About This Guide

The Place You Call Home: A Guide to Caring for Your Land in the Upper Valley is an “owner’s manual” for people who own land in the Upper Valley. It has been produced by the staff of Northern Woodlands in Corinth, Vermont, with the generous support of the New Hampshire Charitable Foundation’s Wellborn Ecology Fund and the local organizations and businesses listed inside the back cover.

Our intended audience includes everyone in the Upper Valley who owns 10 or more acres of land and anyone who believes that, with careful stewardship, the landscape that makes this place 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.northernwoodlands.org or call (800) 290-5232.
Welcome

MY WIFE’S FAMILY HAS ROOTS IN THIS AREA. Topsham to be specific, that go back to the late 1700s. My own roots here hardy go back at all in 1988, she and I bought a piece of land in Corinth, and we moved here and built our house the following year. So even under our roof, we mirror a dichotomy that exists all over the Upper Valley — some people have ties to the land measured in generations. Others have fallen in love with it just recently.

As one of the latter, I became so fascinated with the land and all its systems — the ecosystem as well as its place in the local economy — 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 to include New Hampshire and beyond and was renamed Northern Woodlands.

For 12 years, 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 holding, The Place You Call Home: A Guide to Caring for Your Land in the Upper Valley, is a collection of material that we will think will give landowners the information they need about their land and role it plays in the ecology, economy, and culture of the Upper Valley. It is, in fact, the owner’s manual I wished for nearly 20 years ago.

The purpose of this guide is to help us all — native or newcomer — become better stewards of the land in the beautiful Upper Valley. Even the most committed and effective tenders of the land are not born with a sense of stewardship, which comes with spending time on a piece of ground. By getting to know it in all seasons and in all weather, we develop an appreciation that the land is the only constant: it preceded our ownership and will be here when our tenure is done.

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 is 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 daily activities. And it provides a supply of wood, the processing of which employs thousands of people in the communities of the Upper Valley.

From Haverhill to Bethel to Springfield (both of them), the history of much of this area has followed a similar pattern. When Europeans arrived, they cleared it for farming. By the early nineteenth century, this was an open landscape, dotted with farms. It supported family farms for years, though gradually it diminished in fertility and productivity, until land to the west that had been opened up began to attract large numbers of New Englanders, who followed New Hampshire native Horace Greeley’s advice to “Go West, young man.” Forests then grew up on the pastures and tilled land, and over the last century and a half, most of the land in the Upper Valley has reverted to forestland. Forests now cover 90 percent of the Upper Valley landscape.

As more and more people are attracted to the Upper Valley, those forests are at increasing risk of being divided into 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. I hope that this guide helps all of us make good decisions. — STEPHEN LONG

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Our Home in the Upper Valley

By Chuck Wooster

Technically, at least, the Upper Valley is no longer a rural place, meeting neither the demographic definition (most people living in towns with fewer than 2,000 people) nor the economic definition (most people making a living, in some way, from the land). Medicine and education are the chief engines of the local economy, with the Dartmouth-Hitchcock Medical Center (DHMC) and Dartmouth College being the two largest employers and Lebanon and Hanover being the two most populous municipalities.

But this does not mean that the rural economy has disappeared. Far from it. Farming, forestry, and recreation that is directly linked to farming and forestry employed 4,800 people last year in the Upper Valley. Considered in aggregate, farming and forestry are the second largest employer in the region, trailing only DHMC, which had 5,977 employees in 2005. Farming and forestry also generated more than $712 million in economic activity – just ahead of the College’s annual budget of $629 million. Agriculture and forestry may not dominate the local economy the way they did a hundred years ago, but news of their death has been greatly exaggerated.

Combine this with a second statistic: although 25 percent of New Hampshire and 14 percent of Vermont is public land, very little of that is in the Upper Valley. The various state parks, wildlife management areas, town forests, and other public ownerships total less than 10 percent of Upper Valley land. This means that the 4,800 jobs and $712 million in economic activity are almost entirely dependent on private land that is owned by landowners who are, in all likelihood, very much like you.

According to the 2002 census, there were 2,040 active farms in the four counties that make up the Upper Valley (Windsor and Orange in Vermont, Sullivan and the southwestern half of Grafton in New Hampshire). Collectively, these added up to 322,162 acres – roughly 16 percent of the Upper Valley land base. These farms produced goods valued at $79.5 million.

Two statistics that might surprise you about agriculture: there are more farmers now in the Upper Valley than there were 20 years ago, and farming is a secondary income for 55 percent of those farmers. Dairy farming continues to struggle in the region, helping to feed the misperception that farming overall is in trouble, but other types of farms – vegetables, hay, asparagus, fruit – are springing up to replace them. And these new farmers are a lot like many of their neighbors: they hold down multiple jobs and work in more than one sector of the economy.

None of these statistics, by the way, includes the thousands of Upper Valley residents who keep a few pigs in the summer, run a few sheep out back, or grow so much zucchini in the garden as to be considered a public menace.

There’s also a thriving forestry-based economy: sales of Christmas trees, wreaths, and maple syrup totaled $7.5 million in 2000. Wood (both firewood and biomass chips) provided just over $32 million of all the energy used in the region – more than twice the national average. Chips fuel the region’s two wood-fired power plants, one in Ryegate, Vermont, the other in Springfield, New Hampshire. Firewood sales totaled $6.9 million.

On the higher end of the product range, there are a number of sawmills turning hardwood and white pine sawlogs into lumber that’s sold all over the world. Some of that lumber is used locally by the hundreds of furniture makers ranging in size from large employers like Pompanoosuc Mills and Copeland Furniture to one-man shops turning out custom work.

Each 1,000 acres of forestland in the Upper Valley supports roughly three forestry-related jobs: two directly and one through recreation and tourism. Those “directly” jobs include loggers, foresters, truckers, surveyors, sawmill owners and employees, furniture makers, salespeople, and all the managers who keep these businesses going. There are nearly 500 foresters in Vermont and New Hampshire, for example, more than half of whom do business in the Upper Valley.

Many landowners recognize that when logging is done with the long-term health of the forest in mind, it can both provide wood to the economy and have a positive impact on wildlife habitat, recreational opportunities, and the future productivity of the forest. There are approximately 1,800 logging operations conducted in the Upper Valley each year – more than a dozen per town per year. Roughly 70 percent of forestland owners have logging done on their property at some point in time.

But there is a catch: parcel size is important, and there is a trend toward smaller and smaller parcels as a result of subdivision. There are still thousands of parcels in the Upper Valley larger than 100 acres, but the average forested parcel is less than 50 acres. Nevertheless, you wouldn’t be a land baron to participate in the rural economy. More than a few timber harvests are the result of several neighbors working together on smaller pieces, which can make even a 10-acre parcel viable for forest management. The future of the forest-based economy is very much dependent on the availability of that forest. Whether people coordinate with their neighbors or act independently, the decisions landowners make about their land have an enormous impact on life in the Upper Valley.

This is equally true when it comes to quality of life. Take recreation, for example. State laws in both Vermont and New Hampshire provide for public access across private land, unless that land is specifically posted to the contrary. Many of the activities that make the Upper Valley life so wonderful – walking, skiing, snowshoeing, bird-watching, hunting, fishing – would simply be not possible without this longstanding tradition of public access to private land.

If you are concerned about a specific activity occurring on your land (hunting, or perhaps ATV driving) you might consider putting up signs to limit just that activity rather than putting up the standard “Trespassing – No Trespassing – No Trespassing” sign that erodes this important aspect of New England life. Unlike most states, both Vermont and New Hampshire offer strong legal protections that limit landowners’ liability from misjudgments that occur on their property as a result of public access. (The fine print: landowners can’t charge a fee for access or deliberately set out to cause harm.)

Wildlife is another example of the crucial role that private land plays in the Upper Valley. Since there’s so little public land, nearly every species that we enjoy, from moose to mole and fish to fisher, depends on individual private landowners for survival.

Recognizing the crucial role that private land plays in the life of the Upper Valley, the government of Vermont, New Hampshire, and Montpelier have created a special property tax category to encourage landowners to keep their land in forestry or agriculture. Called “current use” in New Hampshire and “use value appraisal” in Vermont, these programs establish a lower tax rate for undeveloped land that is enrolled in the program. The details vary between the two states, but the tax savings are significant.

Ask your service forester (county foresters in Vermont and extension foresters in New Hampshire) for more details – he or she will point you in the right direction.

These programs are proving to be very popular. In Vermont, nearly two-thirds of all eligible parcels are currently enrolled, totaling a third of the state’s entire acreage. Although New Hampshire does not keep statewide statistics, the acreage is likely even higher because the requirements for enrollment are less restrictive in the Granite State. Because these programs tax the land at a rate based on its current use (growing trees or crops) instead of its potential for growing housing or other development, they help ensure that private land will be available for the rural economy of the future.

Life in the Upper Valley combines the best of two worlds: a thriving knowledge-based economy centered on medicine and education and a thriving natural resource-based economy centered on forestry and agriculture. Not many places in this country can say the same. Nor can they boast the large number of individuals who care so deeply about the landscape around them.

CHUCK WOOSTER is associate editor of Northern Woodlands magazine. He keeps sheep, grows vegetables, and manages woodlands on 100 acres on the Hartford-Hartland line.
A Rocky Past: Rural History is Written in Stone

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, whenever 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 meadow against great cateft,” 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 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.
Neighboring hills were buried in a deep, fine sediment at the bottom of the valley. Here, the stones that were distributed by glaciers over the region’s lowest elevations, such as along the Connecticut River, were 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 cultured 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, it indicates time-draining, causing 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.

What Do Animals Need? And Do Your Woods Provide It?

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?

By Stephen Long

At the heart of what has to be a complex answer is one simple statement: every animal 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 multitude 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 the upper canopies of mature woods (15 to 30 years old) and performs its courtship ritual right 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, white-tails, 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 brooding 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 hunters, on the other hand, use it for breeding, then move to more open woods for nestling. 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 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, 16 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 2,800 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 landscape? It’s not just the forest canopy. It’s the large mammals” 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 hillslopes 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 forest with no traffic is not a forest.”

If you’re interested in knowing what you can do to help wildlife, Johnson suggests contacting the local conservation group, or the state forester’s office, or a wildlife biologist for advice.

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

### 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, or pouring forth from the ground in a spring. Its more ephemeral forms – rain-soaked shrubs or dewy grass – may meet the water requirements of many small mammals.

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, lichen, and 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. Food is not the only form of practical cover from the elements: they need shelter from heat, wind, and precipitation. But more important – literally, of life and death importance – is the need for cover from predation.

The predator-prey relationship determines the characteristics 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 nesting 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 grizzly bear and other predators with cover to hunt the young elk. The grasses and herbs that are the cover for mice, voles, and other rodents are the cover that coyotes use when hunting

### 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 you so 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. Many 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 breathtaking view, even a large 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 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 your forest.

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 you are looking at systemically. 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 topographic map and your aerial photos. See how the non-forest areas that show 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 the type or it can change density of the trees. Thus, you could find yourself coming out of a mature overstory stand of northern hardwoods into a pole-sized stand of spruce and fir. Where do the transition points lie? 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

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**Northern Woodlands / The Place You Call Home**

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**Northern Woodlands / The Place You Call Home**
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 ground-skipper 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 ground-skipper lets the grass get long between games. Place it in a city, surround it with stands and lights for eight 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 hard-wood 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 soft-woods 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 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; 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.
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 broumy) 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 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, mooses, 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 predominately 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 woodland, 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 seasons.

• 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.

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


What’s to Become of Your Land?

Conservation Agreements Help People Hold Onto Land

By Annette Lorraine

“In your future, I see taxes and building lots. . . but then again, maybe not.”

If you, a conservation-minded landowner, could peek into a crystal ball to look at your land 100 years from now, what would you hope to see? Would it be building lots? Brush? Wildland? Well-managed woodland? Many landowners who have invested love and labor into their land would like to see their land-management legacy continued and would like to have some control over making that happen.

Stephen Long is co-editor of Northern Woodlands Magazine.
Putnam (Put) Blodgett, of Lyme, New Hampshire, is just such a 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, Vermont, 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 woodland.

With an investment of a lifetime in his woodland, it is no surprise that Blodgett wonders how to best secure his family’s legacy in the land. Understanding that land is at risk every time it passes to a new generation, he has placed a conservation agreement (also known as a conservation easement) on his land with a nonprofit land trust.

Ron and Sylvia Ferry of Montpelier, Vermont, had similar concerns about their 83-acre farm and woodland. After rearing their three children there, the question remained: “What will become of the land?”

“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 Fereys purchased their land in 1958 at a price that seems absurdly low by today’s standards.

By using the conservation agreement, they solved two possible tax problems: capital gains and estate taxes. The problem with estate taxes is that is all too often, with a bequest of land and not enough cash to pay the tax, heirs are forced to find a way to raise cash quickly. Some end up cutting timber, often before it has reached its maximum potential. Others choose to sell enough development parcels to pay the estate taxes.

Indeed, estate taxes are a major concern for many who wish to leave their land to heirs. Because the value of land throughout the Northeast has increased so much in the last 25 years, estate taxes can be due from many people who would not have been subject to these taxes 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. It’s no longer only the obviously wealthy who need to worry about estate planning.

A simple formula for estimating estate taxes is to total up one’s net worth, which is the fair market value of one’s gross assets minus debts. At the date of death, if one’s net worth is more than the tax exemption for that year allows, there will be an estate tax. The date of death is important because the 2001 tax law change adjusted the exemption upward each year until 2010, when there is no estate tax at all. Then, on January 1, 2011, the exemptions will revert to the pre-2001 amounts unless, in the meantime, Congress changes the law again.

For people pondering estates and estate taxes, it is crucial to obtain up-to-the-minute professional advice. With that in mind, here is a glimpse at the exemption amounts as they exist in 2005.

For a person who dies in 2005, a net worth of up to $1.5 million is exempt from estate taxes. In 2006, that amount will increase to $2 million which will stay until 2009, when it increases to $3.5 million. Any estate worth more than the exemption has an excess amount taxed, and the largest estates will pay the estate tax at the maximum rate, which are currently capped at 47 percent in 2005, 46 percent in 2006, and 45 percent 2007-2009. Again, there is no estate tax in 2010, but unless Congress enact a change, in 2011 the rate will jump to a cap of 55 percent with a $1 million exemption.

In any case, estate planning is a good idea for any person or couple with a net worth of more than $1 million. 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.

There are several strategies for postponing or reducing estate taxes, such as revocable and irrevocable living trusts and lifetime giving techniques. There are pros and cons to each method; a good accountant or attorney can be consulted for individual advice. But, whether in addition to other tax strategies or by itself, there is currently only one option that reduces taxes and guarantees that land can stay undeveloped: a permanent conservation agreement. Removing the development potential from land lowers its fair market value and thus the capital gain upon transfer, and it lowers the owner’s net worth for estate tax purposes.

The most typical way for a landowner to conserve land is by donating a perpetual conservation easement to a nonprofit land trust. In this scenario, a landowner grants perpetual development restrictions on the property to an organization whose sole purpose is 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 bargains-in-title of conservation agreements (as provided by Section 170(h)(4) of the Internal Revenue Code) when they accomplish certain goals, such as the conservation of scenic open space, working farms or forestland, or wildlife habitat, so long as there are significant public benefits. However, as of 2005, Congress is considering changes that could severely curtail these deductions. It is important to be aware of the most recent law and policies. Land trusts will be happy to steer interested parties in the right direction.

It’s important to note that conservation agreements also 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 sometimes limited exceptions may be negotiated beforehand) or used for mining or storing trash. However, most land trusts allow – and often promote – timber harvesting with good forestry practices. This may be appealing to woodland owners who want to see their working forest remain a forest beyond their own.

Conservation agreements can be particularly helpful to woodland owners with tax concerns. Without the development potential, the fair market value of the property is reduced significantly. The landowner must document this drop in value by obtaining a special appraisal of development rights that meets certain IRS qualifications. This should be done by an appraiser experienced in this field, and will cost more than a standard appraisal. However, a landowner will want such an appraisal to determine if a conservation agreement will make a significant decrease in a possible capital gains tax.

An appraisal will also assist the landowner in estimating how the estate taxes, if any, will become more manageable for the heirs. A further benefit is that a donation of permanent conservation restrictions to a nonprofit land trust is tax-deductible. Depending on a landowner’s income and other circumstances, the costs associated with appraisals and the land trust agreement may be deducted from one’s adjusted gross income, along with the fair market value of the development rights as determined by the appraisal.

Theoretically, a decrease in property value should also reduce property taxes. However, governmental policies for assessing conservation lands differ from state to state, and in some cases, town to town. There is no guarantee that extinguishing develop rights through a conservation agreement will lower property taxes. In the case of land enrolled in a state’s “current use” property tax valuation program, 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. It is rare that such a variety of concerns may be addressed by one tool; yet working out a conservation agreement with a land trust has proved a viable option for many. Landowners like Ron Ferry, who has chosen this option, feel satisfied knowing “the land is more ours than it ever was before, because we know it will be preserved.”

Annette Lorraine lives in Hartland, Vermont, and is a stewardship director and legal counsel with the Upper Valley Land Trust.
One of the planet’s most successful creations, the mosquito has been around for at least 50 million years. A female mosquito can suck up two and a half times her empty weight in blood. The fragrance of RK387730 in blood can be almost overpowering. 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. Late in the season, when the water is warm, they hatch within a week.

By now milk snakes have laid their 5-24 eggs. They will hatch from late August to October. Deer mouse population on 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. Newborn butts are cut out. Damage by the larvae of allier frogs is clearly visible. The black caterpillars usually occur in innocuous numbers, but occasionally there is a population explosion. The caterpillars overwinter and reemerge in the spring, before laying eggs.

Backwaterers patrol the surface of ponds, napping against the current. They will hatch from late August to October for white-faced horned moths 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 across a splash with a yip if startled. Chockerserees 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.

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Tricks of the Trade

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 delimbing

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.

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 hop hornbeam, 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 hop hornbeam:

“The twigs are slender, more or less zigzag, 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.”

Tricks of the Trade is provided courtesy of Yankee Forest Safety Network, a non-profit logger safety group serving loggers in New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.
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, dogwoods—even guessing 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 of 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! Read your bookshelves and haul a few good guides out into the field on a clear winter’s day. 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 will.

**Features to focus on**

Numerous plant parts and features hold clues to tree identity in winter. Leaves, in truth, are among the most obvious features, and losing their leaves down to the bare twigs makes them much easier to see for this exercise. To invest all your 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 butter-nut. For the rest, you’ll need to examine a suite of characteristics before making your final diagnosis.

- **Bud size and shape:** fat ones, skinny ones, shiny 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 blottchy 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 fall:** although leaves fall away in winter, leaf scars remain on the twigs to mark the corly 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 twig like a cup, or the bud may perch daintily on top. In general, the largest leaf scars belong to the deciduous trees with compound leaves—such as butternut, hickories, and ashes.
- **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, 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 lines:** twig 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, 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.
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- **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 blottchy 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 fall:** although leaves fall away in winter, leaf scars remain on the twigs to mark the corly 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 twig like a cup, or the bud may perch daintily on top. In general, the largest leaf scars belong to the deciduous trees with compound leaves—such as butternut, hickories, and ashes.
- **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, 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.
- **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 “twiggles.” 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 the 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 reminiscent of 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.”

**Recommended Field Guides**


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

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

**Buds in sub-opposite pairs:** common buckthorn

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

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

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

**Two-ranked*** buds, with the largest buds at the top of the twig:** hophornbeam (also typical of hickories and oaks)

**Two-ranked, equal-sized buds that are typical of birches**

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

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

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

**Buds in sub-opposite pairs:** common buckthorn

**Spiral, three-ranked buds that hug the twig:** quaking aspen (typical of other poplars as well)
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 ducks.
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. Great forests have eye-level, 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,” said William McShea, a wildlife biologist with the Smithsonian Institution’s Conservation and Research Center in Front Royal, Virginia.

In the woodlands of McShea’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 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 exacerbate understory vegetation. They literally eat songbirds out of house and home.

“Is there absolutely no question that regions with high deer populations have deapserauper 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 their stand. She bucked and the resident 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. The bird then dragged the eggs across the ground, then to the nest, tucked them away under a clump of sugarbush owners, sometimes clear forest understory vegetation, making the ground looks cleaner. It was then that the bird 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 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 there can be a nest. There can be even better bird hiding places in the woods.

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 buzzing, this little brown bird regularly eludes birdwatchers. Finding its nest is like finding money in the woods — it’s hidden in a tree cavity, under a stump, or it is a cleared root. The back-and-white warbler, much more obvious with its zebra pattern, is a mouch-trap style. From this and 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 sedges, grass, or other vegetation.

Never would I have found that ovenbird nest had I not been close enough to hide and watch the female 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.

BRIAN PEETERS OF PLAINFIELD, VERMONT, IS A NATURALIST, WRITER, AND SOUNDER OF WINGS ENVIRONMENTAL, SPECIALIZING IN THE STUDY OF BIRDS AND INSECTS FOR LANDOWNERS.
Consulting Foresters: What They Do and Why You Need One

By Stephen Long

What do you think of when you see a skidder parked in a landing next to a pile of logs? Does it warm your heart, reminding you that the forest products industry is a significant part of the rural economy? Or does it bring to mind a horror story told by a landowner of his beautiful woods left ruined by a logging job? For too many, the presence of a skidder brings a shudder of dread.

What gives? Is every logger a scoundrel and every landowner a victim?

Hardly. The problem often starts with a landowner who knows just enough about logging to get into serious trouble. For starters, many misunderstand the nature of the relationship between logger and landowner, thinking that the logger is providing a service, much like the fellow who plows the driveway or paints the house. Unschooled landowners get dollar signs in their eyes when they realize that not only will the contractor thin their woods for them but also he’ll pay them for what he takes off their land.

That is the true nature of the relationship – buyer and seller. A logger is buying raw material from the landowner and reselling it to a mill. And like anyone who wants to stay in business, the logger needs to buy low and sell high. The difference between those two prices determines how well his family is fed, how nice a truck he drives, and whether or not his skidder payments are made on time.

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 what is being sold or, more importantly, what should be sold. And if the logger is making the choice of which trees he buys, there is no reason for him to cut those that have little value. But removing the poorly formed trees is an essential part of forest management, and removing only the valuable trees leaves behind an impoverished forest. Often, in this case, when the job is done and the woods are utterly changed, seller’s remorse sets in. The stumper payment seems a pittance, the best trees are gone, and another horror story gets told.

Brian Stone, a forester who serves as chief of forest resource management for Vermont’s Forestry Division, has heard the tales and knows that all the heartache is unnecessary.

“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 your best interests and your choice. 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. I’ll say O’Nio could do this and so and this is what you would end up with. Or you could do this. Which one would you prefer to do?”

In his present capacity, Stone spends the majority of his workday indoors, and he doesn’t do much walking in the woods with landowners. But there are many consulting foresters throughout the region who do. These foresters – trained in silviculture, forest health, statistics, surveying, ecology, plant identification, physiology, organizational skills, business management, writing 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 should include a map of the different stands and note whether any diseases are evident. It includes a plan for the next 10 to 15 years worth of harvesting activities and should 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 land 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: hiring 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 can prevent the misunderstandings that often occur.
Finding a Forester

If you are looking for a consulting forester, look at the Resource Guide on page 74. You can also contact your service forester, who is also listed in the Resource Guide.

When you have some names, make some calls. Get a sense of the forester’s working style and areas of expertise.

Many foresters can also serve as tremendous sources for 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 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 wild, unusual formations,” she said. “They’ll say to me, ‘Tell me about what you saw, please. ’ ”

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“People love to hear what I saw on their land: tracks and wild, unusual formations,” she said. “They’ll say to me, ‘Tell me about what you saw, please. ’ ”

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 arrange 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. ’ Whenever, they’re done, you might be horrified by what you see. The stumps are bright, there’s slash on the ground, the roads are demended. 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 that they’re 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 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 see the advantages 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 like 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 and market it. It’s the forester’s job to practice good silviculture.”

Morgan is a true believer in forestry. 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 splattered 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 come away and make improvements. You start by understanding geology, soils, natural systems in terms of plant communities and the animals that are part of them, and you ask, ‘How do I intrude into the system to remove products for human beings without destroying the 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 absence of timber but the long-term damage that comes from cutting so heavily that the remaining stand is endangered, compromising the regeneration of desirable species, and by taking only the 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, a forester, said, “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 be a forester. The forester has the background and the experience to provide sound advice, service, and outreach.

Whether it’s an even-aged stand that has resulted from field abandonment for 70 years, 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 territorially complex. It requires an ability to see into the future — as much as an athlete can — and then plan the steps to achieve that vision. Over the years, the smart foresters have learned to practice the art of planning the steps to achieve that vision. Over the years, the smart foresters have learned to practice the art of planning the steps to achieve that vision. Over the years, the smart foresters have learned to practice the art of planning the steps to achieve that vision. Over the years, the smart foresters have learned to practice the art of planning the steps to achieve that vision. Over the years, the smart foresters have learned to practice the art of planning the steps to achieve that vision.

“The idea of silviculture is a people pleasing job, but not the details of good silviculture. ”

This uncompromising stance on the separation of the powers between forester and logger could seem like arrogance, but the beard to his room, part of his clothing, is actually an offending.

He is perfectly comfortable kicking tires and swapping stories on a logging legend, and the loggers who have worked with him for years wouldn’t have it any other way.

Crafsbury 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 what I did. 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.”

“Many foresters view the world as a field where they can be a great fisherman and that’s how they make their living. I’d be a bad person 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 Co-editor of Northern Woodlands magazine
The Look of Logging: Keys to Getting a Good Job Done

BY STEPHEN LONG

Homeowners embarking on a construction project take great pains to do their research. They talk to different contractors, get bids, check references, and look at examples of each contractor’s recent work. When entering into an agreement, they make sure the contract spells out their expectations. Nobody would consider this amount of attention excessive—after all, the homeowners are going to have to live with the result.

If landowners paid the same amount of attention to planning the logging work in their woods, there would be a lot more satisfied landowners out there. There would be fewer complaints about logging jobs, and in the long run, fewer people would be reluctant to manage their forestland. Jim White, the Bennington County (Vermont) forester, believes that every logging job is a partnership among the landowner, the forester, and the logger. “I tell landowners that if they get a good job done, then they deserve some of the credit, because they got a good forester and a good logger to do the work. But, if they get a bad job, they also have to take some of the responsibility,” White said. “They’re all in it together.”

In each state in the Northeast, landowners can find help from service foresters, who operate out of either the state forestry department or the extension office. The job of these public foresters is to help landowners learn about good forestry practices.

White said, “When someone comes in who’s thinking about having some logging done on their land, I like to take them around and let them see some work being done in a stand that’s like the one that they own. That way they’re not surprised by what happens on a logging job.”

Besides the jobs in progress, White shows the landowners jobs that were completed two or three years ago, to give them an indication of the long-range impact. Logging inevitably changes the look of the woods. Since many woodlots are adjacent to a homestead, it’s particularly important that landowners know what is reasonable to expect. With that understanding, they can confer with the forester and logger to determine what the finished results will look like.

Getting started

Few research projects are more pleasant than taking a walk in the woods with someone who makes his living out there. Make an appointment to visit some logging jobs with your service forester. Ask questions, take notes, and keep your eyes open. While these public foresters can’t steer you to a particular private consulting forester or logger, they can provide a list of those working in the area. If you are favorably impressed with a particular job, find out who did it.

When you contact a consulting forester or logger, ask them to give you the names of two landowners for whom they have worked in the last year. White said, “A logger should be happy to have you go see his work, and to have you talk to people he’s worked for. It’s free advertising. Ford and Chevy have to pay people to say good things about them, but a good forester or logger can get that for free.”

What to look for

It’s outside the scope of this article to discuss the type, quantity, and value of the timber that is removed and the timber that remains. Those questions are at the heart of the art and science of forestry, and there’s been a library of books written on the subject. However, most forestry professionals would concur with the following set of standards for a well-done logging job:

• There should be very little damage to the trees left behind to continue growing. The felling and the skidding should not result in trees with skinned-up bark. There should be no trees leaning on others.

• A skid trail means soil compaction, so there should be a minimum number of them. The trails should provide straight and direct access across a gentle slope to the landing. The trails shouldn’t cross watercourses or stone walls unless absolutely necessary. When they do cross streams, it should be at a right angle to the stream, and the logger needs to make provisions not to cause siltation downstream.

• Disturbed ground, particularly on slopes, can erode. Culverts or waterbars should be used to divert water across, rather than down, the trails and roads.

• The landing should be just large enough for the efficient
operation of the equipment required by the job. Too small a landing makes for difficult work; unless you want a large opening for another purpose, too large can be, well, too large.

- The tracking road that leads from the landing should be either flat or on a gentle slope, over well-drained soils. It too should be only as large as it has to be for safe passage of the trucks.

These are the ideals. Can they be achieved? Under perfect conditions, yes. Unfortunately, much of the terrain in the Northeast – while undeniably beautiful – is rarely perfect. Hilly country, wet soils, and a preponderance of springs and streams complicate the work of the loggers.

In addition, small parcels are often difficult to log effectively because boundary lines often have nothing to do with natural features. Laying out a system of roads, trails, and a landing on a 10-acre lot can require the skill of a magician. Still, these challenges can be met successfully.

Jim White said, “There’s a saying, ‘Off you do a good job, everybody in town knows about it; but if you do a bad job, everybody in the county knows about it.’”

White said that he is seeing a different kind of landowner in recent years: people who are more particular about what the woods look like when the job is done.

“The loggers have adapted, and it’s been for the good,” White said. “These landowners demand a better job. They want the logging to be beneficial for the forest. And they ask better questions.”

One of the big questions is what to do with the slash, the unmarketable upper limbs and branches of a harvested tree that are normally left on the forest floor. The wood then rots back into the soil, providing nutrients. A generation ago, standard practice was to leave them untouched. Today, it’s more common to require loggers to cut the larger limbs so the top collapses and doesn’t stick up any higher than two or three feet above the ground.

Some landowners find this visually objectionable and ask their foresters: “Why can’t the slash be run through a chipper and left in neat piles?”

According to White, the slash should not be run through a chipper—leaving a disordered mess of stumps that can be very irritating to look at.

The light thinning of these woods is hardly noticeable two years later.

From the top:

Trees along skid trails that are damaged from skidded logs are called bumper trees. Even though they are skimmed ap, they serve a purpose and should be left in place because they will keep other trees from being damaged in the next harvest.

Deer often feed on buds in the tops of trees cut during a winter harvest.

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 are present, 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 bud 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 weevil likes 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.

The larva moves downward as they feed in the cambium and inner bark, and as they grow, their feeding mines coalesce, aiding in 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 bud 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.

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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 scruffy 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, sapucker-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 deceptively moribund, 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 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. Berries and twigs are browsed by deer, ruffed grouse, cottontail rabbits, and numerous others. Voles, rabbits, and mice seem to savour 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.
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.

Begin by considering 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 American history.

And so it has been in New England. Curiously, though, the apple is not native here – this despite its long history and wide-spread 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 crab 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. – was settled – was limited to seedling trees 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, many varieties emerged as the early favorites: Baldwin, Northern Spy, and Rhode Island Greening. Of course, there were others, including Summer Rambo, Cox Orange Pippin, Nonpareil, Honeygold, Wolf River, Wealthy, Farmhouse, 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 Vyle, 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 Vyle 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 cultivated 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 carries a fruit which the sedentary would call harsh and cramped. What is sour in the hause a bracing walk makes sweet.”

Michael Nottier is the Conservation (Vermont) County Forester.

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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 identifying the finer points of biotic diversity and species interactions, the Discovery Channel has nothing on forest-dwelling apple trees.

This wild apple tree has been released from competition.
Fields Among the Forests
Keeping Open Land Open

By Chuck Wooster

an you name the three most heavily forested states in the United States? The answer might surprise you: Maine, New Hampshire, and Vermont, in that order. All three are 80 percent or more 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 vacation. 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 place. 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 comes from having the farmer keep your field open for free. Ask for a back 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 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.

But a more fun way to view your open field is as a wildlife nursery. Saplings in this field will soon be too large for brush-hogging. Saplings in this field will soon be too large for brush-hogging.

For agriculture 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 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 every third year or so, you will still be maintaining the view while 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, spire, 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 having 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 seedlings 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, 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 pastoral New England 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 the New England 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 windowed 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 associate editor of Northern Woodlands magazine. He keeps sheep, grows vegetables, and manages woodlands on 100 acres in the Hartford-Hartland line.
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 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

**Don’t Get Bogged Down!**

By Rose Paul

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

Above: Shadbush in a shrub swamp
nutrients more available, while carnivorous pitcher plants, sun-
dews, 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 byprod-
ucts of decomposition. Fens are fed by an upwelling of ground-
water that is laden with calcium and other minerals. A rich
look like a bush, 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?
Rose Paul is the Director of Science and Stewardship for the Vermont
Chapter of the Nature Conservancy.

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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.

Dog

Our 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!

Cat

Our smaller, teardrop-shaped toe impressions are asym-
metrically 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!

Susan C. Morse is founder and program director of Keeping Track in Huntington, Vermont.
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 tree 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 those 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 $2,000/MBF for sugar maple and $850 to $1,150/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.
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 cancers, which then grow larger and larger.

As trees with narrow forks grow, their 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.

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 yardstick.

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 chains (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,

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 hogpbournean 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 species. In addition to the value increase associated with sheet 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.

In 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. The only buyers paying more than $300/MBF are chipboard mills, which buy limited amounts at $500/MBF.

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."
of course, it simply means to eyeball it. Wood said that at the start of each timber cruise, he does use an objective measure- ment to get his eye calibrated to the heights and tapers in that particular stand, but once he’s comfortably calibrated, he goes on gut. 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." The boss hog sugar maple in Jonathan Wood’s company woodlot rose to 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. At 12 inches in diameter that roughly 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 diam- eter puts on geometric growth in volume.

The lesson to be learned from spending time in your woodlot 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 measur- ing 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 tak- ing plots and making notes for his volume estimate, he was also silently talking 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? Depending on the size of the tree, it would yield a higher than 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 ledge, 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 to handle. In some stands put on the ground or in a ground-level feeder. Migrating fox sparrows will eat millet, black sunflower seeds, and many other seeds. 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 together, and the skidding is done together, and then 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.

So my wife and I don’t get paid to spend time 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.
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.

Eventually it would rain, and it didn’t take much of a downpour 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 downpour 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 inca- pable 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
A buffer strip like this traps sediment and shades the water, keeping it clear 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 surprising reservoir of oxygen and calcium. It will then also, and thereby, be a good osprey stream, a favorite among otters, a salvation for dippers and kingfishers and bank swallows and herons, mergansers to gape over their shrimping, goldeneye to look for bear.

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 learned tremendously from those days. I look at water quality not just in terms of the chemistry to take a permit. It used to be every city was dumping raw sewage into a trout stream, I can corroborate Quammen’s catalog of the riverine ecosystem. While fishing rivers in the Northeast, I have learned tremendously from those days. I look at water quality not just in terms of the chemistry that we measured water quality 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, Off to 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 parochial as it might seem. Trout are a good indicator species,” he said. “They have a set of habitat requirements that make them the canaries 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 Kihn, a fisheries biologist with Vermont Fish & Wildlife, is responsible for managing central Vermont’s brown, brook 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 Kihn 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 were only too 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 pool of wild brown trout – n—not literally, but nor is it nor under any circumstances a prime dumping ground for dead leaves, a surprising reservoir of oxygen and calcium. It will then also, and thereby, be a good osprey stream, a favorite among otters, a salvation for dippers and kingfishers and bank swallows and herons, mergansers to gape over their shrimping, goldeneye to look for bear.

Not to mention the occasional grizzly bear...."
Each 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.

Traditionally, there are a few 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.

Traditionally, however, also celebrates some now- quesitional road-building practices. “Sunlight is nature’s gravel” is one old saying that suggests the wider the corridor, the dirtier 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 as opposed to 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 vehicular 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 specific 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 at 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.

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 home 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.
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 coverage. The narrower road had only 17 percent canopy closure. 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 solution, he says, is effectively closing temporary roads to vehicle traffic when their job is done. Forman acknowledges that, at least, this is a political 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.

There is probably an impact if you cross the major road, but Forman’s study didn’t assess the effect on the forest system as a whole. The small road had a lower impact; Forman feels that the smaller road had less impact than the larger road on the forest ecosystem.

For more information, contact Phillip deMaynadier at the Endangered Species Group of the Maine Department of Inland Fisheries and Wildlife, 215 Pine Street, North Haven, ME 04849, or call 207-724-9300.

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**It Pays to Be Patient**

by Dan Parent

When I finished marking a woodland, 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 years of this size to make a cord, a 7-inch tree is valued at about $70. 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 $425 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 lovely 7-inch pulp tree. The crown of the crop, of course, is the veneer log. These logs are of exceptional quality and are usually at least 14 inches in 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 thinning, 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, sawtimber class, sawtimber class, prices can increase significantly higher returns when the time comes to harvest them.

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**Prices change. The prices listed in this article are accurate as of early 2005 in the northern New England market.**

**Amount to Landowner**

- $20.00
- $35.00
- $40.00
- $152.00
- $285.00

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**Northern Woodlands**

The Place You Call Home

58

59
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—what 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. Sticking that balance is not 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 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 woodland 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 bolstered 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 skills. Some might cost money. All will pay dividends. If you really want to practice forestry on your land, then only the limits of imagination—you and your forester’s—will determine how small is too small.

Michael Snyder Ph.D. is the Chittenden (Vermont) County Forester.

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 at 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 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 “hawk- ing” 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 woodpeckers to excavate a home.

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

Above: Ruffed grouse use downed logs for drumming, their mating display. Right: This flying squirrel uses a hole made by a woodpecker for its nest. Then dividing by \( \pi (3.1416) \), I have learned that my own personal huggable snags range from 6 to 18 inches DBH. A skinnier 6-inch-cuber, I can hug all the way around and touch both shoulders. An 18-inch beaver 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 huggables 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 pilated 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 rearranges my sense of scale.

If all this hugging and measuring is too much for you, you can simplify the program by focusing on just the biggest of your injured, dying, or dead trees. The smaller woodpeckers can readily excavate their nesting cavities in bigger trees, but pilated 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 these I wonder 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 patrolled 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.

Gale Lawrence is a freelance natural history writer and the author of The Becoming Naturalist. She lives in Huntington, Vermont.
How to Grow an Oak from an Acorn

By Patrick Bartlett

The Place You Call Home

early every step of the way from little acorn to mighty oak, the red oak is a prize to someone or something. Being 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 acorns most 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 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.

This is 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 is a year’s 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 beach 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.
A Look at the Season’s Main Events

By Virginia Barlow

DECEMBER

First week

The white-crowned sparrows that stop at your feeder may remember it and stop again in spring. They are small enough in the far north / Burdick is a bennial, and after its first year, the long taproot is edible. Plus, no baby 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 gleydrent, a compound that keeps them from freezing in their terrestrial hibernating chambers.

Second week

Sweet cicely sprouts new leaves in autumn, but usually stay green in winter, ready to enlarge quickly in spring before tree leaves intercept the light / Sunflower seeds and pruned 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.

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 sapsuckers are territorial in winter; a pair will defend territories. Home ranges are larger, and then try to figure out how to put it there. And then I struggle on the top of one of the sugar maples I’d felled. As I watched, a second one appeared, and then a third, calmly feeding. They’d been busy biting off buds while I was running a chainsaw no more than 60 yards away.

Fourth week

Henbit seeds don’t attract a wide variety of birds but are eaten by chickadees, siskins, and crosbills / Snow usually does not deter many birds from finding food in 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 grassbetraps 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.

Notes from the puckerbrush

By Stephen Long

Shaking the tall, straight stalks of milkweeds will release a shower of tiny black seeds / The juicy red fruits of highbush cranberry are available, purple finches may winter on them, but they are eaten by chickadees, nuthatches are territorial in winter; a pair will defend territories. Home ranges are larger, and then try to figure out how to put it there. And then I struggle on the top of one of the sugar maples I’d felled. As I watched, a second one appeared, and then a third, calmly feeding. They’d been busy biting off buds while I was running a chainsaw no more than 60 yards away.

Winter cranberries are the same species as the cultivated ones. The berries are still on the plants, in bogs and fens / Red-breasted sapsuckers are territorial in winter; a pair will defend territories. Home ranges are larger, and then try to figure out how to put it there. And then I struggle on the top of one of the sugar maples I’d felled. As I watched, a second one appeared, and then a third, calmly feeding. They’d been busy biting off buds while I was running a chainsaw no more than 60 yards away.

I watched the show for a full five minutes, finished my coffee, and by then was anxious to get back to work before my muscles stiffened up. I finished around with my backpack, put on my helmet, and picked up my chainsaw – and still they didn’t notice me.

Of course I recalled the hunting season that had just ended, in which eight days in the woods showed me no more deer than I could see right now. Two weeks ago, they’d been invisible, feeling who knows where on who knows what. But now they were getting themselves on this huge stock- pile of buds I’d so graciously put before them. I pulled the cord on my saw, the engine fired, and finally the deer looked toward me, I waved a greeting. Reluctantly they turned and bounded down the hill, but I didn’t think they’d go away for long.

Some hunting seasons, I see dozens of deer. Sometimes one of them’s a buck, and sometimes I shoot one. And then there are years like last year, when all season long I saw a total of three deer, not one of them with antlers. I hunt almost entirely on my own land because I want to know this one piece of ground inside and out. I want it to be home, just as much as the house we built. Another way of knowing it is through tending my stands of maple, so after the deerless season, I quickly traded in my orange hunting vest for my orange Kevlar chaps and made the transition from the stillness of deer hunting to the 2-cycle roar of felling trees.

I’ve been doing timber stand improvement on my land for as long as I’ve known there was such a thing. I surveyor’s tape around the straightest, best-looking specimens, identifying them as my crop trees, the ones that I’ll grow for decades more. I then cut down any poorly formed trees whose crowns are encroaching on those of my prizes. If I don’t feel confident that I can fell the without damaging its neighbors, I girdle it, cutting two parallel rings around the circumference of the trunk to a depth of at least half an inch, which eventually kills the tree.

I can already notice a difference in the stands that I thinned just seven or eight years ago. The crop trees’ crowns have filled the spaces vacated by the trees I cut, and many of their trunks look as if they’re trying to grow right out of their skin. The next thinning in that stand will definitely produce some small sawlogs. Not all the gratification is delayed, though, because I love the work itself. Lately, I’ve had my forester mark the trees to thin out, and the work goes more quickly when I don’t have to agonize over every decision at every tree. Now all I do is find the blue paint and cut the tree. Of course, it’s not quite that easy. I ponder what direction it should fall as opposed to where it wants to fall, and then try to figure out how to put it there. And then I struggle to make it happen according to the plan. What if the bull(sf) when you snip off the last bit of holding wood and down it goes, right where you wanted it. But when you snip off the next one and the tree goes nowhere, or worse, settles back on your bar, you’ve gone from hero to goat in a hurry. The resultant wedging and pounding are done with the added benefit of adrenaline, and all I can say is that so far I have not done myself any bodily harm.

Knock on wood.

So in early December, I was doing just that, cutting mostly 5-inch to 8-inch sugar maples that had been marked. Thus far, I had put in four or five afternoons, and for my efforts I could look out on scores of trees showing starkly against the snow on the slope below me, most of them laid out nice and orderly; a couple of them hopelessly hung up. This morning, after an hour or so of steady work, I was pleased to hear the engine scream, telling me I was just about out of fuel.

I shut off the saw, took off my helmet, and poured a cup of coffee from the thermos in my backpack. I was about to sit down for a break when out of the corner of my eye I saw movement. Not far below me stood a deer. It was steadily chomping down on the top of one of the sugar maples I’d felled. As I watched, a second one appeared, and then a third, calmly feeding. They’d been busy biting off buds while I was running a chainsaw no more than 60 yards away.

I watched the show for a full five minutes, finished my coffee, and by then was anxious to get back to work before my muscles stiffened up. I finished around with my backpack, put on my helmet, and picked up my chainsaw – and still they didn’t notice me.

As the wookoo is dalliated, look for signs of last summer’s activities – mouse nests, chipmunk middens, beetles, or snakerskins / The big sticky buds of balsam poplar have a wonderful smell, which is intensified if you wonder them / Both acrobatic aerial courtship tumbling, and soaring are accompanied by the engine screaming, telling me I was just about out of fuel.

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By Virginia Barlow

A Look at the Season’s Main Events

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First week

The white-crowned sparrows that stop at your feeder may remember it and stop again in spring. They are small enough in the far north / Burdick is a bennial, and after its first year, the long taproot is edible. Plus, no baby 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 gleydrent, a compound that keeps them from freezing in their terrestrial hibernating chambers.

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Northern Woodlands / The Place You Call Home

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 loose 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.

Try to prune to a height of 17 feet.

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.
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 log-gaging 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 the pruning white pines until they are at least 16 feet tall. If the white pine weevil invades the leader later, that you will at least 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 fungii, 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 squared 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 30 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 show-shoe into the woods on a sunny February or March day with your pruning saw can yield a pretty good return immediately.

What About 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 pick 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’ll 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 bark 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 viable defects such as branch scars, proper pruning really can make a big difference. When you remove small branches from signature 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 inches,” 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 overlook 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 it doing so will create more tree damage than benefit. When in doubt, don’t.

MICHAEL SNYDER IS THE CHITTENDEN (VERMONT) COUNTY FORESTER.
Field Work

At work in the woodlot with John O’Brien

By Kathleen Hentcy

Consulting Forester John O’Brien stands with head thrown back, cap in hand, looking up at the top of a white pine tree that stands 90 feet tall. He’s about 15 minutes into his first outing of the day, and already, a splash of blue paint runs down from his right front jeans pocket. There is paint on his flannel shirt, a dab of paint on his face, spots on his hat. His insulated boots, which don’t match, are streaked with paint. O’Brien’s dog, Annie, an 11-year-old black Labrador retriever who wanders through the woods around us, has blue spots on her coat. Except for the paint on his face and clothing, which wasn’t there when I met him, there’s no telling which is fresh paint and which is left from a previous day’s work.

O’Brien steps back from the tree and looks toward the skid road, which is obscured by fir seedlings. He’s imagining the tree’s underbrush in this small pocket of pines on the shore of Upper Pond, in Orford, New Hampshire.

“Now, he’ll know how to get to it,” he says. A plastic jug of paint rides on his back in a small rucksack, with a tube leading from the cap to the spray gun.

O’Brien has been to this job several times already, laying out the skidder trails with an eye for the land as well as for the first phalanx of trees with the least amount of damage to other trees. As trees are removed, O’Brien returns to walk the woods again, checking to see if other trees can be cut this time or if they should stay and grow another 5 to 10 years.

“There’s a little spruce right over there,” he says. “I can’t mark too many all at once,” he said. “If you do, you lose control over the job.” The loggers he works with have come to expect this system from O’Brien and are happy to accommodate him.

“Like a job to look nice,” he says. “So I work with loggers who take a lot of pride in what they do. The kind of loggers who, when they’re done, step back and say, Oh, that looks nice.”

For all this talk about looking “nice,” however, what is really at stake is the vitality of the woodlot. O’Brien selects diseased trees for cutting. He chooses trees with tops that fork into two stems, making them weak and susceptible to snapping off in a high wind. He marks trees with tops too small to support the tree with any significant growth, since they have so little foliage.

But he will leave a small-topped tree if felling it would break a healthy tree’s branches or skin too much bark from the healthy tree. A forester working in a dense woodlot also must consider the need for a continued windbreak for trees left standing, since trees grow to resist the wind they are exposed to. If they have come up in a dense clump, they’ve resisted much less wind—and therefore are much weaker—than if they’ve withstood the gales alone.

Too many trees taken from a dense woodlot, therefore, puts the remaining trees at risk of losing their tops in a high wind, no matter how big and strong the trees appear.

O’Brien respects the loggers who work for him, but he recognizes that their job is very different from his. While their job is to safely remove trees from the woods, O’Brien’s is to safeguard the health of the forest while seeing that the landowner earns enough from the logging job to make long-term management worthwhile.

Trees grow, and they’ll grow fast if you give them a chance to add some foliage to their crowns,” he says.

Today, on this walk through a stand of century-old white pines, he recounts the story behind nearly every stump he passes. He walks to a stump near the shore, brushes off sawdust and snow, and points to how heart rot; another stump, he explains that even though the tree was obviously large, it suffered from blister rust or the top was split. He remembers each tree he marked, why he marked it, and where he expected it to fall. He stops to inspect damage on trees where a falling tree scraped the bark. Some he marks for cutting, others he pronounces only superficially damaged and says they will do fine.

“Look at that tree,” he says, pointing out the largest white pine. It seems to me that tree is 3 feet in diameter,” he says. “A logger would say, Oh, that’s a nice size, perfect for cutting.”

“I say, let ’er grow.”

O’Brien has been a forester his entire professional life. He started in 1972 as an employee with Wagner Woodlands, a Lyme, New Hampshire, forestry consulting company. In 1983, he went out on his own as O’Brien Forestry Services up the road in Orford. Today he manages 30,000 acres for 150 clients within a 50-mile radius of his office. He manages woodlots that range from his friends’ 10-acre plots to the Hanover Waterworks’ 1,500-acre tract where he oversees logging in the watershed of Hanover’s reservoirs.

O’Brien offers his clients a range of services. He will go in and mark for thinning work only, or work with the landowner for wildlife management or strictly for an “active forest,” from which the landowner would regularly have a significant number of board feet cut. He will put in a network of trails, in addition to the skid roads, which he always envisions as hiking trails.

He marks all boundary lines and the trees for cutting, hires the logging crew, contracts for log trucking services, and markets the logs. By keeping so much under his control, he believes he can maximize the landowner’s profit while also maximizing the protection of the forest’s health.

In addition to his paying clients, O’Brien also volunteers as a forester for the American Tree Farm Service. After 13 years of work with that group, he was chosen from among 10,000 foresters nationwide to receive an award as the “Outstanding Tree Farm Inspector of the Year.” O’Brien has brought 53 new tree farms into the program and re-inspects those farms and any others in his district at five-year intervals.

On a drive through a section of the Hanover Waterworks tract, his pride in achieving a sustainable, productive forest is clear. The trees are growing so well here that theoretically he could take out a half-million board feet of timber a year without depleting the timber. Since he began managing this land in 1978, loggers have cut 12 million board feet of timber under his direction. He varies the amount of cutting depending on the market— if the price for sawlogs or pulp is down, he just waits another year. Weather is another determining factor— he won’t log if the ground isn’t frozen or very dry.

At another woodlot, this one owned by Sam Doyle, who once was named New Hampshire Wildlife Steward of the year, O’Brien tours the cutting area, marking a few trees.

“If a tree is unique, I leave it,” he said, walking past the few birch trees in this stand. “If there are just a few of one species, I figure Mother Nature put them there, leave ’em.”

A group of red oaks draws his attention. These are young, straight-fooled trees whose oaks provide important mast for bears and other wildlife. Y ears from now, they should also produce valuable sawlogs for Doyle.

“These are the future, right there, as far as revenue for the landowner goes,” O’Brien says. And so he has directed the cutting around them with the intent of maximizing their growing conditions.

We emerge from the woods onto the windy hillside log landing. The loggers are bucking logs, and a man running a loader is stacking them on the log truck. After watching awhile, we walk to O’Brien’s truck.

“The key to this work is, you have to go slow and careful, plan ahead,” he says as we arrive at his truck. “You have to be looking many years down the road, and at the next generation.”

His dog, Annie, who accompanied him on his first outing of the day, chose to remain in the truck to sleep through the rest of his stops. When O’Brien opens his door, he hauls Annie toward his side to give me room to get in. Once I’m settled, he releases her and she curls up, half on my lap, half on the seat, for the ride home. As we bump across the field, I finger the dab of blue paint on her back.

Kathleen Hentcy works for the Vermont Department of Public Service in the Consumer Affairs and Public Information Division. She lives in Waitsfield, Vermont.
## Conservation Organizations

### Appalachian Trail Conference
Lyman, NH (603) 795-4935

### Audubon Society of New Hampshire
Concord, NH (603) 224-9909

### Cross Vermont Trail Association
Montpelier, VT (802) 498-0770

### Keeping Track
Huntington, VT (802) 434-7000

### Museum of Natural History
Norwich, VT (802) 649-2200

### New England Forestry Foundation
Orange, MA (978) 544-1514

### Northeast Organic Farmers Association
Richmond, VT (802) 434-4112

### Northern Forest Center
Concord, NH (603) 224-9909

### Northern Woodlands
Concord, NH (603) 439-6292

### Society for the Protection of N.H. Forests
Concord, NH (603) 224-9945

### The Nature Conservancy (NH)
Concord, NH (603) 224-5853

### The Nature Conservancy (VT)
Montpelier, VT (802) 229-4425

### The Trust for Public Land
Chester, VT (803) 223-1373

### Upper Valley Land Trust
Hanover, NH (603) 649-7890

### Vermont Institute of Natural Science
Woodstock, VT (802) 457-2779

### Vermont Land Trust
Montpelier, VT (803) 639-1700

### Vermont Natural Resources Council
Montpelier, VT (802) 223-2338

### Vermont River Conservancy
Middlebury, VT (802) 389-9277

### Vital Communities
White River Jct., VT (802) 291-9100

### White River Partnership
Middlebury, VT (803) 767-4600

## Landowner Associations

### New Hampshire Coverts
Main Clyde (603) 862-2166

### N.H. Timberlands Owners Association
Jasen Stack (603) 224-9969

### N.H. Tree Farm
Committee
(802) 224-9945

### Vermont Coverts
Ferby Brown (802) 586-2350

### VT Tree Farm
Kathleen Warner (802) 287-4284

### Vermont Woodlands Association
Kathleen Warner (802) 287-4284

## Government Offices

### NEW HAMPSHIRE

- **N.H. Dept. of Environmental Services**: Concord, NH (603) 271-3503
- **Wetlands Bureau**: Concord, NH (603) 271-2147
- **N.H. Fish & Game**: Concord, NH (603) 271-3211
- **N.H. 3 conservation officer**: Keene, NH (603) 526-6692
- **N.H. Division of Forests & Lands**: Concord, NH (603) 271-2214
- **Forest Rangers**: Concord, NH (603) 271-2214
- **N.H. State Forester**: Phil Bryce
- **N.H. Dept. of Agriculture**: Concord, NH (603) 271-3551
- **Grafton County Extension Forester, Northfield**: Parr (603) 787-6944
- **Grafton County Agriculture Education**: Parr (603) 787-6944
- **Sullivan County Extension Forester, Charlestown**: Chuck Hursey
- **Sullivan County Agriculture Education**: Parr (603) 863-9320

### VERMONT

- **VT Dept. of Agriculture, Food, & Markets**: Montpelier, VT (802) 229-2550
- **VT Dept. of Environmental Conservation**: Montpelier, VT (802) 241-3880
- **VT Dept. of Fish & Wildlife**: Montpelier, VT (802) 241-3700
- **Fisheries or Wildlife Biologists**: Springfield, VT (802) 885-8855

### U.S. GOVERNMENT

- **New England Forestry Foundation**: Rutland, VT (802) 747-6740
- **Murch-Billings-Rockefeller Nat. Hist. Park**: Woodstock, VT (802) 457-3405
- **Natural Resources Conservation Service Field Offices**
  - **Berkeley, VT**: Bruce Chapelle (802) 828-4683
  - **St. Johnsbury, VT**: Timothy McKay (802) 748-2641
  - **Newport, NH**: Scott Hecken (603) 756-2988
  - **Walspole, NH**: Scott Hecken (603) 756-2988
  - **Woodsville, NH**: Kathy Judd (802) 747-2901
  - **White River, Jackson, VT**: Jon Boulanger (802) 255-7940
- **U.S. Fish and Wildlife Service**: Tumwater Falls, MA (413) 863-3070
- **U.S. Geological Survey**: Pembroke, MA (603) 226-7600
- **USDA Forest Service**: Durham, NH (603) 868-7600
- **White Mountain National Forest**: Lincoln, NH (603) 256-8721

For information about the current use programs, here are two websites:

- **www.nh.gov/environment/currentuse.htm**
- **www.nh.gov/environment/currentuse.htm**
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, 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 loudly, 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 zigzagged 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 the novel, Learning to Drive: She Lives in Cornish, Vermont.

The Place You Call Home: A Guide to Caring for Your Land in the Upper Valley

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Our intended audience includes everyone in the Upper Valley who owns 10 or more acres of land and anyone who believes that, with careful stewardship, the landscape that makes this place 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.northernwoodlands.org or call (800) 290-5232.