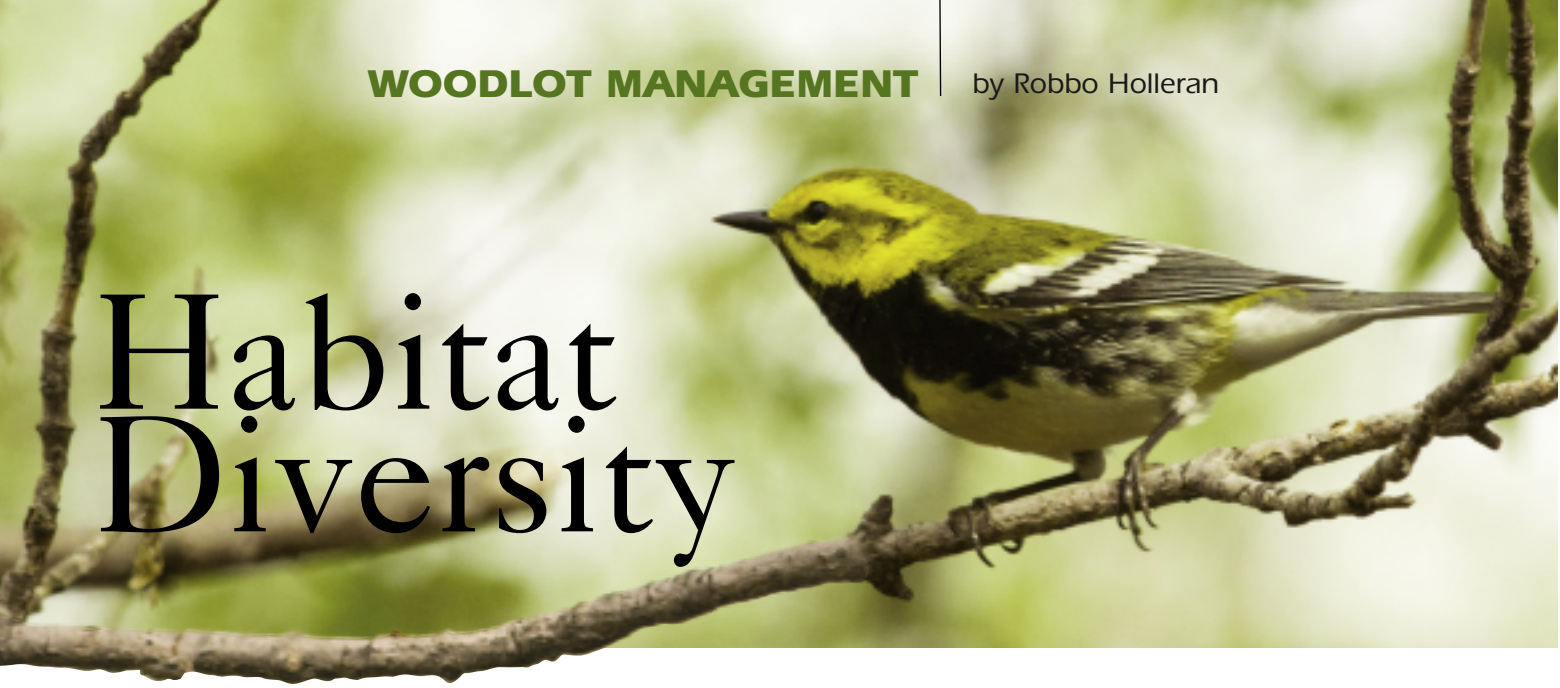
by Robbo Holleran



Habitat Diversity

The managed forest is a better place for wildlife. That's a pretty bold statement with today's debates about nature, wilderness, sprawl, and fragmentation.

Most of the private forest management around the Northeast involves a full range of selective harvesting options, along with relatively small clear-cuts, and substantial reserve areas, in irregular patterns. The mosaic of ownership, with different goals on each property, helps create this pattern. We work with the native species, rarely planting anything. The result is rich habitat diversity.

The Parameters of Diversity

The three major types of habitat diversity provide a full range of food, cover, and conditions for all flora and fauna. First, we have a long list of tree and plant species, mostly native (species diversity). Second, we have a range of tree diameters, ages, and heights in many stands (vertical structural diversity). And last, we have adjacent stands with varying ages and characters (horizontal structural diversity).

Also consider that the well-managed forest will have a mix of hardwoods and softwoods, with nut-bearing species like oak or beech, winter cover in hemlock or spruce, along with both short- and long-lived species. It will have regeneration, young trees, middle-aged, and mature stands. It will have large, old legacy trees with cavities along with some permanent openings. And there is always some water nearby—wetlands, seeps, or streams. If we could ever find things to be just right, how could we keep it that way? Forests are always changing.

Overall, today's forests fall short of the ideal. We have only about 2% early successional habitat in most of the Northeast. These are the areas of young forest, "brush," raspberries, and prolific herbaceous plants, created by pasture abandonment, heavy logging, and rare natural disturbances like tornadoes. With sunlight nearly hitting the ground, these areas are very productive. Plants and young trees in daylight have more nutrition for the "plant eaters." The plants provide for a range of insects for the "bug eaters," and all these critters benefit the predators, so the whole "food web" benefits. We have had more brush-habitat in the past. Since the Civil War, each generation has been abandoning substantial portions of farmland to grow into young forest. The last great shot against agriculture was the requirement for refrigerated bulk tanks in the 1960s, when thousands of hill farms in New England gave up milking, and left their small pastures to grow up into ideal habitat in the '70s and '80s. These are now 40- to 50-year-old forests, and there is not much farmland being abandoned to grow into young trees today.

Room for Improvement

But since most wildlife biologists agree that 5% to15% early successional habitat is ideal, there is room for improvement. The reality is that this habitat has to come from aggressive timber harvesting, like clear-cutting, heavy shelterwood cuts, and large-group selection. With the exception of the large industrial tracts in the North Country, clear-cutting is relatively scarce. According to the Vermont Department of Forests and Parks, heavy cuts over 40 acres have dropped to about 3,500 acres per year. This is less than 1/10th of 1% of Vermont's forestland. And regeneration cutting is less common in New York and Massachusetts. If these heavy cuts provide suitable brushy habitat for 10 years, they amount to less than 1% of the area.

What happens during the regrowth of these heavy cuts? They go through various stages. The first few years see herbaceous plants, raspberries, and very small trees getting started. Then it will be dominated by tree seedlings, sprouts, and saplings, with as many as 20,000 small trees per acre. As the trees grow to about 6 inches in diameter, many stems drop out by competition. The density drops to about 1,000 stems per acre. As the trees develop into sawlog sizes, 100 trees per acre will make up the final stand—just a tiny percent of the original seedlings. Somewhere along the timeline, daylight coming through the main canopy allows a new understory to begin growing on the forest floor. As the initial overstory meets some kind of demise, the understory can begin to replace it. If the stand progresses naturally, this may take 200 years or more. Active thinning, release of crop trees, and final harvest can shorten that to half the time, and recover wood from trees that were destined to perish and rot. Active management also directs this process toward desirable ends of species composition, stand structure, and valuable wood products.

Each year, throughout these stages, every species of wildlife will seek the habitat it needs during that month. For example, a whole list of warblers and sparrows nest in the dense thickets of seedlings or young saplings, and young ruffed grouse chicks hunt for insects in these thickets in the late spring. After a decade or so, these thickets grow into the next stage, so the species will migrate to find replacement habitat.

Even-aged, Uneven-aged

Even-aged is easily explained with the example of a pine plantation. All the trees are started together and grown for a period of time, usually 60 to 100 years. They may be thinned out several times, but eventually they are all cut and replaced with a new forest. The final removal may be a clear-cut, or less drastically removed in several cuts over 10 to 30 years. Most of our post-pasture forests are even-aged. Proper application of even-aged forestry on a landscape level would have a balance of age classes with young, middle-aged, and mature portions.

Since many small woodlot owners do not accept the heavy cuts that end the rotation and start the next generation of trees, uneven-aged forestry is preferred—creating a mixture of several age classes throughout the stand. Some of this has happened by accident, but it is a common forestry goal today. Irregular, diverse, even-aged forests often have groups of trees that grow faster, or mature earlier, mixed with longer-lived or slower-growing trees. When partial cuts are done to remove these groups, such as white pine, fir, or poplar, and there is enough light to create new seedlings, a new age class is formed. Later, another cut removes groups of mature or marketable trees creating a third age class, and so on. This is how uneven-aged forests have been created.

How does this allow for diverse wildlife? Once you have a multi-aged forest, the theory is that there are always groups of trees that are mature and ready for the next harvest, along with immature groups in several stages. These stands are often diverse in species composition and forest structure: large and small trees in groups, areas with overstory and understory conditions, mast and den trees—a complicated forest. These stands are aesthetically pleasant, and can produce excellent wildlife habitat, all on a relatively small woodlot. There is never a

Young spruce and hardwoods released from a shelterwood cut provide dense cover for snowshoe hare, grouse, and many other species.

As the stand develops, natural mortality reduces density and little sunlight penetrates to the ground. This no longer provides berries, browse, ground plants or dense cover and most wildlife simply move to new areas.

A good example of an uneven-aged stand with large, medium, and small hardwoods and softwoods. This shows a lot of structural diversity on one acre, but if every acre looks like this, we lose horizontal diversity.

drastic cut on the whole stand, and there is an income-producing cut every 15 years or so, a model of sustainability.

Where Do You Start?

Begin with a map of your property. Since wildlife are not too concerned with your stone walls and red-painted blazes, look beyond your borders to see what habitat is available in the neighborhood. I like to use topographic maps and air photos for this. Pretty good aerial photography is available online—such as Google Earth, but state foresters and farm service agencies are also helpful. By looking over your region, you can see the elements of habitat that are abundant and scarce. By talking with your neighbors, you might get an idea of their forest management plans and how the habitat is likely to change. And a careful review of your own property will show how your lot fits into the big picture. There may be special elements that your lot provides. Large, old legacy trees, beaver wetlands, or ledgy den sites would just be noted and maintained. If you have wild fruit or nut trees, then releasing them from competing trees will help their fruit crops. But if your neighbor has an orchard, your few apple trees might not be that important. These fruits will benefit both birds and mammals that depend on them in the fall.

Looking at the forest structure is a bit more complicated, and it will be helpful to have the advice of a professional forester. Forest stands are usually areas of 5 to 100 acres that are consistent, with a similar mix of tree species, similar soils

and drainage, and the same land-use history, such as farm abandonment or style of logging. The forester will map out the young, middle-aged and mature forests, hardwoods, softwoods and mixes, even-aged and multiple-aged stands. Each stand may have special features to note, such as vernal pools or legacy trees.

Bill Leak and Mariko Yamasaki et al. published a book titled *Landowner's Guide to Wildlife Habitat for New England*. This is an excellent resource, very practical and easy to read, with photographs and computer images of forest changes over time that are very helpful. They recommend (on relatively large areas) a mix of forest cover as follows:

Regeneration	5–15%
Sapling to pole-sized	30–40%
Sawtimber	40–50%
Old/Overmature	<10%
And—	
Short-rotation hardwoods	5–15%
Long-rotation hardwoods	20–35%
Oak-Hickory-Beech	1–5%
Conifers	35–50%
Upland openings	3–10%
Wetlands	1–5%

This mix will provide a full range of habitat diversity, maximizing the number of species that will benefit. Unmanaged forests, such as the Adirondack Park, and most of the National Forests, tend toward long rotation sawtimber or overmature stands, lacking many stages of all three types of diversity. If you compare your forest with this list, you can see where you have excess or shortage. If you have less than 100 acres, it is important to consider the neighboring lands. A square mile, 640 acres, is plenty of habitat to cover the home ranges of almost all of our species. The species that range farther, such as moose and bear, will certainly be found passing through areas with this mix.

Let's try an example for a 200-acre woodlot. Your forest map determines the following mix:

Pole-sized hardwoods	30%
Sawtimber hardwoods	20%
Sawtimber softwoods	10%
Mixed-age, mixed woods	30%
Overmature mixed woods	5%
Beaver pond/wetlands	4%
Open ledge	1%

Good Neighbors

The neighboring parcels have a similar mix with one exception, a 30-acre clear-cut done 15 years ago after the big ice storm. Right now, your region enjoys a pretty good mix. But as the neighbor's clear-cut grows out of the sapling stage into young poles, a whole list of species loses one element of habitat. Your own forest is a little short on softwoods and seedling-sapling stages. A plan that focuses on timber management might harvest some of the sawtimber softwood and hardwood stands, but for wildlife you might retain the softwood another 10 years and then regenerate it by shelterwood or small group selection to retain elements of softwood cover over a longer period. But you can also increase your softwood component by harvesting hardwoods from the mixed-wood stands. Group selections, retaining long-lived softwoods like hemlock or white pine, will open up regeneration patches that will provide young forest habitat in mixture with older softwoods—good vertical structure.

If some of the hardwood sawtimber is mature, a 10- to 20-acre clear-cut or several large group selection cuts will begin to provide the seedling cover that will be lacking as your neighbor's clear-cut regrows. These heavy cuts should focus on the most mature timber, especially with signs of risk, disease, or decay, along with areas of poor quality trees. It is not wrong to focus on marketable species, as the income from this sale may help you to make other improvements like access, boundary work, or just to keep owning the land for another decade. You might also harvest groups with shorter-lived species, especially aspen. Aspen roots will resprout into beautiful thickets of prime wildlife habitat, and aspen is increasingly marketable with rapid growth to commercial size. Thinning some of the remaining hardwood stands will improve the growth rate and species composition, provide some income and firewood, and begin to initiate some understory development. Look to retain areas with a high proportion of smooth, high-quality stems of species with good value potential like oak, sugar maple, and yellow birch.

The warblers, ruffed grouse, sparrows, and rabbits that have enjoyed your neighbor's clear-cut will move into your cut areas as the berries and young trees fill in. You still have a mix of pole and sawtimber stands providing horizontal structural diversity, with mature trees providing nut crops and softwood cover. Your log landing can be limed and seeded to clover for a permanent opening of perhaps an acre. This could be a mating site for woodcock, or a summer feeding area for bats, deer, and whippoorwill.

Plan for Cycles

If you develop a written plan, it will make you eligible for favorable

property tax treatment in all the northeastern states. It is likely that implementing this first phase would take place over 3–10 years. You might use several different types of harvesting crews, and watch for changes in the log markets for each section. If there are road-building costs, you might have a full-service contractor with excavating equipment build the road and do the first cut, concentrating on some higher-value wood or the larger patch cuts. If there are sections with a high percentage of low-quality trees, you might prefer a biomass-chip harvesting operation that can "eat up" truckloads of otherwise unmerchantable material. Then you might have a crew with smaller equipment do the thinnings. This will spread out your income and expenses, and will create new stages in seedling habitat when new groups are cut. Also, you could get a fresh supply of firewood every few years.

Harvesting trees for lumber, firewood and pulp is the main tool to manipulate forest vegetation and wildlife habitat.

Let's look ahead 10 years. Your forest is closer to that ideal mix. The overall quality and species mix of the trees in your woods is improved. Some of the pole-sized trees are growing into sawlog size. The sawtimber hardwoods that were retained are growing into mature sizes. The cut patches are growing into saplings, and the softwood crowns in the mixed-wood stand are expanding into quality softwood cover. But you are losing the seedling stage, and hopefully one of your neighbors is ready for another heavy cut, so you don't lose the species that depend on this. The sections that were not entered will be ready for thinning and some group selection cuts to provide some income and new, young habitat. And the areas thinned early in

Deer have a home range of about one square mile. In this area, they need ample young forest for browse, older forest for cover and nuts, open areas for summer feeding and dense softwoods for winter cover. Deer make a fine example of the importance of habitat diversity.

the first cycle will be ready for another trim in five years or so. All this brings you closer to that ideal mix of habitat, maintains the three types of diversity, and produces a full range of flora and fauna.

You can see that if circumstances warrant it, a large heavy cut will not be a bad thing for the wildlife in your region. For example, ice and wind storm events sometimes change the best forest plans unexpectedly and require a salvage cut. A forest can be a family's main asset and withdrawing some income may be a necessity. Or if you have a large area of poor quality or overmature timber, there is nothing wrong with letting some daylight in. This should also give you some appreciation for the few heavy cuts you may notice as you travel around, as they are essential to many species of wildlife by providing habitat diversity in the mosaic of the forest. ●

Robbo Holleran is a private consulting forester helping landowners meet their goals in Vermont and adjacent states. His work has him outdoors about 150 days each year plus play time. He and his wife homeschool their children. They have a home office, a big garden, and a large bonsai collection.