

III. CHANGES AFTER EUROPEAN SETTLEMENT

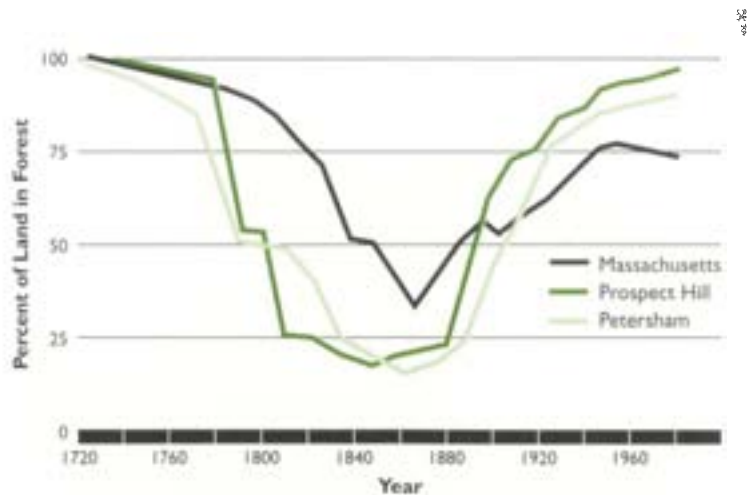
The Colonial Period

European settlement spread through Massachusetts at uneven rates. The coastal counties Essex, Suffolk, Norfolk, Plymouth, and Bristol were largely settled by 1675, as was the Connecticut River valley, with settlers moving northward from settlements in the Springfield area that dated from the early 1600s. Concentrated in the coastal lowlands and major river valleys, these early settlement zones corresponded closely with the areas where aboriginal practices had most affected the forests. Settlement spread westward from the coast into Middlesex and Worcester counties in the late seventeenth and early eighteenth centuries and into the foothills of the Connecticut River valley during the same period. In 1725 Massachusetts began using land grants to pay off debts, especially for military service,¹⁸ which encouraged settlement in the central upland areas. The last areas to be settled, from the second half of the eighteenth century into the beginning of the nineteenth century, were the Berkshire Mountains and the northernmost portions of the central uplands.

Forest clearing was initially quite slow, for reasons that included the lack of markets for excess production and a town organization based on the European model of a centralized settlement and common field system.^{16,19} More than a hundred years after its settlement in 1635, Concord was still more than fifty percent forested. This rate of deforestation, about 0.4 percent a year, was typical of towns in the seventeenth century.¹⁶

A shift to a town pattern of dispersed settlement and individual ownership of private land, with all land in the township distributed, led to much more rapid deforestation toward the middle of the eighteenth century. Rates of 0.8 percent to 1.0 percent per year were common in the second half of the eighteenth century both in older towns like Concord and new ones like Petersham.

This acceleration in deforestation coincided with a shift toward a market economy, partly driven by a developing beef trade with the West Indies. Cattle were suitable for remote hilltown farms during this period because they could be walked to market on the rudimentary roads that precluded the long-distance transport of most

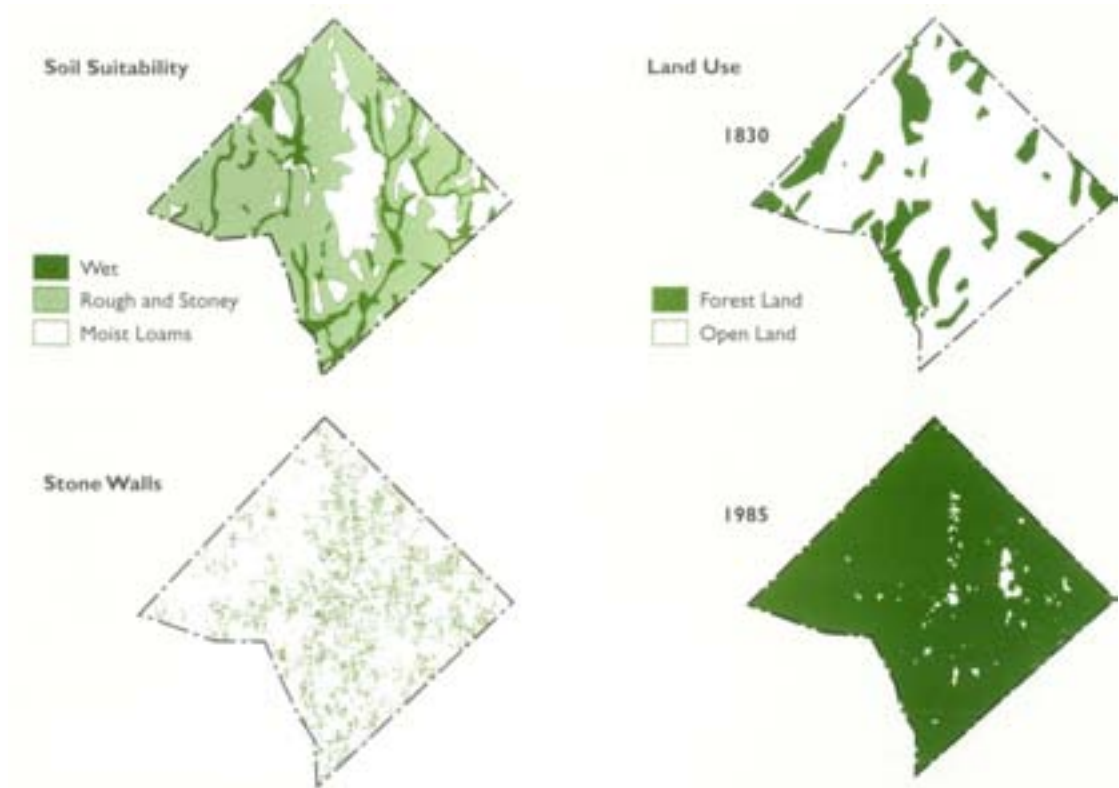


*Changes in the percentage of the land area covered by forest during the historical period in the state of Massachusetts, town of Petersham, and the Prospect Hill tract of the Harvard Forest*²⁰

products. The difficulty of transport also partly explains the methods most commonly used to clear the forest: girdling the trees and leaving them in place to fall apart slowly, or cutting and burning them.¹⁶ Except where water transport

HARVARD FOREST ARCHIVES





These maps of the township of Petersham, Massachusetts, depict soil suitability and stone walls, on the left, and on the right, forest cover in 1830 and 1985. Stone walls and agricultural land are concentrated in areas of more productive soil.²¹

was available, trees had value as lumber or firewood only locally. Potash, a relatively more compact and transportable product, was probably the major marketable product from the trees of these early farms.

Pasture was the most suitable use for most of Massachusetts, since the rockiness of most areas made preparing land for tillage a long and backbreaking chore. It has been said that it took two generations to clear upland farms for plowing, the first to remove the trees and the second to remove the stones. The massive stone walls surrounding abandoned fields across the state

attest to the effort required by the second task. And yet the great number of rocks scattered throughout the remaining pastures and second-growth woods suggest that the majority of the landscape was never tilled, but rather grazed or at most mowed. The principal exceptions, of course, were the major river valleys, where postglacial alluvial deposits provided excellent tillage once the trees were removed. These areas are notable for their lack of stone walls.

In upland areas, hilltops were often selected for village centers and initial clearing for agriculture because they had good drainage and

Above left, presettlement forest; below, initial clearing and subsistence farming, 1740. Most human disturbances prior to European settlement were infrequent and scattered. Nonetheless, the forest communities that the settlers encountered had evolved under dynamic conditions and had been in place only a relatively short time.

These images are from the dioramas (three-dimensional models) in the Land-Use History series on permanent display at the Fisher Museum of Forestry, Harvard Forest, Petersham, Massachusetts. They depict typical changes in the upland Massachusetts landscape, from initial European settlement through the 1930s (when they were constructed). Other dioramas in this remarkable series depict forest management and conservation practices.

relatively few stones. Except for the broad river valleys, inland lowlands often offered poor drainage and a shorter growing season. Colonists commonly evaluated land quality on the basis of topography and on their knowledge of the site preferences of different tree species and forest types.^{16,19}

Initially, a farmer might clear six to eight acres over the course of several years. When tilled, this initial clearing could support a typical family of five to seven.¹⁶ During this period the dominant economic base of rural Massachusetts was low-intensity agriculture combined with artisanship. Few individuals provided for all their needs through their own labor, but through cooperation and exchange, townships could be largely self-sufficient. Towns supported a range of artisans, shops, mills, and tanneries. Roads provided internal circulation but relatively poor access to external markets. At the same time, coastal communities were developing extensive fishing, manufacturing,

and shipping industries, exploiting local forests for shipbuilding materials and export products. By the mid-1700s Salem was the most prosperous port in the country and a center of worldwide trade.

Agricultural Period

The period from the late 1700s through the first half of the nineteenth century saw a major transformation of the economy, social structure, and landscape of Massachusetts.^{22,23,24} The rural economy underwent a shift from home production and local consumption to market-oriented intensive agriculture, enabled by the improvement in transportation brought about by newly constructed roads, canals, and railroads. Farmers responded to the expanding markets by clearing more forested land and draining wetlands, often on marginally productive sites. Pasture remained the primary land use, with beef and wool the dominant farm products until canal and rail connections with the West



Height of intensive farming, 1830 The percentage of land cleared for tillage, pasturage, orchards, and building sites in central Massachusetts was about 70 percent A century later, the percentages of cleared and forested areas had been reversed. The stone walls testify to the tremendous labor required to farm land that is better adapted to growing trees than hay and grain

and relaxation of wool tariffs in the 1830s and 1840s reduced their profitability.²² Most farm families also engaged in home production of some sort (shoes, hats, clothes), and many earned some income from mills or tanneries. Local industry thrived, and most hill towns reached their peak levels of agricultural and commercial activity, as well as population, during this period.¹⁹ However, this period also represented the start of the region's shift to industry, a factor that together with the expanding national transportation network and westward settlement initiated the decline of New England agriculture.

Many settlements literally moved downhill, changing from ridgetop agricultural villages to riverside industrial towns for a variety of reasons. Hill towns without significant water-power resources were unable to participate in the transition from an agricultural to a manufacturing economy. The new factories for producing textiles, wooden products, and tools needed water to power their machines.²⁵ The developing railroad network, which followed the same watercourses that the factories used for power, transported raw materials and finished products to and from the factories. The new roads and railroads allowed many non-perishable farm products to be shipped from the Midwest more cheaply than they could be produced in Massachusetts.

Many factors contributed to the decline of Massachusetts agriculture, but depletion of the fertility of the land was not a major one. In fact, there is evidence that the quality of tilled land in hill towns improved through the eighteenth and nineteenth centuries.²⁶ The disadvantages of Massachusetts farmland included stony soil and small fields divided by numerous stone walls, which were incompatible with mechanization. Industrial production and improved transportation removed opportunities for supplemental income by reducing the need for local artisanship. Social factors also contributed to the decline of Massachusetts' hill-town agriculture: attractiveness of urban amenities and income, the decline of interest in agricultural life, and the shrinking economic opportunities in small towns.

The pattern of decline was strongly influenced by regional geography. Towns adjacent to

developing industrial centers like Worcester and Fitchburg had a ready market for fuelwood, produce, and milk, while those more distant produced butter, cheese, and hay. The farthest distant towns declined most rapidly.^{22,27} In 1810 Massachusetts was an agricultural state with a population of 412,000 that was remarkably evenly distributed in rural areas (79 percent), with the exception of Boston, Salem, and a few other coastal communities. Industrialization brought a tremendous increase and concentration of population in urban and, more recently, suburban centers. In 1975, 85 percent of the population of 5.8 million was located in urban areas. In contrast, many rural communities have greatly declined in population over the past hundred years.²⁸

How did our forests fare during the agricultural period? By the late eighteenth century the gradual clearing of the first half of that century had become a rapid deforestation that continued until the mid-nineteenth century. Forest clearing was concentrated in the uplands, with the wetter swamps and steep, rocky slopes generally left as woodlots. The Berkshires were the last areas to be cleared and were never developed for agriculture to the extent that the remainder of the state was. The statewide peak in the level of deforestation was reached about 1860, by which time nearly 70 percent of the land was cleared. Many areas east of the Berkshires experienced the same pattern as Petersham and the Prospect Hill tract of Harvard Forest, with maximum clearance in the 1840s to 1860s, when less than 20 percent of the forest remained. The location and amount of forest left uncleared varied by geography. For example, in the north-central portion of Massachusetts from the Connecticut River valley to eastern Worcester County, the hills east of the valley, with many rocky ridges, remained largely forested, as did the north-south-trending, poorly drained valleys farther east. Most of the rest of the region was cleared.

Of course, even areas not cleared for agriculture were harvested intensively by the nineteenth century. The growing rural populations, whose numbers peaked in the mid-1800s, required large amounts of cordwood for fuel. Petersham, for example, had a population of nearly 1,800 people in 1840. Assuming an average household size of six, this population would

ASHBURNHAM

-  Forest
-  Meadow
-  Open



1830



1980

BARRE

-  Forest
-  Meadow
-  Open



1830



1980

DEERFIELD

-  Forest
-  Meadow
-  Open



1830



1980

have represented three hundred households to heat. If each household used 15 cords a year (a conservative figure when fireplaces are used), they would have required a total of 4,500 cords of fuelwood a year. The 20 percent of Petersham that remained forested in 1840 represented about 6,000 acres. Because Massachusetts forests can be expected to grow between one-half and one cord of hardwood per acre per year, virtually all the woodland growth in Petersham could have been used for fuelwood.

These hardwoods were probably managed by means of a coppice system, in which trees would be harvested very young (every twenty to forty years), left to resprout, and then harvested again as soon as the new growth was big enough to burn. Across upland Massachusetts most farms could maintain woodlots to satisfy their own fuel needs, but near cities and along the coast where settlements had been in place longer, the fuelwood was soon exhausted and had to be brought great distances by ship at considerable expense.

Although fuel was by far the dominant use of wood in the early 1800s, the remaining forests also faced other demands. Hemlock and chestnut trees, especially, were cut to provide tanbark for tanneries. Lumber was needed for constructing houses, barns, and public buildings. Wood was used to make charcoal, and fences had to be built. The scarcity of wood by the early 1800s probably accounts for many of the stone walls that still exist along boundaries and in pastures, where the stones would not have had to be removed for plowing or mowing; by then stones were more readily available than wood.

Postagricultural and Modern Periods

The decline of agriculture in the second half of the nineteenth century was accompanied by a corresponding regrowth of forest. Our present forests can be divided into secondary forest on land formerly cleared and used for agriculture

(plowed or grazed), and primary forest on land never actually cleared but harvested throughout the agricultural period. As we have seen, the major portion of upland farmland was used for pasture, and even tilled land may have reverted to mowing or pasture before final abandonment. The resulting sod surface was not hospitable to many "pioneer" tree species such as birch and aspen, whose small, windblown seeds would often dry out and die after germinating; the sprouting seeds were trapped in the grass unable to reach mineral soil. The sod did, however, provide a suitable seedbed for the windblown but larger seeds of white pine, which colonized vast areas of abandoned farmland. Pines were much less likely to have been cut for fuelwood, and those left as shade trees in a pasture or along a fencerow could colonize many acres with dense stands of young pine. Moreover, animals still grazing these pastures would avoid pine seedlings while devouring most broadleaf species.

These new forests grew quickly, and by the late 1800s supported renewed harvesting for lumber and especially for shipping containers. The new portable steam sawmill, in common use by the turn of the century, permitted logging throughout the backwoods areas. Tremendous volumes of "old-field" (or abandoned-field) white pine were harvested, peaking in 1910–1911. During this timber boom, extensive harvesting of all species across the state resulted in large tracts of even-aged, young, low-value stands. Many of these cut-over stands, considered nearly worthless at the time, were acquired by the state for overdue taxes and have formed the basis of our state forest system. It was at this time, the early twentieth century, that the excesses of the timber industry throughout the East gave rise to the conservation movement, which was strongly represented in Massachusetts.

When the old-field pines were harvested, they were unable to sprout from the remaining stumps and roots (except for pitch pine, our only

Maps of three townships characteristic of different physiographic regions in central Massachusetts depicting distinctive amounts and patterns of forest, open land, and meadow in 1830 and 1980.

Ashburnham, on rocky hills near the New Hampshire border, was least extensively cleared and today is the most forested. Barre, on rolling terrain in the central uplands, was extensively cleared for agriculture but has largely reverted to forest. Deerfield, in the Connecticut River valley, was extensively cleared except for a few north-south bedrock ridges, and the fertile valley bottom remains in agriculture today.

HARVARD FOREST ARCHIVES



Agricultural abandonment and establishment of old-field white pine, 1850 Almost immediately the forest started to reclaim the idle fields and pastures. They were quickly seeded to white pine, with hardwoods such as red maple, white ash, red oak, chestnut, gray and paper birch forming a minor element



First crop of old-field white pine harvested, 1910 From 1890 to 1920 portable sawmills appeared everywhere, and many new wood-using factories were established. With yields of 25 to 50 thousand board feet per acre and standing lumber valued at \$10 per thousand, one might well envy a farmer who owned a 100-acre woodlot, worth perhaps \$30,000—a wholly volunteer crop on which only taxes had been expended.



Old-field white pine is followed by hardwood, 1915. Five years after logging, hardwoods are primarily growing in the open lanes between the windrows of slash. These trees originated as stump sprouts—red maple, red and white oak, white ash, hard maple, chestnut, black cherry, black birch—or as seedlings of light-demanding species—gray and paper birch, pin cherry, and poplar



Hardwood stand reaches cordwood size, 1930. Twenty years after logging on moderately moist soil, red maple, gray and black birch, and most other species begin to slow their growth upwards. Red oaks maintain a steady growth in height and girth so that by sixty years they will have formed an overstory above the other trees

native conifer with this ability) and so had to reestablish themselves on the site from seed. As the old-field pines were growing, however, various broadleaf species, including oaks, red maple, and cherry usually established themselves beneath them from seeds carried in by animals or blown in by the wind. All these hardwoods have the ability to sprout from cut or damaged stems. Therefore, even if they were cut back when the pines were harvested, the hardwoods could grow much more quickly from their established root systems than could the tiny pine seedlings. This succession from a first generation of old-field white pine to a second generation of mixed hardwoods has been typical across most of Massachusetts.

The proliferation of old-field pine across Massachusetts in the second half of the nineteenth century, before they were harvested and replaced by hardwoods, led to problems as well as economic benefit. The vast expanses of young pines fed an epidemic of a native insect, the white pine weevil. The larvae of this insect eat the terminal buds of young pines, killing the leader and releasing the branches in the topmost whorl to replace it. At best, the growing trunks develop a crook; at worst, they divide into multiple, spindly stems. In either case the economic value of the trees is greatly reduced. White pine

blister rust, a fungal disease lethal to white pine, also spread rapidly through the tracts of old-field pine. This disease requires an alternate host of the genus *Ribes* (currants and gooseberries) for part of its life cycle. During the 1930s the state and federal governments conducted a massive eradication program for *Ribes*, with men marching through the woods tens of feet apart pulling up wild *Ribes* plants. The prevalence of white pine weevil and blister rust also led in the 1920s and 1930s to red pine being planted across the state on many sites where white pine might normally have grown, because red pine is not affected by either pathogen. Although red pine is at the very southeastern edge of its range in western Massachusetts, these plantations have generally done well. Many are now maturing and being harvested.

The extensive old-field white pine stands also played a major role in the most dramatic natural disturbance to affect our forests in the twentieth century, the hurricane of September 21, 1938. Historically, hurricanes have been a major force in shaping Massachusetts forests. The 1938 storm followed a track similar to that of other historically significant storms (1788, 1815), but several factors conspired to make it the most destructive storm in our recorded history. The week before had been very wet, satu-

The Dexter Woodlot, situated just south of Petersham village. Before the hurricane of September 21, 1938, this was one of the most attractive white pine groves in the region.



rating the soils and predisposing trees to windthrow. The added rain from the storm produced massive property damage from flooding along rivers, compounding the wind damage. Large areas of central Massachusetts still supported stands of old-field pine on land abandoned in the late nineteenth century. Even pine stands as young as thirty years of age suffered severe damage if their sites were not protected topographically from the southeast winds. Hardwood stands on similar sites were not as susceptible to damage unless they were at least twice that age.¹³ The prevalence of old-field pines set the stage for the unprecedented impact of the storm on our forests, nearly three billion board feet of timber blown down. We had unintentionally created about as vulnerable a landscape as possible. There is evidence that the storms of 1788 and 1815 may have been similar in intensity and path, but they encountered a landscape with much less forest and their impacts were quite different.

In 1938 the vast tracts of blown-down pine presented a problem: the threat of fire. Fires often follow other disturbances, especially in conifer stands where the resinous foliage and lack of new green sprouts contribute to flammability. With this in mind, and in an attempt to recover some of the value of the blown-down

timber, a massive salvage operation was undertaken that recovered much of the windthrown timber. Logging crews were brought in from all over the Northeast, temporary camps were set up, and logs were salvaged and brought to the mills. Because the volume of logs far exceeded the capacity of all the available mills, logs were stored in every pond in the area. As long as the logs remained underwater, away from oxygen in the air, they were preserved. Many ponds in central Massachusetts were dammed and raised to their present levels in order to accommodate as much salvaged timber as possible. The tremendous volume of lumber produced by the hurricane salvage also drastically lowered lumber values. To stabilize the price, the federal government bought up the vast supply, stamping "U.S." at the end of each log. Mobilization for World War II finally made use of this vast lumber supply.

Humans have been unwitting accomplices in several other recent forest disturbances as well. Increased mobility of people and products has resulted in numerous forest pests and pathogens being introduced from abroad. In many instances these organisms pose special problems because native plants possess little resistance to the exotic pests. Several such "immigrants" have severely affected our forests,



E. G. STEELMAN, ARCHIVES OF THE ARNOLD ARBORETUM



Al Cline, director of Harvard Forest, 1939–1946, surveys white pine logs awaiting milling at Harvard Pond. Following the 1938 hurricane more than half of the fallen timber across New England was salvaged, purchased by the federal government, and stored in lakes and ponds to prevent insect damage, staining, and decay until the material could be milled. Today, occasional logs stamped on the end with “U.S.” will be pulled from the mud bottom of a pond and, when dried, provide perfectly intact and usable wood

and Massachusetts has the dubious distinction of being the introduction site of one pest that has damaged forests on a national scale. Gypsy moths were introduced into the United States in 1869, when Leopold Trouvelot imported them to Medford with the intention of using them as silkworms to develop a local silk indus-

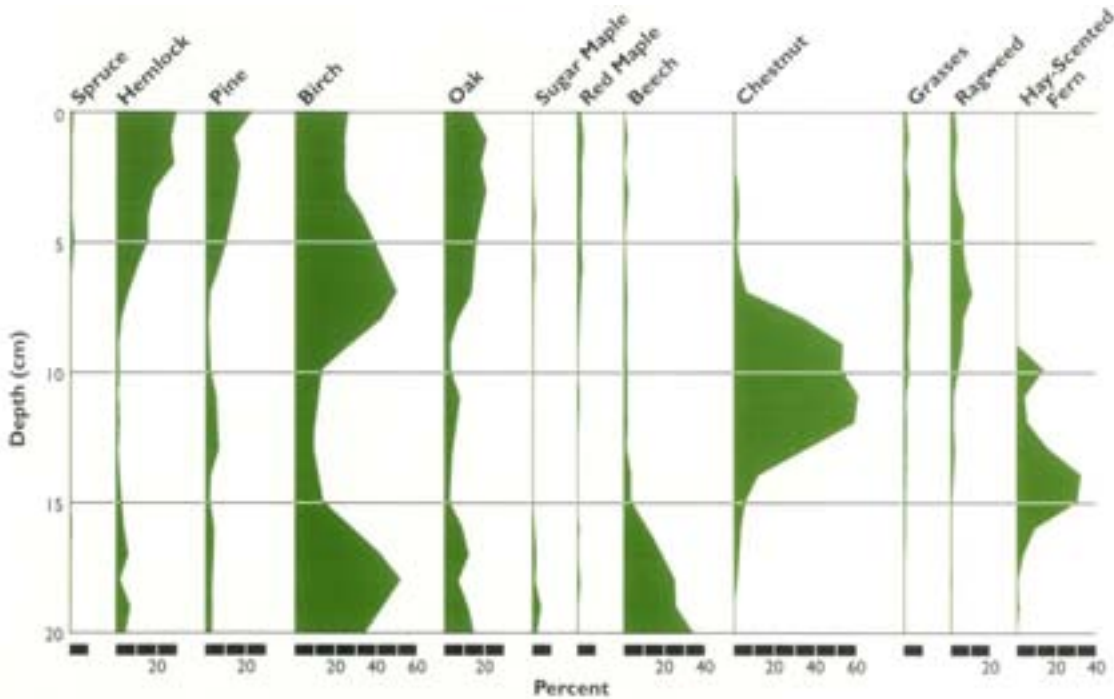
try. The moths quickly proved unsuited for this purpose and escaped into the local forests, where they found the native deciduous species, especially oaks and aspen, to be an ideal food source. Since then, gypsy moths have gradually expanded their range, and during periodic regional outbreaks consume virtually every

green leaf in the forest, leaving it in mid-July looking nearly as barren as in midwinter. Defoliation for two successive years is especially harmful. The outbreak of 1980–1981 across the Northeast was particularly severe, causing extensive oak mortality. Today the gypsy moth has spread throughout the Northeast and into the Middle Atlantic and midwestern states and is one of the most destructive forest pests throughout the region.

Probably the most dramatic effect on our forests by an introduced pathogen has been that produced by the chestnut blight fungus. Although the details of its introduction are not certain, the fungus was first noticed in New York in 1904 and rapidly spread throughout

the range of the American chestnut, passing through Massachusetts in 1913–1914. An especially virulent pathogen, chestnut blight fungus is the only pest that has effectively eliminated mature individuals of its host, greatly altering our forests in the process. Chestnut was certainly one of the most useful trees in the nineteenth-century forests, providing abundant crops of edible nuts, bark for tanning, and excellent wood that was beautiful, decay-resistant, and as strong as oak but lighter. It also sprouted vigorously and grew very quickly and therefore increased in numbers in areas that were repeatedly harvested.

By the early 1920s all the large chestnuts in the state had been killed. However, because in



Pollen diagram from the humus soil in a hemlock forest at the Harvard Forest, Petersham, Massachusetts. The site is a primary forest that was never cleared for agriculture but was clear-cut early in the settlement period (apparent in the pollen diagram at a depth of approximately 17 centimeters) and then cut repeatedly for firewood.

*Each tree species responded differently to the series of human impacts. Chestnut benefitted greatly from the cutting activity until its virtual elimination by blight in 1913 (seen at about 8 centimeters in depth). Other major changes are the decline in several long-lived, shade-tolerant species during the agricultural period. Both hemlock and beech are very sensitive to fire and could be largely eliminated from upland areas by repeated fires, a rather common agricultural practice. Beech and sugar maple never recovered to presettlement levels of abundance and have been replaced by oak, pine, and red maple, which have gradually increased; hemlock has become the dominant species on this moist lowland following the loss of chestnut to the blight.*²⁹



Farm abandonment accidentally provided more favorable conditions for wildlife than did old forest: low-growing game food and cover are much more plentiful and varied. Shrubs and apple trees furnish fruit and browse, valuable herbaceous species and a wealth of insects are within reach of young birds. Deer, rabbits, woodcock, and aquatic birds are among the wildlife that flourish in old fields, abandoned millponds, and stone walls.

effect the fungus kills by girdling the trees—gaining access through cracks in the bark and preventing transport of water and nutrients past the point of infection—the roots and base are not affected and can send out new sprouts. The chestnut's decay resistance, especially within the sapwood, has preserved many stumps that testify to the former importance of this species, and today chestnut sprouts are common in our woods. Individual stems are usually killed by the time they are several inches in diameter, when the bark naturally develops cracks, only to be replaced by new sprouts. Chestnut's place in the forest has been taken by a mixture of species, especially oaks, but its wood and its nuts cannot be replaced.

Other native tree species have also been significantly affected by human-introduced agents, although none so dramatically as the chestnut. Dutch elm disease, a wilt fungus transported by a bark beetle, completely transformed the appearance of almost every town in the state in

the 1950s and 1960s by killing the stately shade trees that lined most of our main streets. The disease is passed from tree to tree by insects above ground and through root grafts below ground in areas where the trees grow adjacent to each other, as in street plantings. Its effects were somewhat less traumatic in our forests, because elm occurred in mixed stands and exhibited a greater range of natural resistance than did chestnut. Nevertheless, the devastation of the elms in our urban landscapes once again demonstrates the susceptibility of manmade monocultures to various pathogens.

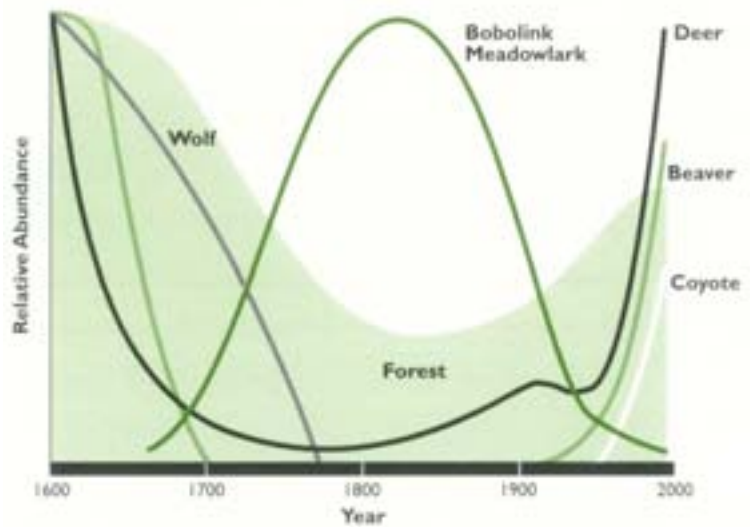
More recently, many of our beeches have been killed or disfigured by beech-bark disease. This disease, caused by the coincident impact of a fungus and a scale insect working together, is steadily spreading southward after being introduced into the Canadian Maritimes. Hemlock woolly adelgid is beginning to cause mortality in the southern Connecticut River valley area and has been reported in many other areas of

the state as it slowly advances north. This aphidlike insect, first introduced to the West Coast and then to Maryland on nursery stock from Japan, poses a dire threat to hemlock forests because hemlocks have shown little resistance to its effects and are incapable of sprouting. Moreover, because many hemlock stands occupy steep habitats and produce deep shade, thereby creating unique microenvironments, their loss would represent drastic changes to many of our forests.

Over the past several decades, however, it is through logging and land conversion for suburban development that humans have most affected our forests directly. The regrowth that followed the cutting of old-field pine stands and other forests early in this century and the 1938 hurricane has produced an abundant middle-aged and maturing forest, much of which has been and is being harvested at varying degrees of intensity. Limitations set for environmental reasons on harvesting federally owned trees together with a strong export market have resulted in added pressures on Massachusetts' forests. Despite these pressures, however, the average size of our trees has been steadily increasing. In some instances we have even managed to reduce the impact of suburban development on the forest. Significant numbers of people are now building homes on large forested lots, clearing only the area immediately around the houses, and in some developments buildings are clustered together, reserving the majority of land as forest or open space. While both of these development patterns alter the forest, they are much less destructive than traditional tract development.

Wildlife species in Massachusetts have been significantly influenced by human-induced changes in the landscape as well as by hunting. Information on this subject is difficult to gather and much of it is indirect. It is believed, however, that most members of the large, broad-ranging species, including elk, wolf, mountain lion, and moose, were eliminated during the

initial period of forest clearance. Deer were nearly eliminated by the mid-1800s. Because they represent an edge species, however—using open areas for browsing and forests for cover—and are tolerant of human activities, deer have responded so favorably to the return of the forest that they have reached densities detrimental to the vegetation in those areas where they are not controlled by hunting.³¹ Beavers were extirpated by the 1700s owing to the value of their pelts. They were successfully reintroduced in



Changes in the relative abundance of selected animal species in Massachusetts over the past 400 years. Whereas the wolf has been eliminated and remains absent, beaver have been reintroduced and the coyote represents a new species in the landscape³⁰

West Stockbridge in 1928 and have subsequently expanded their range to the point of overutilizing existing habitat. More recently, wild turkeys have been reintroduced very successfully, and moose are returning on their own as part of their growing northern populations migrate south. These three species are responding to the expansion of our woodland area, as have the black bear and the fisher, which have significantly expanded their ranges and numbers within the past seventy-five years. Other species, most notably open-land birds such as the bobwhite and meadowlark, have decreased in number as the forest has regrown and matured.