

From wheat to pines to oaks and ashes on John Sanderson's farm

Or, how a perfectly satisfactory New England farmstead became the Harvard Forest.

by Christopher Reed

Most of us hold innocent views about virgin forests. We assume that all the trees in virgin forests sprouted at the beginning of time, or certainly no later than the Renaissance, and measure four feet thick and 250 feet high at the minimum. They stand, we imagine, in deep, dark, silent, awe-inspiring proximity, like the giant redwoods, so massive and towering that they bring to the forest the atmosphere of a cathedral. We suppose, moreover, that were it not for man's habitual and unrestrained violations of the land, we would be able to find such a forest within driving distance, and could go there on Sundays for spiritual renewal.

It is quite true that man has laid hands—and often rudely—on much of the countryside. In central New England, little more than a century ago, probably as much as 65 percent of the once-continuous forest had been stripped of trees for farming, and what little woodland remained was prowled by lumbermen intending to have their will of the biggest and best trees. But despite an insufficiency of tenderness, man isn't the only guilty party when it comes to virgin forests. When man isn't ravishing them, Mother Nature is. As a result, they can look very different from the forests of our dreams.

No forest is a stable community, unchanging in the grandeur of its trees or in the number of tree species it contains. Even if untouched by man, a forest is subject to periodic and drastic alterations—at the hands, especially, of wind and fire.

In 1938 the kind of hurricane that comes about once a century swept across New England with the force of an unimaginable number of bulldozers, leveling miles and miles of woodland. It hit the Harvard Forest—an area of about 3,000 acres chiefly in Petersham, Massachusetts, some 65 miles west of Cambridge—and wiped out a lovely, long-established growth of trees on the shore of Harvard Pond. Similarly tough hurricanes came to Petersham in 1815 and 1635, and although the forest recovered quickly, evidence of its early devastations by wind can still be found if one knows where to look.

When it was finished with Petersham, the 1938 hurricane moved north and knocked down the trees in the Mt. Pisgah forest, a tract in southern New Hampshire belonging to Harvard and essentially untouched by man. The Mt. Pisgah area was filled with white pines of evident venerability, some in pure stands and some with spindly hemlock and hardwoods growing beneath them. Like the stand of trees that formerly bordered Harvard

Pond, this was a so-called old-growth forest. It looked as if it had been in place forever. Yet the Mt. Pisgah pines, which still lie where they fell, can be shown to be even-aged, to have germinated within a twenty-year period. Since white pine can establish itself in quantity only with full exposure to light on open land, the Mt. Pisgah trees argue that something catastrophic happened thereabouts, something that abruptly created a large piece of open land. The something was fire, which points a lesson about impermanence. Examination of the soil beneath the pines turns up the charred remains of large trees that burned about 1665. The trees were almost totally consumed by fire, which would not have happened had they been alive and standing at the time. Thus, though they burned in 1665, they had been knocked down earlier. Very possibly that misfortune befell them in 1635, in the same hurricane that razed part of Petersham. One last deduction on the basis of the charcoal evidence: the trees that burned in 1665 and had been blown over thirty years earlier had their origin in the aftermath of a forest demolition occurring sometime in the fifteenth century.

In forests, virginity is relative. The forest most aptly described as virginal has escaped for a considerable time the more destructive attentions of nature as well as man. Here one finds majestic trees of many species, in great number but not commonly in tight, unbroken ranks. Some have fallen, blown down by heavy gales, and are now in various stages of decay. A row of young hemlocks grows upon the rotted trunk of such a tree, fallen a century before. Where the tree's roots were ripped from the earth, a pit remains, its contours softened by ferns. Stubs of other trees are records of those whose roots withstood the wind but whose trunks were fatally weakened through decay. Stark shafts are all that remain of ancient

Opposite: The lower limbs of forest-grown trees die when young for want of light. Toward the middle of this picture, in the distance, is a big sugar maple, which reveals by its heavy lower branches that it began life in open ground. It marks the edge of what used to be a pasture. The Harvard Forest in Petersham consists of some 3,000 acres, of which all but about thirty were at one time cleared for agriculture. The area in the foreground of this picture never was, but the trees, even the spindly ones, are almost all 125 to 130 years old, suggesting that this part of the forest was clearcut for timber or firewood around 1850.





Most of the trees on the far side of Harvard Pond began life after the 1938 hurricane. A few century-old hardwoods survived that blow, along with some pines that had probably grown at the edge of pine stands and become by necessity more firmly rooted than their fellows. Everything in this picture was once farmland, including the pond, which until the early nineteenth century was a sedge meadow. Visitors in spring find lily pads and at least three species of turtle.

pinus killed by lightning. The forest floor is deep with the moldering remains of woodland vegetation and is springy underfoot.

In the size of many of its trees, and in the unmistakable evidence of antiquity, such a place contrasts strongly with the young, even-aged forests that cover what was once John Sanderson's thriving farm in Petersham. But time is all the difference. The forest has an amazing capacity to renew itself. Abandoned as farmland less than a century ago, and having passed already through a major evolutionary phase, John Sanderson's meadows now support as many species of tree as the primeval forest his ancestors struggled to clear. Since Sanderson's land is today part of the Harvard Forest, it is not likely to be cleared a second time, or cut extensively for profit, but

instead will be grown to maturity with a forester's loving care. Thus, we can reasonably hope that if the trees are not knocked down by wind or consumed by fire, some of us in the fullness of time will indeed have an old and beautiful forest within driving distance. We can think of it as an experienced virgin forest, and ignore John Sanderson's stone walls.

The history of a farm such as Sanderson's, and the fundamentals of silviculture, are portrayed in a series of remarkably realistic dioramas on public exhibition in the Harvard Forest's Fisher Museum. A 48-page booklet about the dioramas, *The Harvard Forest Models*, is on sale at the Museum for 25¢. Since the Sandersons of Petersham were typical of farmers throughout New England, and since what happened on their land in the years after they left it is standard across the region, the dioramas teach a lesson about land use in the northeastern part of the United States.

The first Sanderson to own land in Petersham was Jonathan, born in 1740 in Framingham, Massachusetts. Seventy-one men who had fought in the French and Indian Wars had been granted land in Petersham in 1733 in lieu of pay, and in 1763 Jonathan bought a 75-acre piece of it from one of the old soldiers. In 1768 he married Molly Curtis, and together they set up housekeeping on a subsistence farm they made for themselves in the forest.

Someone with a nice curiosity about the Sandersons has made an exhibit for the Fisher Museum tracing, in a sort of family-tree format, the fortunes of three generations of that family. For some reason the exhibit is not on public display, but it exists, propped against a wall in a little-used room upstairs, and one can see it if one asks. It tells especially of what life was like for Molly and Jonathan Sanderson and for their son John.

Jonathan's first assignment was to clear wild, hilly land covered with a forest of red oak, chestnut, red maple, white ash, and paper birch, with some pine and hemlock mixed in. He dropped trees with an ax, limbed them, and removed the brush to make space for his crops, planted at first between the stumps of felled trees. If he used his land and energy the way most subsistence farmers did, he plowed about a third of his place and left the other two-thirds in pasture. He and Molly lived off the natural abundance of the land (berries, herbs, nuts, wild turkey, passenger pigeons) as well as off what they planted (Indian corn, wheat, rye, beans, potatoes, pumpkins). While Jonathan plowed his field or chased wild turkey, Molly picked wool, carded and spun yarn, wove cloth, made and mended garments, turned lesser ingredients into soap, bottomed chairs, braided baskets, constructed carpets and coverlets, plucked geese, milked the cow, fed the calf, and went visiting on foot.

An inventory of land in Petersham taken in 1771, after the town had been in existence for 38 years and Jonathan and Molly had been farming for three, showed 2,502 acres being used for agriculture, or about 12 percent of the area of the town. Probably 2 percent had existed as natural meadow, and the rest had been cleared by man. The farm economy of Petersham in the early days was simple and self-contained, and growth was slow. By 1791 only some 15 percent of the town's land had been cleared of forest.

If one wants to feed only oneself and one's family by farming, not much land is needed. There is a limit, after all, to how many pumpkins one can stomach in a year.

This piece of forest would look very much like the one on page 31 were visibility not much reduced by summer leaves. Both are typical of central New England, containing a very rich mixture of some twenty tree species, dominated in these pictures by oak. The difference between them is one of age. Most of the trees below are only forty to fifty years old. They are growing on land that was once cleared for agriculture. Abandoned by farmers, the land quickly seeded itself to white pine. The pine stand was cut down around 1925, and these trees grew in its place.



Jonathan Sanderson stuck to his 75 acres because it was sufficient. Even if he had produced more than enough food to satisfy his own needs, he wouldn't have been able readily to sell the surplus. The only worthwhile markets for farm produce were far away, and the roads in central New England were better not taken.

But rapid change began in the last decade of the century. A better network of roads made it easier for Petersham farmers to do business not only with neighboring towns but with those in the Connecticut Valley and on the Atlantic coast. Conventions concerning credit became more widely understood and observed, facilitating commerce. Most important, the industrial revolution came to upcountry New England at last, bringing with it investment capital to build such things as water-powered



In autumn leatherleaf and sedge color the foreground of this picture brown. In the distance a slight rise of swampy ground separates Harvard Pond from another pond only a little distance away. The water from Harvard Pond drains south into Quabbin Reservoir, and ultimately helps slake the thirsts of Bostonians. The water from the other pond drains north into Miller's River, and thence down the Connecticut River to Long Island Sound.



1700. *This is how the forest looked before the white man came to settle Petersham. A series of seven dioramas at the Harvard Forest traces the history of land use in that region over a period of some two hundred years.*

mills, attracting people who would in turn create large local markets for farm produce.

Jonathan and Molly Sanderson's son John started his working life in 1792 as a tanner. He inherited the family farm in 1806, and, seeing what new and expanding opportunities lay in farming, straightway added sixty acres to his parents' original 75. In 1825 he bought two more parcels, one north and another southwest of his farm. In 1830 he added still more land, bringing his total holdings to 339 acres.

Consider this, parenthetically: if an acre of land has 100 trees on it, and it takes a man an hour to drop each tree and another hour to cart it off, 200 man-hours are required to clear an acre of land. If a man worked an eight-hour day, 365 days a year, he would spend 23 years clearing 339 acres.

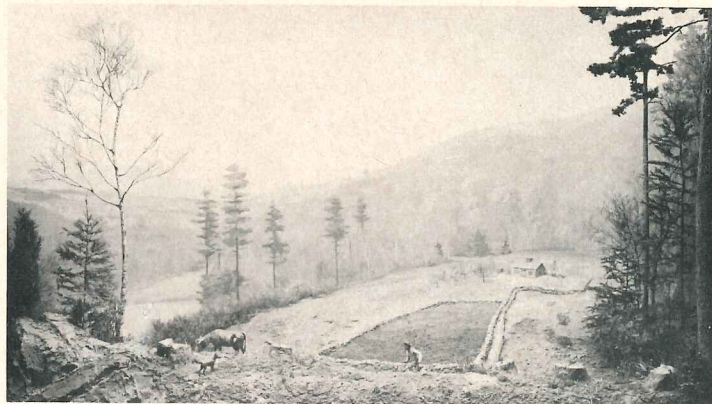
Consider this, too: there are 436 miles of stone wall in Petersham. They contain enough stone to make 22 miles of pavement twenty feet wide and one foot deep, a quantity of stone equal in volume to a quarter of the largest pyramid in Egypt. If one man and a pair of oxen can make seventeen feet of wall per day, they need 310 days to make a mile and 135,160 days, or 370 years, to build 436 miles. John Sanderson's farm—no better or worse than average—had about ten miles of stone wall, which represent, in labor, more than eight years of seven-day weeks.

Sanderson built himself a fine house, which today is used as a residence for faculty and students at the Harvard Forest. He married Lydia Morton, and they had children, one of whom, John Jr., was to become state senator from Franklin County. (He carried on the family agricultural tradition, raising stock in Bernardston, where he reared the great ox Constitution, which had a live weight of 3,860 pounds.) Like hundreds of other farming families in central New England in the first half of the nineteenth century, the Sandersons prospered and were able to accumulate savings. John Sanderson turned much of his income back into the land, improving it and expanding his holdings, acting like a person who looks forward to permanence.

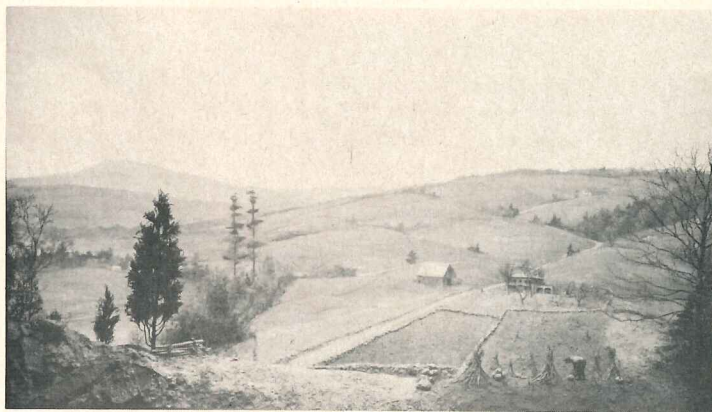
Between 1791 and 1830 the amount of land in Petersham devoted to farming increased to over 60 percent of the total, and the expansion continued until mid-century. In 1840 the population of the town was 1,775, the largest in Petersham's history and almost two and a half times what it was a century later. Of what are now the Harvard Forest's 3,000 acres, all but about thirty were cleared for agriculture. Yet today forests cover nearly 85 percent of the land in Petersham, and scarcely anyone is a farmer in earnest.

The ruination of the New England farmer was accomplished in part by the people who built the Erie Canal. That most useful waterway was opened in 1830 and was at once filled with settlers moving westward, and with the agricultural produce of the incredibly rich Middle West moving eastward toward John Sanderson's markets. The Erie Canal was a boon for the Middle West, of course, for it brought investment capital and prosperity. But New England farmers, tilling stony, essentially infertile soils, could prosper only as long as they had no competition. As soon as the Middle West's cornucopia overflowed into the Northeast, the farm economy that had sustained John and Lydia Sanderson collapsed.

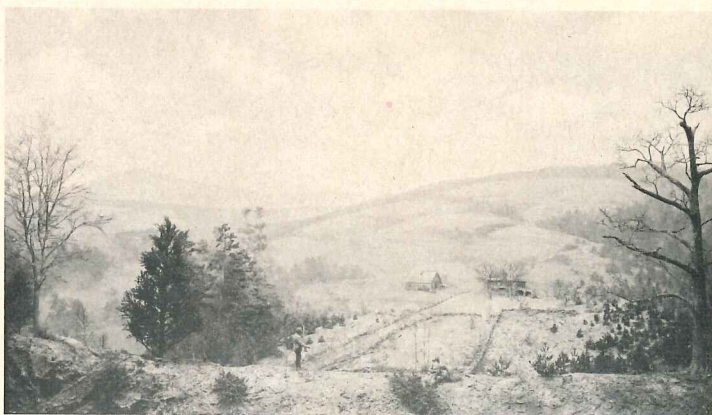
Hugh M. Raup, formerly director of the Harvard



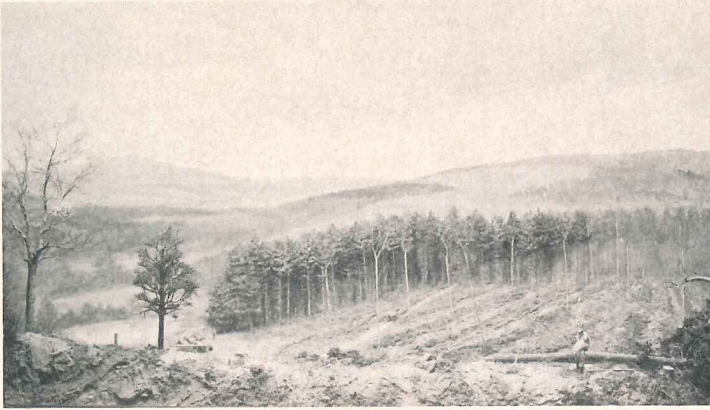
1740. One of the first settlers of Petersham carves a subsistence farm out of the primeval forest. On 75 acres, he grows enough to feed his family.



1830. Demand for farm produce and good roads to market brings prosperity to Petersham farmers, who clear much of the town's land for agriculture.



1850. The Erie Canal connects the rich farmlands of the Middle West with Eastern markets, and New England's farm economy collapses. Wholesale farm abandonment ensues, and the idle fields are quickly seeded by white pine.



1910. *An entirely volunteer crop of pine comes to maturity on abandoned farms all over central New England. It is harvested and sold for over \$400 million.*



1915. *Spindly hardwoods had grown beneath the pine and were cut down with it. Five years after logging, the small hardwood stumps have sprouted and are doing well.*



1930. *The hardwood stand has reached cordwood size, and could be cut and sold. But if inferior trees are removed, and the rest periodically thinned, the stand will produce high-quality timber in another forty or fifty years. It contains the same species of tree as the primeval forest.*

Forest, grew up in Ohio, where his ancestors achieved modest wealth in the latter part of the nineteenth century through the manufacture of farm equipment. In Ohio, farming boomed; in Massachusetts, it went bust; and in "The View from John Sanderson's Farm" (Forest History, April 1966), Raup commented on the effect that the changing fortunes of the two regions had had on him.

Noting that his grandfather's success in the farm-equipment business had insured for future generations of the family a certain degree of comfort and, in particular, had helped Raup get the education necessary for his later work as Charles Bullard Professor of Forestry and director of the Harvard Forest, he observed: "I think it might be said that I am here now as a result, in some appreciable measure, of a flow of economic, social, and technological change that was set in motion by the people of New York when they built the Erie Canal. I think it can be said also that I am here, in a fractional though nonetheless real sense, at the expense of John Sanderson."

John Sanderson died and his heirs sold the farm in 1845, just before the golden age of New England farming turned to brass on account of what was happening in the incomparably rich farmlands west of the Appalachian and Allegheny Mountains. The family took their money and started a bank.

Between 1845 and 1876 the Sanderson land passed through four ownerships, eventually coming to a religious communal group, the Adonai Shomo, whose members added substantially to the holding. They went bankrupt in 1897, and in 1908 the land became the nucleus of the Harvard Forest.

In the twenty years between 1850 and 1870, people simply quit farming about half of what had been open land in central New England. After that, abandonment continued more slowly, but resolutely. The land, unattended, did what comes naturally. It continued to be productive, but in its own way, and seeded itself to white pine, just as the Mt. Pisgah forest did after the land was cleared by fire in 1665.

The sod topping of an abandoned pasture is an especially favorable seedbed for white pine, which quickly overshadows its hardwood competition. In a decade or so, the idle fields of central New England became pine forests. What farmer, who all his life had thought of forests as a nuisance, could have suspected that at the turn of the century a hundred acres of an entirely volunteer crop of pine trees would be worth about \$30,000?

So thick were the young trees that nothing would grow at their feet. After thirty or forty years, however, as the pine grew and the forest canopy got higher, the increase of light and room on the forest floor permitted certain shade-tolerant hardwoods to establish themselves as what is called an understory. Red oak, white ash, chestnut, black cherry, and sugar maple formed a thicket of spindly trees beneath the pines. They didn't amount to much, but there they were, waiting for their time to come.

The pine acquired value by happenstance. It chanced to mature when there was great demand for boxes, barrels, pails, and other containers that could be made from it. It was growing in readily accessible places, surrounded by all those important roads over which John Sanderson had hauled his corn to market. Portable sawmills, manufacturing technology, a willing labor force, and an economically feasible price and wage struc-

ture all combined to facilitate the production of containers made of pine. Finally, a transportation system existed to carry the containers to those who would fill them with many ingredients of the good life, some of which, incidentally, had been grown in the Middle West.

In the thirty years between 1895 and 1925 perhaps 15 billion board feet of pine growing on abandoned farms was cut in central New England. It had a value of over \$400 million.

With no regard for what would happen on the cut-over land, woodsmen felled entire stands of pine, heaped the slash in rows covering a third of the ground, sawed up the trees into planks, and departed, leaving behind a pile of sawdust and a picture of near-complete forest devastation. Yet in a mere five years, hardwoods had grown up in the open lanes between the slash, the striplings of a whole new forest.

When the woodsmen came to cash in the pine, they hacked their way through the spindly hardwood understory mentioned earlier. When very small specimens of red and sugar maple, red and white oak, white ash, chestnut, black cherry, and black birch are chopped off at the ground neat and clean, they sprout and make straight trees perfectly good for timber. The baby hardwood forests were mostly composed of these entirely suitable heirs to the New England countryside, with a few pine trees thrown in if logging had been done in a good seed year for pine. But less desirable elements existed too. A few large hardwood trees had managed to grow in the pine forests and were cut down with the pines. They sprouted just as the small hardwoods did, but in clumps worthless for a potential sawtimber crop. Moreover, weed trees insinuated themselves in the years just after logging, when light was plentiful, and so the good oaks and ashes were elbowed by aggressive gray birches, pin cherries, and poplars.

When the hardwood stands were twenty years old—a birthday that occurred about 1930 in the case of the trees on John Sanderson's farm—they had reached a critical point in their lives. They were of cordwood size and thus could be chopped into fireplace lengths and sold. When that possibility became apparent, a great many promising young hardwood stands bit the dust. What followed them was a stump-sprout generation of trees markedly inferior to what had grown before.

In other cases, need or greed was forestalled, and the land wasn't stripped of trees. Then, most often, nothing was done, and Nature was allowed to take her course—which from a lumberman's point of view is not the best course that might be taken. Studies made by the Harvard Forest have shown that if one treats a good young hardwood forest right, it will reward its owner with a lot of high-quality timber. What's meant by right is not benign neglect. Without a little silvicultural intervention about twenty years after the pines were cut, the hardwood stands in the Harvard Forest would have been taken over by rank-growing sprout clumps from the big hardwoods cut down with the pines, especially red maple, and by weed trees. The average number of suitable crop trees twenty years after logging was nearly 300 an acre, many more than enough to make a fully stocked final crop at sixty to seventy years of age. But the undesirable trees had to be removed at once, and the good trees thinned at

intervals, by foresters who knew what they were about.

Those who are disposed to think of man as an ecological bull in a china-shop environment may find some comfort in the knowledge that in 1930 the hardwood forests of Petersham contained the same species of tree as the pre-Colonial forest, despite 200 years of intervening land use.

Seven dioramas, or Harvard Forest Models, trace the life and times of trees on the land that was for a time the Sandersons'. Ten more demonstrate the best in silvicultural practices for the wise management of forests, and six are devoted to such topics as soil erosion and forest-fire control. Most of the models were designed by the late R. T. Fisher, first director of the Harvard Forest, and A. C. Cline, its second director. They were built in Cambridge between 1931 and 1941 of copper wire, excelsior, gesso, wax, and asparagus fern treated with arsenic. Their designers and builders had a fondness for fine detail. In the dioramas, in addition to trees and foresters, one finds a man in knickers and a beat-up felt hat painting a picture, another sharpening a scythe, another lighting his pipe, and one with a spray-paint gun, a squirrel, a rabbit, a woodpecker, a fox, two partridges, three beehives, dogs, cows, deer, a lunchbox, a gasoline can, a mailbox, a stop sign, a measuring tape, an outhouse, and no beer cans.

In 1908 Harvard Forest staff members were firmly committed to the notion that sound forest management ought to be self-supporting. Harvard's foresters hoped that the well-regulated land would go on producing the pine for which there would continue to be a brisk demand. This, of course, was a forlorn hope, as everyone in our plastic age will understand. But in 1908 it seemed perfectly clear that the little pines coming up from seed in the cutover stands of forest would be sold at a profit in 1968, that the pines germinating in the next good seed year would be ready for a money-making harvest in 1971, and so on forever. No one foresaw that the 1908 demand for pine would soon disappear. No one imagined that sensible people would allow the land to fill up with hardwood instead of pine. Foresters, according to Hugh Raup, have always had trouble with time because people change their minds about the uses of wood far faster than trees can grow.

But the Forest has continued productively in its own way, as a center of research and teaching. It has some seventeen species of academic associated with it, and fourteen supporting personnel. Undergraduate and graduate students study such things as logging problems in forestry, soil deterioration on hiking trails, the clear-cutting controversy, the management of orchards, soil genesis and classification, and bogs. The present director is Martin H. Zimmermann, Bullard Professor of Forestry, a specialist in palms and the translocation of sugars in trees. A Swiss with extracurricular interests in harpsichord-making, flute-playing, stained glass, photography, cross-country skiing, scuba-diving, tropical fish, and the design and construction of fiendishly difficult wooden pull-apart puzzles, Zimmermann has perfected what he calls a shuttle microscope, an ingenious device that enables him to record on color motion-picture film the minute structure of long stretches of the vascular systems of all kinds of plants. But that's another story. □