orchard's ghostly planter.

I was, oddly, not afraid. The orchard was a safe place for me, though I was a timid child. It was a place of transformation; it lent me courage. It gave me grace.

And it was mine alone, or so it seemed. As I grew older I came to realize that other family members spent

time there, too. My mother went there on purpose, I discovered, because of its beauty. Even Aunt Kit, who it turned out had not worn thick stockings and lace-up shoes since birth, had played there as a child.

Once, after my parents were gone and I had come back to take care of some repairs, I was stopped in the midst of my chores by the sight of the late-September sun filtering through the yellow leaves of the maple in front of the house. It reminded me suddenly of the light in the orchard, which I hadn't thought about in years. There was just enough time before dusk, and I threw on my jacket and ran up the hill.

As I approached the orchard, I saw a boy get up and move quickly away through the trees. I was surprised; I had never met up with anyone there. At first, I assumed he'd been scouting for deer, and was shy of being challenged. But then I thought, perhaps I had disturbed him in his refuge. He looked to be about 14.

MARY HAYS IS THE AUTHOR OF *LEARNING TO DRIVE*, A NOVEL SET IN VERMONT IN THE 1950S. SHE LIVES IN CORINTH, VERMONT.

**The Place You Call Home:
A Guide to Caring for Your Land in Vermont**

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Our intended audience includes everyone in Vermont who owns 10 or more acres of land, and anyone who believes that, with careful stewardship, the landscape that makes this state so special can support and sustain us for many generations to come. For more information, or to request additional copies of this guide for a friend or neighbor, visit www.northerwoodlands.org or call (802) 439-6292.

