HISTORY AND DYNAMICS OF A RIDGETOP PITCH PINE COMMUNITY

MOUNT EVERETT, MASSACHUSETTS

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Front cover: Southern slope of Mt. Everett viewed from Mt. Race.

Back cover: Contorted crown of red oak (*Quercus rubra*)
with scars and broken branches from winter storms.

SUMMARY

1. The summit of Mt. Everett in the Town of Mount Washington, Massachusetts supports a highly unusual dwarf pitch pine-oak community; similar vegetation is found on only a few sites throughout the northeastern United States. Age-structure analyses and historical records of human and natural disturbance were used to investigate the long-term history and dynamics of the summit vegetation.

2. Throughout the historical period, the summit of Mt. Everett has been dominated by dwarf pitch pines and ericaceous shrubs similar to the modern vegetation. There is no evidence that tall-stature forests occurred on the site at any point in the past few centuries.

3. The summit supports uneven-aged stands; pitch pine recruitment into the current stands began in the 1830s and occurred in every decade since the 1860s. Average pitch pine age is 78 years with a range of 12–170 years. Red oak and red maple increased in importance in the twentieth century, with most stems establishing from 1940 to 1980. In some areas, hardwoods have overtopped pitch pines, apparently resulting in pitch pine mortality.

4. Whereas most dwarf pitch pine communities in the Northeast occur on sites that burn frequently and have a high degree of cone serotiny, we found no evidence of recent fires and no cone serotiny on the summit of Mt. Everett. Small amounts of macroscopic charcoal that we documented may have resulted from fires in the pre-European or early historical periods. Because the site has long been a destination for local residents for recreation and for berry gathering, it is possible that fire or cutting were used historically to improve fruit production or expand views, but we found no documentation of such activities.

5. During the twentieth century, under management by the Commonwealth of Massachusetts, access trails and two fire towers were constructed on the summit, one of which still stands although it is in poor repair and has rarely, if ever, been staffed.

6. Harsh climatic and edaphic conditions on the summit, including frequent wind, winter storms, and minimal soil development have apparently contributed to the establishment and long-term persistence of dwarf pitch pines on Mt. Everett, even in the absence of frequent fires. The ability of dwarf pitch pines to persist on a site in the absence of frequent fire is highly unusual among Northeastern barrens and has not been well-incorporated into previous conceptual ecological models of these communities.

7. Our results suggest that even among Northeastern barrens, the summit of Mount Everett is characterized by highly unusual vegetation and dynamics. The site has long been recognized as regionally significant and should be afforded the strictest conservation protection. With no evident history of human disturbance or recent fire, there is no apparent need for immediate active management of the site.

History and Dynamics of a Ridgetop Pitch Pine Community Mt. Everett, Massachusetts

INTRODUCTION

Pitch pine (*Pinus rigida*) "barrens" occur throughout the northeastern United States on xeric outwash deposits and exposed ridegetops of acidic bedrock. Pine barrens are considered to be among the highest priorities for conservation in the Northeast because they are uncommon, support numerous rare species, and are highly threatened by development and by altered disturbance regimes (Barbour et al., 1998). Although numerous studies have investigated the disturbance history and vegetation dynamics of pitch pine-scrub oak and related communities on sand plains throughout the region (Little, 1979; Olsvig, 1980; Patterson et al., 1984; Dunwiddie and Adams, 1995; Motzkin et al., 1996 and 1999; Foster and Motzkin, 1999; Copenheaver et al., 2000; Eberhardt et al., 2002), the distribution, composition, and dynamics of ridgetop communities have been poorly documented. It is likely, however, that the history and dynamics of ridgetop communities differ substantially from those that occur on sand plains. For instance, modern vegetation composition and stand dynamics on most outwash sites are strongly influenced by fire history and a wide range of historical land-use activities, including forest cutting and extensive clearing for agriculture (Motzkin et al., 1996 and 1999; Copenheaver et al., 2000; Eberhardt et al., 2002). In contrast, disturbance regimes on rocky ridgetops are likely to be characterized by relatively little historical clearing for agriculture, differing fuel and fire characteristics, and perhaps increased importance of damage from ice or other storms (Abrams and Orwig, 1995; Batcher, 1997; Orwig et al., 2001). In addition, ridgetop sites frequently have a unique history of disturbance associated with recreational and other human uses, including clearing of vegetation to improve views and construction of trails, roads, and fire and communication towers (Orwig et al., 2001). Thus, despite compositional similarities, it is unlikely that ecological models and conservation approaches developed for sand plain ecosystems are directly applicable to ridgetop communities.

In order to address the lack of information on ridgetop barrens, we have initiated a study of the dynamics of ridegtop pitch pine and red pine (*Pinus resinosa*) communities throughout central New England. As part of this study, we report here on our investigation of the age structure and dynamics of the pitch pine-oak communities on the summit of Mt. Everett in the town of Mt. Washington, Massachusetts. The site has long been recognized as supporting unusual "dwarf" pitch pines, which are rare throughout the eastern United States, occurring primarily in the New Jersey and Long Island pine barrens and on scattered rocky ridgetops, including portions of the Shawangunk Ridge in New York, Panther Knob in West Virginia, and several summits of the Taconic Range. Previous historical investigations of Mt. Everett determined that while there is little documentary evidence of past fires, timber removal, or other clearing of vegetation on the summit, dwarf trees similar to the modern vegetation have long dominated the site (Tillinghast, 1999). We selected this site for investigation in part because it provided the opportunity to compare the historical record with field evidence of disturbance, and in order to evaluate the age structure and dynamics of a ridgetop pine barren on a site where fire and land-use history may have had minimal importance. Specific objectives for the current study include: 1) to document the vegetation composition and age structure of the summit of Mt. Everett, with particular emphasis on areas dominated by dwarf pitch pines; 2) to evaluate field or historical evidence of fire, cutting, or other disturbances on the summit; 3) to record observations on the growth form of the dwarf pitch pines; 4) to provide a perspective on the regional significance of the ridgetop dwarf pine barrens community that may aid in conservation planning for Mt. Everett.

STUDY SITE

Mount Everett is located in the town of Mount Washington, in southwestern Berkshire County, Massachusetts (42°06'N 73°26'W), within the Taconic Mountains ecoregion (Griffith et al., 1994). The summit is located in the center of the 445-ha Mount Everett State Reservation, managed by the Massachusetts Department of Environmental Management, at an elevation of 793 m a.s.l. The bedrock of Mt. Everett and nearby portions of the Taconic Range is comprised of thrust sheets of phyllitic bedrock (Zen, 1983). Soils on the summit and upper slopes are very stony glacial tills of the Taconic-Macomber association, derived mainly from phyllite, slate, and shale (Scanu, 1988). Soils are shallow, somewhat excessively drained gravelly loams, and bedrock outcrops are common. The regional vegetation is northern hardwoods, hemlock, and white pine (Westveld et al., 1956).

Berkshire County has a continental climate with mean winter temperatures of -4.4°C, mean summer temperatures of 18.9°C, and mean annual precipitation of 109 cm, with approximately 180 cm of snow (Scanu 1988). Due to the high elevation of Mount Everett, mean temperatures are likely to be several degrees cooler than in the surrounding lowlands, and snowfall amounts are likely to be much higher. Although no weather data are available from Mt. Everett, numerous anecdotal accounts indicate that the summit is subject to more frequent ice storms than the surrounding lowlands (Leverett, 2000).

METHODS

Vegetation and Age Structure

Vegetation on the summit of Mt. Everett was sampled during the months of July–November 2000 in a total of fourteen, 15 m × 15 m plots (Figure 1); nine plots were located along transects previously established by Rick Van de Poll for mycological studies, and five additional plots were established in the northwestern (2 plots) and southeastern (3 plots) portions of the summit in areas not covered by the transects. Plot numbers (e.g., T1–30) indicate the transect and distance (in meters) from the USCGS benchmark ("Bald Peak No. 1, 1938") at the summit of Mt. Everett to the southwest corner of our square plots (with the exception of T6 which extends from the summit trail to the corner of an existing fire tower). Plot T7–1 was located approximately 40 m west (254°) of T2-185, while plot T8-1 was located 45 m south (176°) of plot T7. Two of the fourteen plots only supported hardwood species.

At each plot, the basal diameter of all live and dead pitch pines > 5 cm basal diameter, and the diameter-at-breast-height (dbh; 1.37 m) of all other trees (> 5 cm dbh) were measured using calipers, with the average of two measurements recorded for asymmetrical stems. The number of saplings (pitch pines 2.0–4.9 cm basal diameter and other trees < 5 cm dbh) were tallied within the entire 15 × 15 m plot and seedlings of each species (pitch pines < 2 cm basal diameter and other trees < 1.37 m height) were counted within a 5 m × 5 m subplot in the southwestern portion of each plot.

In each plot, the percent cover of each herb, shrub, and overstory species was estimated in the following cover/abundance classes: 1 = < 1%; 2 = 1–3%; 3 = 3–5%; 4 = 6–15%; 5 = 16–25%; 6 = 26–50%; 7 = 51–75%; 8 = > 75%. A metal probe was used to determine the depth to bedrock in five random locations in the plot, and slope, aspect, and percent cover of exposed bedrock were estimated. As part of extensive reconnaissance, observations of tree growth-form and evidence of disturbance were recorded in each plot as well as across the summit. Average tree height per plot was estimated, and the heights of several of the tallest trees in each plot were recorded.

In order to determine the tree age-structure across the summit, increment cores were extracted from a minimum of eight stems per plot, representing the range of species and stem sizes characteristic of each plot. Increment cores also were extracted in some instances from nearby trees outside of sample plots. Cores were dried, mounted, and sanded using very fine sandpaper (600 grit) prior to ring counts with dissecting microscopes. The total age of stems was estimated for cores that did not include the pith. Despite great effort in preparing the cores, the extremely slow growth of many of the trees, coupled with the potential for false or missing rings, indicate that our estimates of tree ages are subject to several sources of potential error (Hager, 1995). However, in most cases we believe that they are accurate to within several years.

In order to evaluate the occurrence of fires on the summit, we searched each plot for fire scars, stem charring, and soil charcoal. Mineral soil grab samples were taken from ten to fifteen random locations within each plot and returned to the laboratory where they were sieved (5 mm mesh size) to determine the presence of macroscopic charcoal.

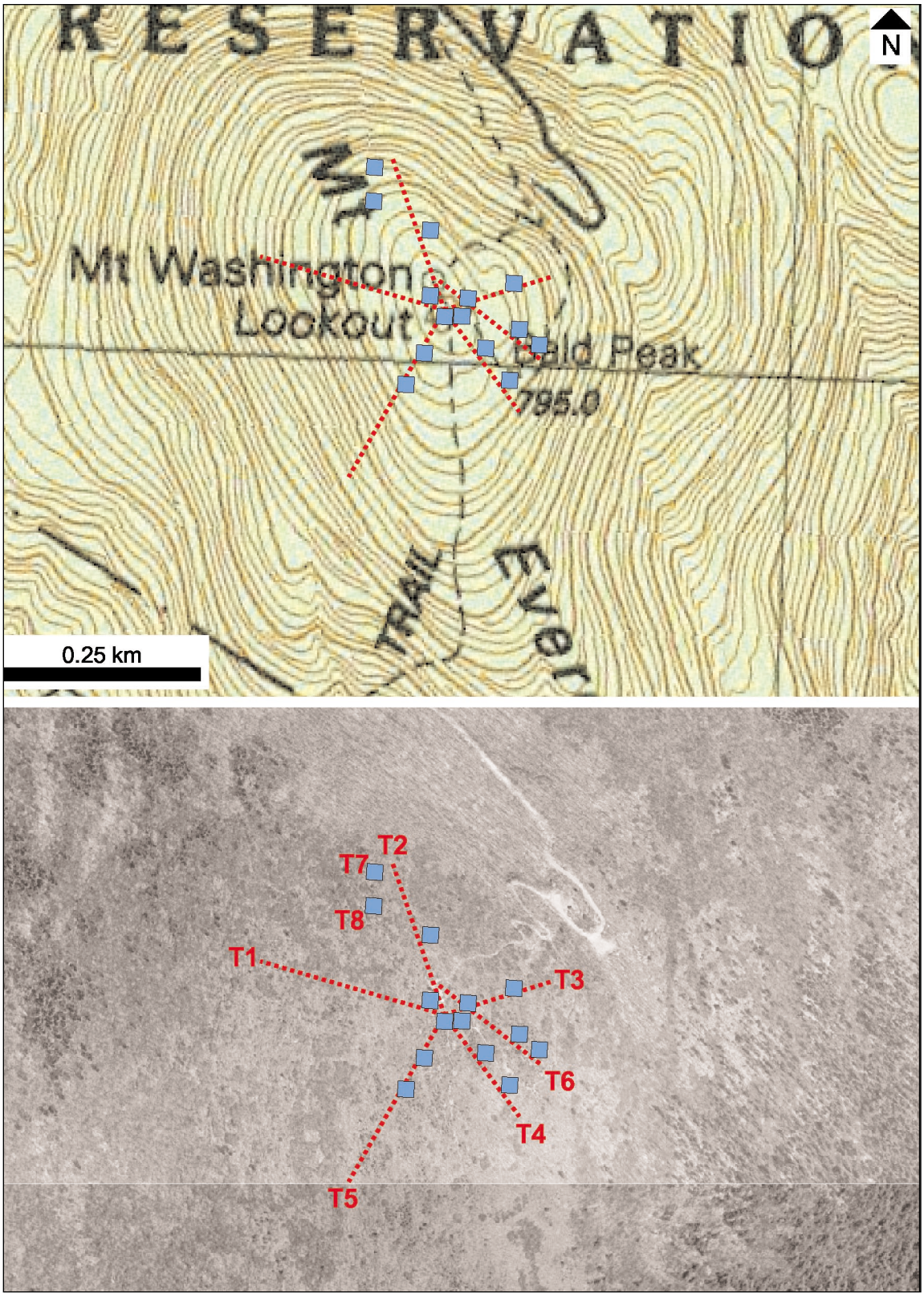

Figure 1. Plot and transect locations on the summit of Mt. Everett. Topographic map *(top)* has 3 m contour intervals. 1997 aerial photo *(bottom)* is from MassGIS (2001). Note road and access trail to the summit.

The History of Mt. Everett

Historical maps and aerial photos were checked to determine the disturbance and vegetation history of the summit. In addition, we relied heavily on Eleanor Tillinghast's (1999) compilation of historical references to Mt. Everett.

RESULTS

Vegetation and Site Characteristics

The summit community of Mt. Everett is dominated by pitch pine (*Pinus rigida*), which comprises over 50 percent of the total tree density and basal area (Table 1). Red oak (*Quercus rubra*) represents approximately 30 percent of the total relative importance value, whereas red maple (*Acer rubrum*) and birch (*Betula*) species contribute an additional 12 percent. Despite high stem densities of approximately 1500 ha^{-1}, total basal area (13.6 m^2 ha^{-1}) is quite low.

Pitch pine varies greatly in height and appearance, ranging from prostrate mats only 0.3 m tall (*see* Tree Growth Forms section) to upright, single stem trees 3 m tall. The average pitch pine height is 1.6 m, while the average height of the tallest pitch pine in each plot is 2.4 m. In contrast, the tallest hardwoods in each plot vary from 3.6 to 5.6 m with a few red oak and red maple individuals exceeding 7.5 m in height. Over 60% of all stems in this short-statured forest are < 10 cm in diameter and only a few red oak and pitch pine are larger than 20 cm in diameter (Figure 2). Dead overstory stems occur in every plot, with the majority (85 percent) consisting of pitch pine < 10 cm in diameter (Figure 2).

Unlike the overstory, sapling densities are much lower and only red maple, red oak, and grey birch (*Betula*

Table 1. Overstory vegetation composition of live and dead stems on the summit of Mount Everett, southwestern Massachusetts.

Species	Density (# ha^{-1})	Rel. Density (%)	Basal area (m^2 ha^{-1})	Rel. Basal area (%)	Rel. Importance value* (%)
Live stems					
Acer rubrum	175	11.7	1.9	8.7	10.2
Betula species	35	2.4	0.2	1.4	1.9
Pinus rigida	826	55.4	7.3	53.3	54.4
Quercus rubra	422	28.4	4.7	34.7	31.5
Other species	32	2.1	0.3	1.9	2.0
Totals	1490		13.6		
Dead stems					
Acer rubrum	16	—	0.12	—	—
Betula species	6	—	0.01	—	—
Pinus rigida	295	—	1.58	—	—
Quercus rubra	19	—	0.18	—	—
Other species	10	—	0.03	—	—
Totals	346	—	1.92	—	—

*Importance value calculated as the average of relative density and relative basal area.

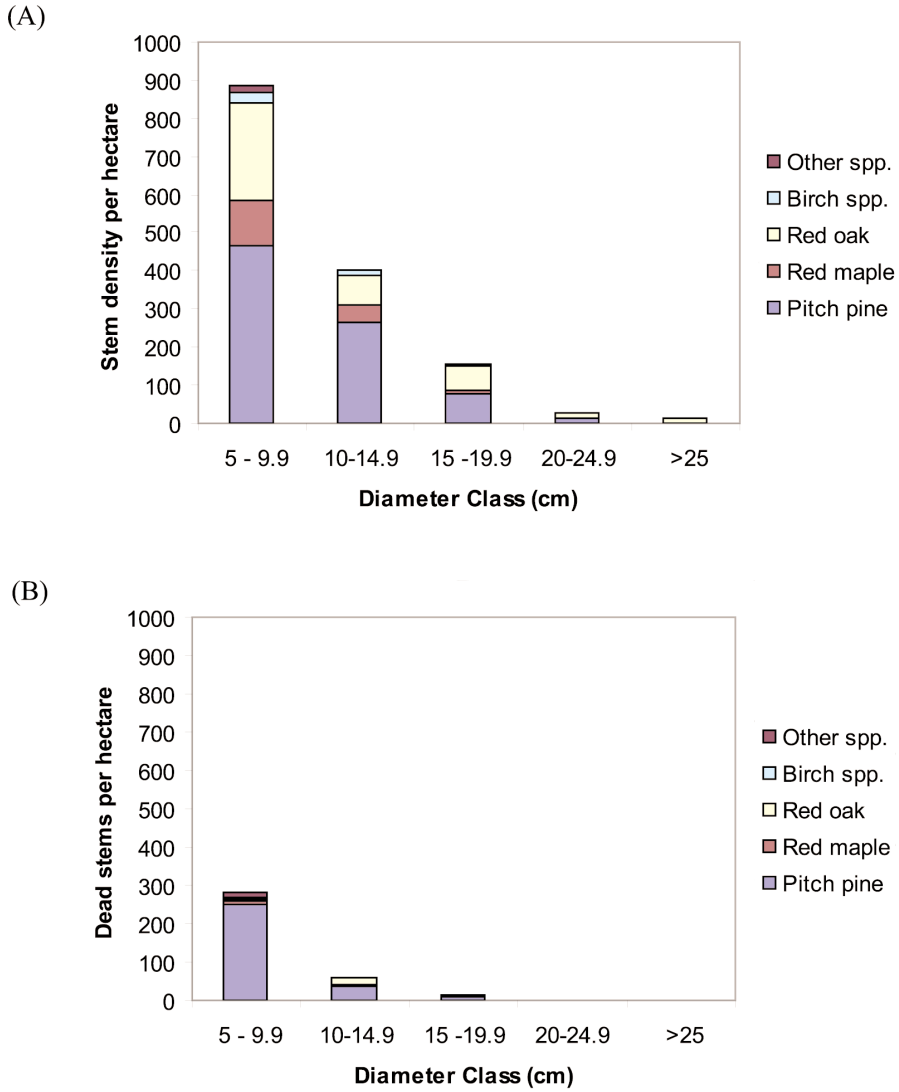

Figure 2. Diameter distribution of live (A) and dead (B) stems on the summit of Mount Everett, Massachusetts. Diameter is basal diameter for pitch pine and diameter at breast height for all other species. Other species include mountain ash, hemlock, and striped maple.

populifolia) exceed 50 stems ha^{-1} (Table 2). The seedling layer is dominated by red oak with lesser amounts of red maple and mountain ash (*Sorbus americana*), which were found predominantly in the two hardwood plots. Low densities of pitch pine seedlings and saplings occur across the summit.

A prominent shrub layer occurs across the summit, comprised of dense patches of low bush blueberry (*Vaccinium angustifolium*), huckleberry (*Gaylussacia baccata*), chokeberry (*Aronia* spp.) and scrub oak (*Quercus ilicifolia;* Table 3). Common herbaceous species include hairgrass (*Deschampsia flexuosa*), wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), and starflower (*Trientalis borealis;* Table 3). Evidence of deer browse is common across the summit, especially on low shrubs and small hardwoods. The amount of exposed rock is variable among plots, averaging 16 percent and ranging from 2 percent to almost 50 percent. Soils are consistently shallow, averaging only 14.1 cm. Slopes average 11 percent and vary from flat to 24 percent.

Age structure

The summit supports uneven-aged stands with pitch pine recruitment that began in the 1830s and occurred in

Table 2. Density of tree saplings and seedlings on Mt. Everett.

Species	Saplings (# ha^{-1})	Seedlings (# ha^{-1})
Acer rubrum	51	1,628
Acer pensylvanicum	3	0
Amelanchier sp.	0	343
Betula populifolia	57	286
Pinus rigida	13	143
Prunus pensylvanica	0	29
Quercus rubra	57	7,143
Sorbus americana	0	1,429
Total	181	10,999

every decade since the 1860s (Figure 3). Pine recruitment was highest from 1910 to 1930 and lowest from 1950 to 1970. Average pitch pine age is 78 with a range of 12–170 years. Red oak recruitment began in the 1860s, increased in the early 1900s and then remained consistent from 1940 to 1980. Average red oak age is 56 years. Red maple establishment occurred sporadically at low densities from 1840 to the present and most stems became established between 1940 to 1980. Only 6 out of a total of 119 trees cored were greater than 130 years old.

Tree diameter was not a reliable predictor of age, as red oak and pitch pine trees with similar diameters differed in age by more than 70 to 100 years (Figure 4). Pitch pine growth rates vary substantially, with some individuals averaging as little as 0.08 to 0.3 mm per year radial growth for periods of up to 50 years.

Table 3. Frequency (%) of woody understory and herbaceous species in fourteen plots on the summit of Mt. Everett.

Woody Understory	Freq. (%)	Herb Layer	Freq. (%)
Acer rubrum	86	*Agrostis* sp.	7
Acer pensylvanicum	50	*Aralia nudicaulis*	93
Amelanchier spp.	79	*Aster acuminatus*	29
Aronia spp.	100	*Athyrium filix-femina*	7
Betula populifolia	79	*Carex pensylvanica*	36
Betula lenta	7	*Carex* spp.	64
Betula papyrifera	50	*Clintonia borealis*	50
Cornus canadensis	36	*Comandra umbellata*	7
Diervilla lonicera	14	*Coptis groenlandica*	7
Gaultheria procumbens	43	*Cypripedium acaule*	21
Gaylussacia baccata	100	*Danthonia spicata*	14
Hamamelis virginiana	29	*Dennstaedtia punctilobula*	7
Ilex verticillata	7	*Deschampsia flexuosa*	100
Kalmia angustifolia	7	*Dryopteris intermedia*	7
Kalmia latifolia	71	*Epigaea repens*	43
Medeola virginiana	7	*Juncus tenuis*	14
Nemopanthus mucronatus	43	*Lycopodium obscurum*	29
Pinus rigida	64	*Lysimachia quadrifolia*	57
Pinus strobus	14	*Maianthemum canadense*	93
Prunus pensylvanica	36	*Monotropa uniflora*	50
Quercus ilicifolia	71	*Polypodium appalachianum*	36
Quercus rubra	100	*Potentilla tridentata*	50
Rhododendron prinophyllum	50	*Pteridium aquilinum*	43
Rubus sp.	7	*Scirpus* sp.	7
Smilax herbacea	7	*Solidago* spp.	14
Sorbus americana	86	*Thelypteris noveboracensis*	7
Tsuga canadensis	14	*Trientalis borealis*	71
Vaccinium angustifolium	100	*Uvularia sessilifolia*	14
Viburnum cassinoides	71		

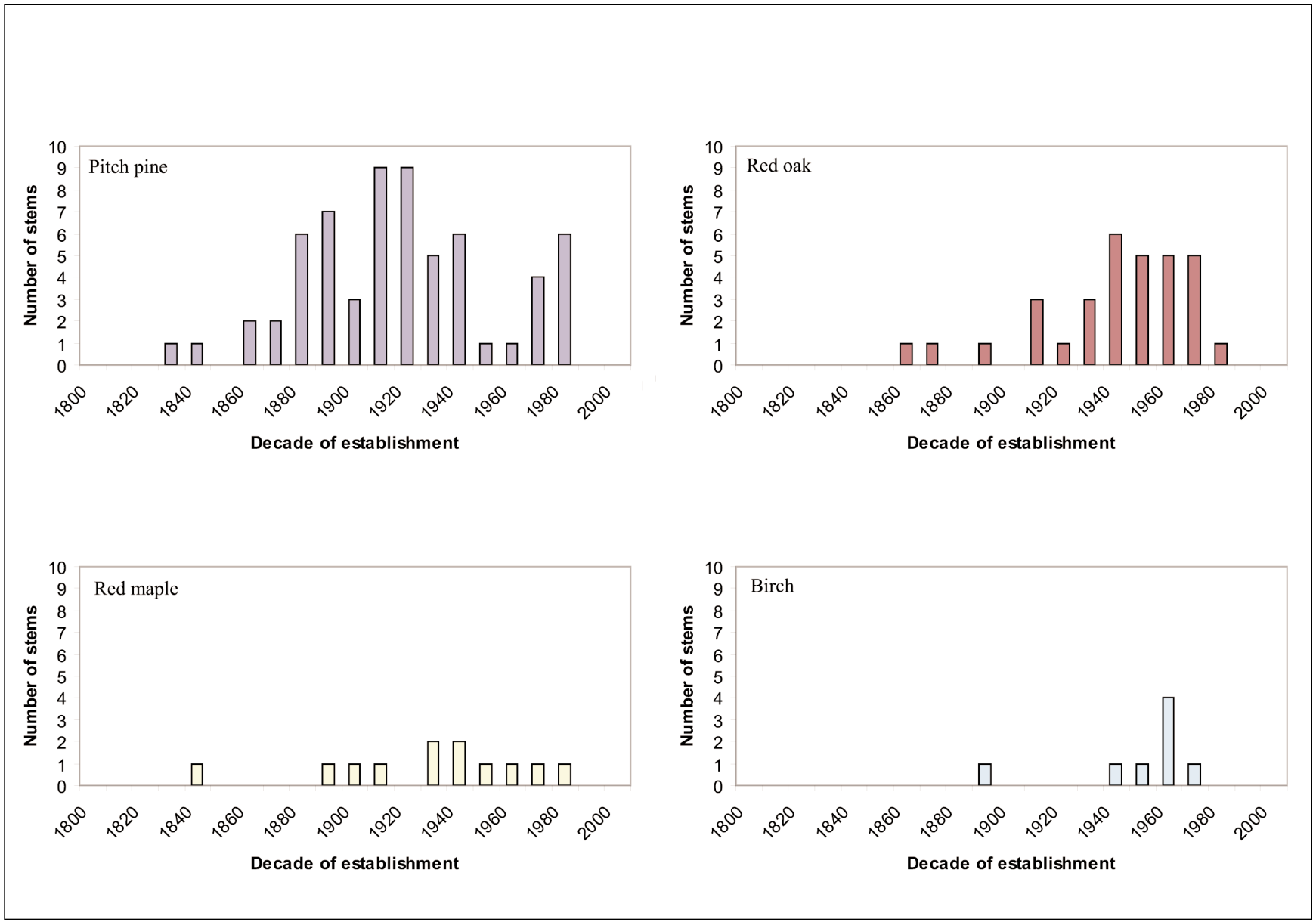

Figure 3. Recruitment dates by decade of major tree species sampled on the summit of Mount Everett, Massachusetts. Dates represent recruitment to 0.2 m for pitch pine and breast height (1.37 m) for hardwood species.

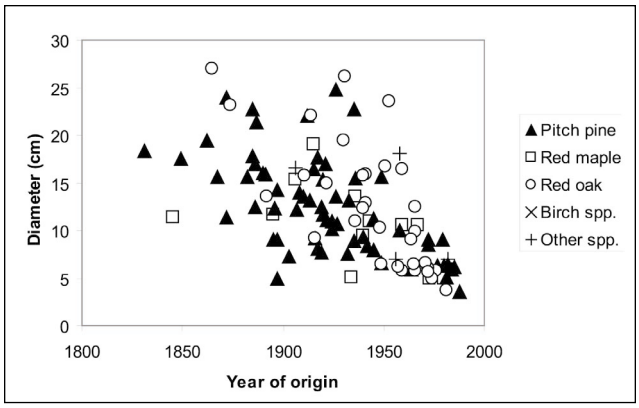

Figure 4. Age versus diameter of cored trees (n = 119) on the summit of Mount Everett. Diameter is basal diameter for pitch pine and diameter at breast height for all other species. Other species include mountain ash and hemlock.

Tree Growth Forms

The unusual growth forms of the pitch pine on the summit of Mt. Everett have long been noted (Figures 5 and 6; e.g., Warner, 1893; Manning, 1919). Several observations on these growth forms are warranted: (1) in addition to being short in stature, many pitch pines on the summit are highly contorted (Figure 5b); as a result, the total extent of stem elongation is substantially greater than stem height; (2) prostrate pitch pine stems are common (Figure 5c), often covering several to > 10 square meters. In all occurrences that we investigated, these prostrate "mats" are branches of upright stems that often extend several meters from the central stem; (3) although the lower branches of many pitch pine stems are buried by organic matter, we found no evidence of layering (e.g., root development) from these stems; (4) many pitch

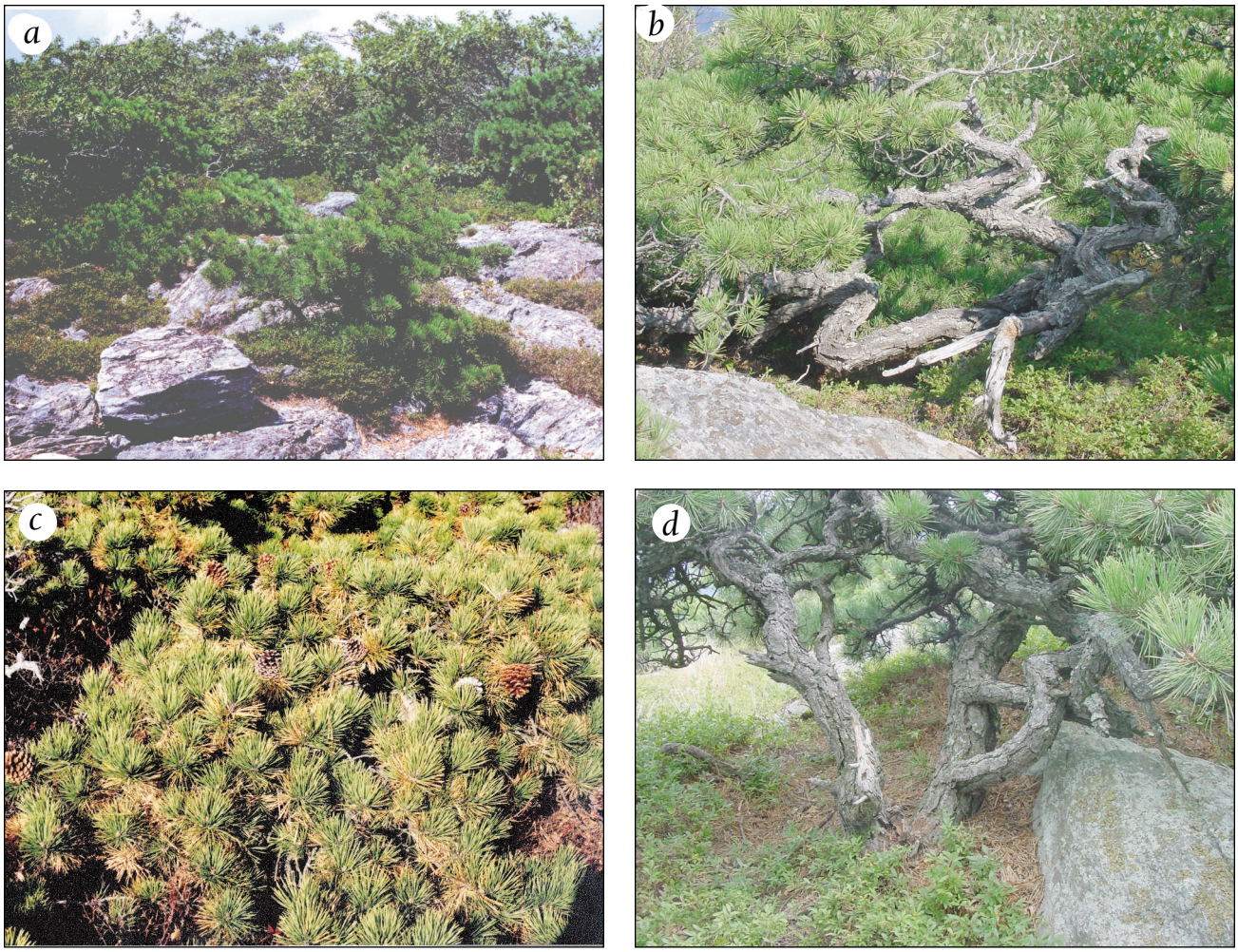

Figure 5. Photographs of the summit of Mt. Everett showing *(a)* dwarf pitch pines (~1 m in height) with extensive bedrock outcrops, *(b)* highly contorted growth form of pitch pines, *(c)* prostrate pitch pine with open cones, and *(d)* multiple-stemmed pitch pine sprouts.

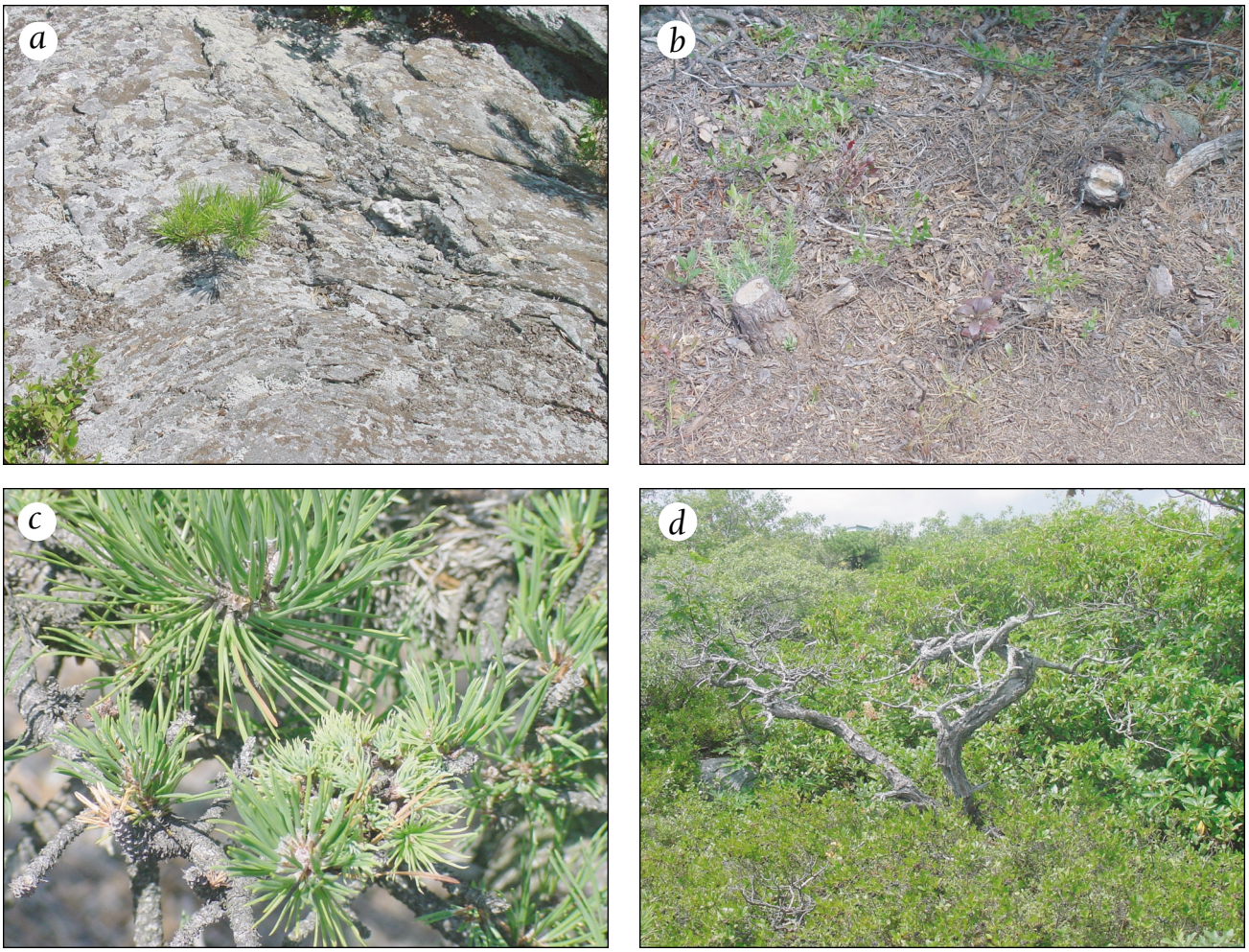

Figure 6. Pitch pines on the summit of Mt. Everett: *(a)* seedling growth from a small pocket of soil on a bedrock outcrop, *(b)* sprouts developing from a cut stem along a trail *(left);* cut stump on the right did not resprout, *(c)* a single branch with normal foliage *(top center),* short needles *(bottom center and left),* and juvenile foliage on epicormic sprout, and *(d)* dead pitch pine sprouts with crowns still intact.

pines have broken branches in their crowns, presumably resulting from ice or other storm damage. Epicormic sprouting from the unbroken portions of these branches contributes to the contorted and "bushy" appearance of these trees; (5) basal sprouting of pitch pines is quite common across the summit (Figures 5d and 6b). We conservatively estimate that 46 percent of all pitch pine stems in our plots developed as basal sprouts; (6) cone production is common on upright as well as prostrate pitch pine stems, and we observed no evidence of cone serotiny on the summit of Mt. Everett.

Although perhaps somewhat less unusual than the pitch pine growth forms, many hardwoods (especially oaks) on the summit of Mt. Everett have sustained repeated crown damage from ice or other storms (Figure 7a). For example, in the winter of 2001, branch breakage was quite common on hardwood stems, whereas pitch pine stems were largely undamaged. Interestingly, in a number of instances, past crown damage to oaks apparently stimulated basal sprouting, even in the absence of cutting, fire, or mortality of the central stem (Figure 7b). Approximately one-third of all hardwood stems sampled were of sprout origin.

The History of the Summit

The Town of Mount Washington (formerly known as "Taconic Mountain") was settled by Europeans by the early eighteenth century and was incorporated in 1779. From the mid-eighteenth century onward, travelers and

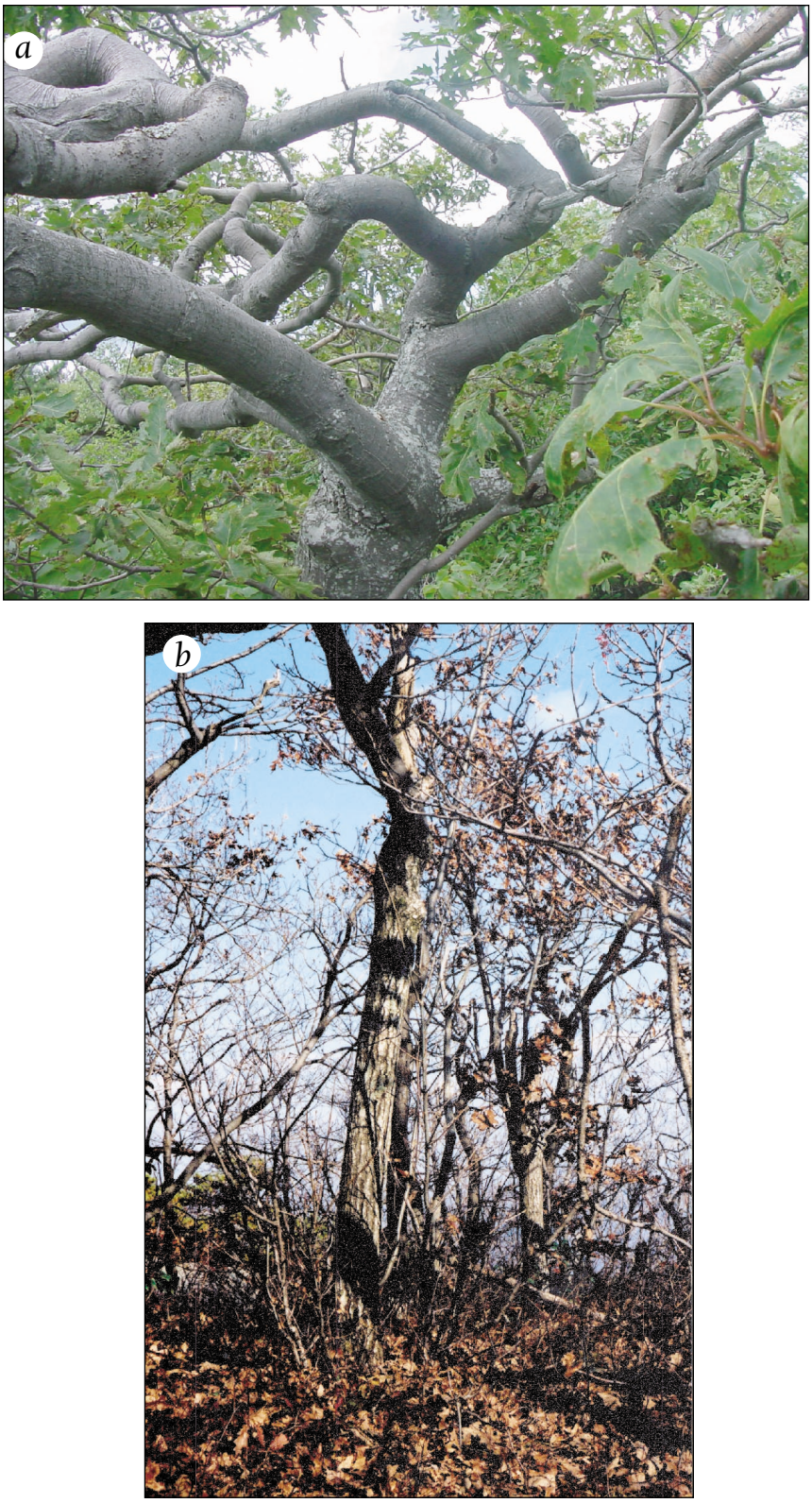

Figure 7. Live red oaks on the summit of Mt. Everett showing: *(a)* highly contorted crown with scars and broken branches, and *(b)* numerous basal sprouts that apparently developed in response to crown damage from a winter storm.

Table 4. Historical references to Mt. Everett and nearby mountains (modified from Tillinghast, 1999). Additional references are found in Appendix 1.

1749 "To the eastward was a high chain of mountains (of the Berkshire system) whose sides were covered with woods up to more than half of their height. The summits however were quite barren; for I suppose that nothing would grow there on account of the great degree of heat, dryness, and the violence of the wind, to which that part was exposed." (Kalm, 1749)

1781 ". . . I ascended the loftiest summit of this mountain; and found a most extensive, and splendid prospect spread around me. On the North rose Saddle mountain . . . at a distance of 40 miles. At the same distance the Catskill mountains formed, on the West, the boundary of the vast Valley of the Hudson. In the South-West rose Butter Hill, the most Northern summit of the Highlands on the Western side of that river, and the majestic front of an immense range receding gradually from the sight, limited the view, beneath us, towards that quarter of the horizon. The chain of the Green Mountains, on the East, stretched its long succession of summits from North to South a prodigious length; while over them, at the distance of forty miles, rose the single, solitary point of Mount Tom; and farther still, at the termination of fifty or sixty miles, ascended successively various eminences in the Lyme Range. Monandnock, at the distance of seventy miles on the North-East, is distinctly discernible in a day sufficiently clear." (Dwight, 1821)

1829 "The County was originally well timbered and fruitful in vegetables. Except the higher parts of Taconic Mountain, the hills were, and many still are, covered to their summits." (Dewey, 1829)

"This ridge [around the town] consists mostly of broken ledges of rocks, and but few trees of any considerable size grow upon it. There is only soil enough intermingled with the rocks to support shrubs from one to three or four feet in height. The whortleberry bush abounds, and the inhabitants in the vicinity flock to it in the months of August and September to gather the fruit." (Hayden, 1829)

1841 "On the east side of this valley, rises Mount Everett. It's central part is a somewhat conical, almost naked eminence; except that numerous yellow pines, two or three feet high, and whortleberry bushes, have fixed themselves wherever the crevices of the rock afford sufficient soil. Hence the view from the summit is entirely unobstructed. And what a view! . . . This certainly is the grandest prospect in Massachusetts . . ." (Hitchcock, 1841)

1851 "In the early sunshine of the morning, the atmosphere being very clear, I saw the dome of Taconic with more distinctness than ever before, the snow-patches, and brown, uncovered soil on its round head, being fully visible." (Hawthorne, 1896)

1879 "Two or three miles from Bash-Bish, is the Dome of the Taghconics, a lofty mountain rising, precisely like a dome, from the ridge of which it forms a part. It is in our estimation, far superior to the Catskill, for you have from a single spot, a perfect panorama below you; you have only to turn on your heel, and east and west, north and south, an almost endless prospect spreads away on the vision. You are the center of a circle at least three hundred and fifty miles in circumference; and such a circle!" (J. T. Headley in Greylock, 1879)

1885 "Rising in noble granduer above the valley of the Housatonic, the traveler through southern Berkshire will see the dome-like summit of Mt. Everett, or Bald Mountain . . . The views of the surrounding country from . . . that monarch of all, Mt. Everett, from whose dome-like summit you have an unrivalled view of the whole of Berkshire county, Western Connecticut, New York State to the Catskills, and a bird's-eye view of the fine scenery of the town which lies beneath you." (Child, 1885)

1893 A winter photo shows a man standing on the summit of Mt. Everett surrounded by very short stature vegetation (Fig. 8a). (Warner, 1893)

1893 ". . . thick growth of low birches at first, and higher up, is shut in by scrub oak and dwarfed pines, but near the top there is one glorious burst of vision from a jutting crag to the east, and when, hurrying on, you stand upon the bare rocks of the highest point . . . [f]rom its isolated position, it commands a larger tract of country than many loftier summits." (Warner, 1893)

1899 "[the Dome's] sides are clad in a growth of maples, chestnuts, and birches, as far as the upper ledges where the scrub-oaks and pines compete with the blueberry bushes in the struggle for existence." (Adams, 1899)

1919 "We should also have [the Mount Everett State

Reservation commissioners'] assurance that they will not undertake any improvements on the top of [Mount Everett] that will destroy the exceedingly attractive cushion-shaped, stunted pitch pines or the ground cover of huckle-berries, potentilla tridentata and the chokeberry that covers practically all the soil between rocks." (Manning, 1919)

1920 "It is a curious fact that on Mount Everett timberline is practically reached at 2,500 feet. Graylock (sic), fifty miles to the north, does not reach it at 3,500, and it is at something like 4,000 feet in the White Mountains." (Eaton 1920)

1921 "The woods on the Reservation, badly disfigured by dead chestnut and also blow downs caused by the ice storm of 1921." (MESRC, 1928)

1922 Pitch pine is ". . . frequent in Sheffield, occasional in Stockbridge, New Marlboro, Sandisfield, Great Barrington; summit of The Dome, Mt. Washington." (Hoffman, 1922)

1930 "On the final path up the peak to the naked, windswept summit, I had been preceded by several wild folk. A deer (the hunters didn't get quite all of them), a cottontail, a fox (maybe after the rabbit), a partridge walking a considerable distance and a red squirrel. It seemed odd that these animals should seek the bleakest, coldest spot in fifty miles, but no doubt the scouring summit wind keeps a food supply exposed. Deer in winter are almost always to be found near the top of the mountain." (Eaton, 1930)

1936 "Many dead trees and much underbrush were cut out in order to open up better views from the cabin and above." (MESRC, 1936)

1938 "The Dome which is the rounded summit of Mount Everett, is over two thousand six hundred feet above sea-level and from it may be seen panoramic segments of five neighboring states. In itself, this high flung rocky eminence is a natural, primeval rock garden of dwarf, angular pines and of similarly small scaled deciduous trees — many, ancient though they are, hardly higher than a man may reach. Laurel, and small flowering and fruit-bearing shrubs and minute plants follow the design of the main and branching crevices and fissures of the upheaved rock structure." (Eaton, 1939)

1938 "If ever, the main roadway should be carried to the very summit of Mount Everett, it would destroy that for which it was built. The view, itself, would be experienced under a handicap and the primeval rock garden which is a rare gift of the forces of nature would be entire lost." (MESRC, 1938)

"The hurricane of September 21st which caused devastation in New England beyond any known in a hundred and fifty years, fortunately did not bring corresponding hurricane disaster to the Reservation and the surrounding country side. The main damage came from the excessive rains which washed out roads and created other erosion problems on the Reservation . . ." (MESRC, 1938)

1943 "The greatest problem on the Reservation last year was cleaning out the trails and fire lanes as a result of the severe ice storms last winter. The east side of the Reservation was the hardest hit but all areas were blocked with large trees and limbs." (MESRC, 1943)

1944 "The mountain forest suffered greatly from ice last winter, large trees being snapped off or tipped across the trails, and during the summer the road . . . was badly washed out by a cloud burst and had to be closed for two weeks for repairs." (MESRC, 1944)

"Not much seemingly can be done about the woods, so badly punished in the past decade, except to let Nature heal the scars which she has created, and guard against fire, which will continue to be a menace until the down stuff is rotted." (MESRC, 1944)

1948 ". . . a trail leads through the scrub oaks and dwarfened pitch pine over wind-swept ledges, to the [Mount Everett fire] tower." (Simpson, 1948)

". . . you may be intrigued by the thought of finding harebell, Campanula rotundifolia, among the rocky ledges of the Dome." (Simpson, 1948)

". . . a small colony [of Bicknell's thrushes] is nearly always to be found summering in the stunted tree growth skirting the bald Dome." (Wallace, 1948)

". . . the scraggly, picturesque pitch pines virtually reach their tree limit on the upper slopes . . ." (Hendricks, 1948)

". . . the view from Everett is one of the Berkshire's best, and, because of the stunted growth on the summit, it can be enjoyed without climbing the tower." (Hendricks, 1948)

1949 "Because of the extreme drought last summer, the Reservation was closed . . . The wisdom of this restriction

would have been apparent to anyone visiting the upper portions of the mountain especially. On the rocks around the new stone hut at the upper parking space the tufts of grass were like tinder, and just below the ledge at that point the mountain ash trees were parched and withered, and the undergrowth would have blazed had a cigarette been dropped into it. Fortunately there were no fires at any point on the Reservation, and we hope that the ash trees will recover." (MESRC, 1943)

1958 "The [Bash Bish] ravine as a whole is of special interest, but particularly so on the lower slopes of Bashbish Mountain . . . because of the presence of a number of plants not found on the surrounding mountain slopes nor in nearby woodlands, plants characteristic for the most part of more northern latitudes or of higher altitudes. Like conditions and like flora are found in our area only near the summit of Mount Everett and on the high hills adjacent to the Rensselaer Plateau." (McVaugh, 1958)

"East of the Hudson Valley, where the metamorphic rocks predominate, surface exposures of both acidic and calcareous rocks are very frequent. The largest exposures are found on the Taconic Mountains from Mount Fray southward and southeastward. The tops of these mountains form a nearly continuous exposed and dissected rocky ridge for more than 15 km." (McVaugh, 1958)

"On the summits of the high Taconics, the continuous exposures of hard gray schists extend from Mount Fray southward and southeastward for some miles, forming an area quite distinct in vegetational aspect from that of any other part of Columbia County. I am unable to explain the abrupt termination of this area at Mount Fray. North of this mountain the Taconics, including those of equal or greater heights, are all forest or grass covered to their very tops . . . the peculiar plant-association developed south and east of Mount Fray is wholly lacking, although physiographic and edaphic conditions seem essentially similar." (McVaugh, 1958)

". . . it is quite possible that the present low shrub association [on the southern Taconic summits] is a more or less permanent physiographic climax. Under natural conditions succession is apparently slow. There is no evidence that the communities of Arctostaphylos-Potentilla-Aronia-Amelanchier-Prunus [bearberry-cinquefoil-chokeberry-shadbush-cherry] have been disturbed within historic times. The first two in particular are known throughout their ranges as plants of exposed rocky summits, and it is highly improbable that either could have existed within the limits of any densely forested area. It is equally improbable that the association could have invaded the area in toto since the removal of the forest by the white man. In the absence of definite information as to the original covering of these rocky summits, then, it is probable that the present vegetation represents the highest stage of development that has been reached since the retreat of the glaciers." (McVaugh, 1958)

1964 Description of an ice storm: "At the top of the mountain in the mist . . . the grotesque shapes of low pitch pines loomed like convoluted masses of coral, solid to the rock from which they sprang. Terminal sprigs of pine needles had grown by accretion to cauliflower heads weighing more than a pound. We brought several home to keep in the deep-freeze to convince summer skeptics. Little branching twigs were grown to sizeable deer antlers, blunt-ended as in the velvet." (Bulkeley, 1964)

1972. "Referred to as 'The Dome of the Taconics' and called simply 'the Dome' by old-timers, [Mount Everett's] prominent crown is covered by stunted pitch pine and topped by a fire tower. An excellent panoramic view may be had from both the parking area and the fire tower." (Smith, 1972).

1992 " . . . an unusual dwarf "forest" of *Pinus rigida,* with *Quercus ilicifolia,* is found on the flat summit of Mt. Everett . . . The dwarf trees average about 1 m in height, and present a flat-topped, laterally growing aspect . . . These summits . . . have thin soil . . ., and what little organic material is there accumulates slowly. There is slight inflow of nutrients, such as might occur on a slope. Conditions are quite xeric, and the lack of a tree canopy allows extremes of heat and dryness to occur. Wind is probably not an important factor in keeping the vegetation low, as there are many higher ridges that are occupied by taller forests; however, fire may be a factor." (Weatherbee and Crow, 1992)

naturalists recorded observations about Mt. Everett that provide some insight into the vegetation and history of the summit (Table 4). Although Dewey (1829) recorded the earliest references that we are aware of describing vegetation composition on the summit of Mt. Everett, as early as 1781 Timothy Dwight (1821) described panoramic views from the summit, extending 40–70 miles in all directions and including the Catskills, the Green Mountains, Mt. Monadnock, and Mt. Tom. Dwight's descriptions suggest that the summit did not support tall or dense forests during the late eigthteenth century, for such stands would have obstructed the "splendid prospect (that) spread around me." Similar descriptions of unobstructed views were recorded throughout the nineteenth century (Table 4). In the 1820s, Dewey (1829) noted the occurrence of scrub oak (*Quercus ilicifolia*) and three-toothed cinquefoil (*Potentilla tridentata*) on "Taconic Mountain," species that are shade intolerant and characteristic of open summits. Also in the 1820s, Hayden (1829) described the short stature of the vegetation on the rocky ridge around the town of Mt. Washington, noting "only soil enough intermingled with the rocks to support shrubs from one to two or three feet in height. The whortleberry bush abounds, and the inhabitants in the vicinity flock to it in the months of August and September to gather the fruit." The first reference to dwarf pitch pines on the summit apparently comes from Hitchcock (1841), who observed that Mt. Everett was an "almost naked eminence; except that numerous yellow pines, two or three feet high, and whortleberry bushes, have fixed themselves wherever the crevices of rock afford sufficient soil." In the late nineteenth century, the summit of Mt. Everett continued to support extremely low stature vegetation (Figure 8), and numerous subsequent references confirm the occurrence of dwarf pines and open vegetation to the present.

In summary, we found no historical sources that indicate that the summit of Mt. Everett was forested at any point during the historical period; rather, numerous historical sources indicate that the summit of Mt. Everett was open and supported low stature vegetation throughout the historical period, with dwarf pitch pines present from at least 1841, and probably much earlier (Tillinghast, 1999).

Several historical sources refer to the harsh nature of the summit, noting that little soil occurs on this "windswept," rocky site (Adams, 1899; Manning, 1919; Eaton, 1930). We saw no evidence of tree windthrow on the summit. Although local residents have long observed frequent ice storms on the summit of Mt. Everett (M. Bulkeley, pers. comm.), historical references to ice damage at the State Reservation (MESRC, 1929) focus on the damage to forests below the summit, presumably because such damage had greater aesthetic impact and occasionally blocked the road through the Reservation.

Although the history of recreational use of the summit of Mt. Everett is largely undocumented, the site has been a destination for outings throughout the historical period (Table 4). Trails were presumably constructed to the summit by the late eighteenth or early nineteenth centuries and recreational use is likely to have increased in the second half of the nineteenth and twentieth centuries, similar to summits throughout New England. By at least 1918, under management by the Commonwealth, a fire tower was constructed on the summit of Mt. Everett (MESRC, 1919). A second tower that was constructed in 1970 still stands, though it is in poor repair and has rarely, if ever, been staffed (E. Tillinghast, unpubl. data; Appendix 1). Although camping is not allowed in the State Reservation, we observed the remains of a few campfires on the summit.

Fire History

We have been unable to find any references to historical fires on the summit of Mt. Everett. However, throughout the northeastern United States, documentary evidence for fires prior to the twentieth century is often lacking, even in areas that apparently burned in the early historical period (Lutz, 1934; Forman and Boerner, 1981; Motzkin et al., 1996 and 1999). After establishment of the Mount Everett State Reservation in 1908, the commissioners of the Reservation filed annual reports until at least 1955. Tillinghast (1999) reviewed each of the annual reports that is available (i.e., 1909, 1911, 1916-1920, 1922–1944, 1946–1955) as well as the minutes from annual meetings of the commissioners of the Reservation for several years during the period from 1940 to 1964. None of these sources contains references to fires on the summit of Mt. Everett, although they do include frequent references to fire danger and fires on nearby summits outside of the Reservation. Thus, it seems likely that no significant fires occurred on the summit of Mount Everett during the twentieth century.

We found no evidence of fire scars or stem charring in our plots or in extensive observations across the summit. Sieving of soil samples documented the occurrence of small amounts of charcoal in all but three plots. Two

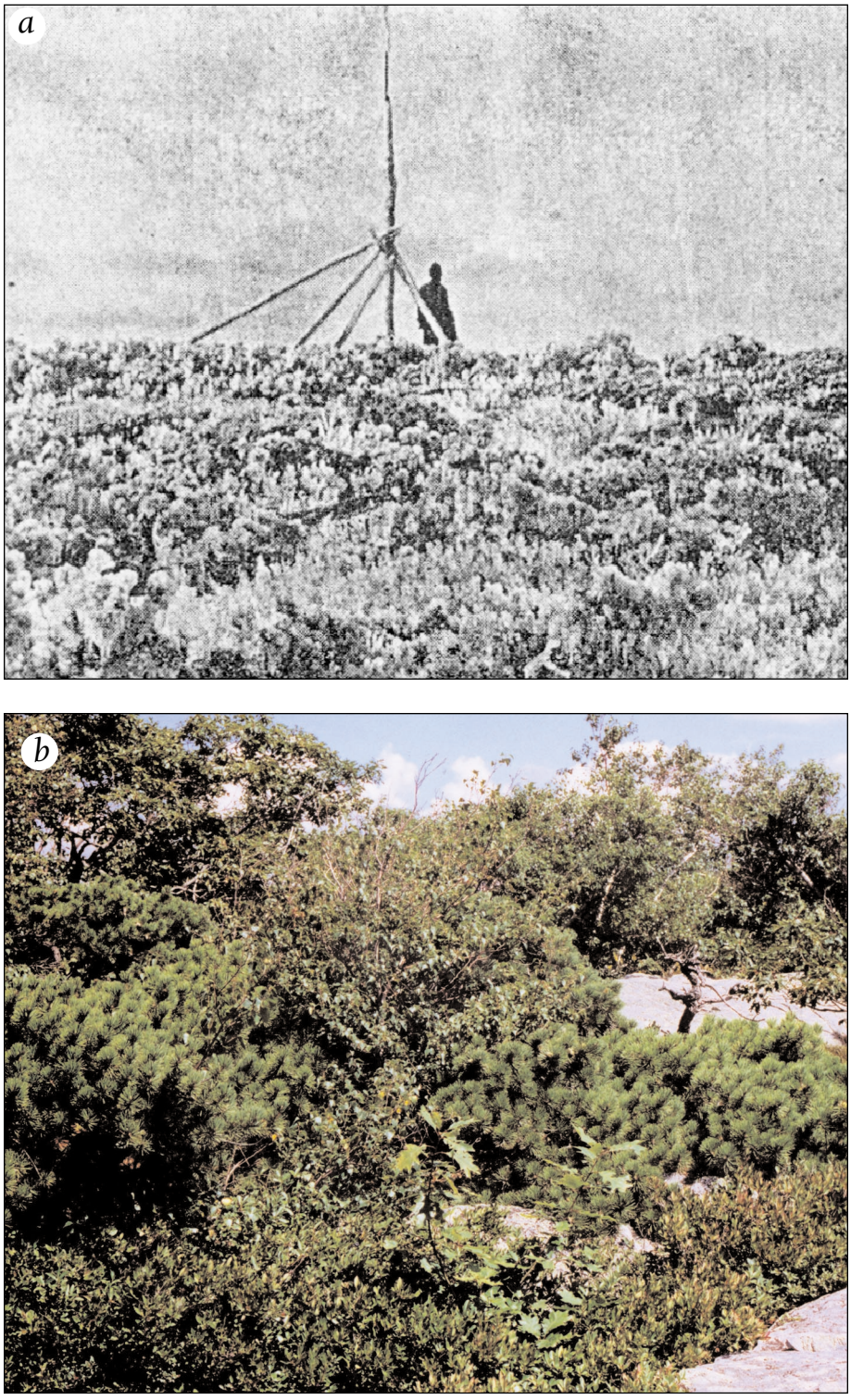

Figure 8. Photographs of the summit of Mt. Everett in winter, ca. 1890s *(a)* and summer 2001 *(b)*. Note the ice on the dwarf pines and lack of emergent hardwoods in the 1890s in contrast to abundant hardwoods today. 1890s photo from Warner (1893).

plots with abundant charcoal were located in close proximity to abandoned campfire sites. In general, soil charcoal was substantially less abundant across this site than on many barrens sites that we have investigated.

Discussion

Vegetation Composition and Age Structure

The summit of Mt. Everett supports approximately 8 ha of a dwarf pitch pine community that is highly uncommon across the northeastern United States, occurring only on a few sites. Vegetation composition on the summit is characteristic of open, rocky ridges (Niering, 1953; Shaw, 1999), with no known rare vascular plant species (P. Weatherbee, unpublished data). However, rare lichens and insects do occur on the summit, including a few highly disjunct species (May, 1999; Wagner, 2000). Numerous historical sources indicate that the summit has been non-forested since at least the eighteenth century, with vegetation that was apparently quite similar to the modern vegetation (Dewey, 1829; Hitchcock, 1841). Although Hitchcock (1841) provides the first specific reference to dwarf pines on the summit of Mt. Everett, our results indicate that short stature pines on the summit may be quite old, with many stems that are 60 to more than 100 years old. If pitch pine grew at similar rates in the past, then Hitchcock's (1841) observation of 2–3 feet tall pines suggests that he was observing trees that had become established by at least the mid-eigthteenth century. We suggest, therefore, that it is highly likely that pitch pines have occurred on the summit of Mt. Everett throughout the entire historical period.

As a result of unusual site conditions and disturbance regimes, age structure and stand dynamics at Mt. Everett differ substantially from many barrens. Our results indicate that pitch pines at Mt. Everett are uneven-aged, with continuous recruitment since the 1860s and scattered older stems. Similarly, in one of the few previous studies to address long-term dynamics of ridgetop pitch pines, Abrams and Orwig (1995) determined that an old-growth (320 year old) pitch pine rock outcrop community in the Shawangunk Ridge of southeastern New York was characterized by uneven-aged pitch pines, with continuous tree recruitment since the late 1600s. In contrast, on many sand plains throughout the region, pitch pine frequently occurs in relatively even-aged cohorts that establish following fire, abandonment of agriculture, or other disturbance (G. Motzkin, unpublished data).

It is unclear why the average age and maximum longevity of pitch pines and hardwoods on the summit of Mt. Everett are considerably less than on other harsh rocky summits, where trees exceeding 300 years have been documented (Abrams and Orwig, 1995; Orwig et al., 2001). Although rates of annual diameter growth of pitch pines on Mt. Everett are among the slowest recorded for any tree species in the northeastern United States, they are comparable to those of old-growth pitch pines in the Shawangunk Mountains where trees exceeding 250 years old exhibited substantial growth releases in recent decades in response to favorable climatic conditions (Abrams and Orwig, 1995). In contrast, on Mt. Everett standing dead pitch pine stems were observed in every plot, typically with no obvious cause of mortality and no evidence of damage from fire or windstorms. In some instances, the crowns of the dead stems are sufficiently intact to indicate that mortality was not directly associated with crown snapping or other severe physical damage from winter storms (Figure 6d). It is likely that the harsh climatic and edaphic conditions on the summit contribute to the mortality and limited longevity of these trees; however, long-term studies are necessary to document the influence of ice storms and other disturbances on sprouting and mortality.

Although the modern vegetation composition and structure on the summit is broadly similar to that which has occupied the site for at least the past few centuries, questions remain about long-term vegetation trends and, in particular, the relative importance of hardwoods (especially oaks) versus dwarf pines. A photograph of the summit from the 1890s (Figure 8a) indicates very short stature vegetation, with no emergent hardwoods visible. Because 5 to 7 m tall hardwoods are now common on some portions of the summit (Figure 8b), this raises the possibility that over the past century, trees on the summit, and in particular hardwoods, may have increased in height and perhaps in relative importance. Age data suggest that oak recruitment has increased since the 1940s and most of the tall hardwood stems measured in each plot were only 30 to 70 years old. In addition, our data document substantially higher densities of oak seedlings and saplings than pitch pine, and in several locations on the summit we observed hardwoods that had overtopped pitch pines, apparently resulting in pitch pine mortality. Thus, although low densities of pitch pine

seedlings and sprouts continue to establish on the summit, particularly on extremely open, rocky areas, there is evidence to suggest that the relative importance of hardwoods has increased over the past century. These patterns suggest the possibility that undocumented past disturbance(s) (e.g., severe fire) in the early historical or pre-European periods may have allowed widespread pitch pine establishment across the summit and that hardwoods may have increased recently with greater time since disturbance. The extent to which such potential species replacement may be a relatively new phenomenon, resulting from altered disturbance regimes, climate change, or other causes, versus a long-term dynamic that has resulted in shifts in abundance of pine versus oak over time is unknown.

Disturbance History

No information is available about pre-European vegetation dynamics or disturbance history on Mt. Everett. By the 1820s, Mt. Everett was used heavily by local residents for berry gathering (Hayden, 1829). Although we have found no references to historical fires on the summit, frequent burning to improve berry production was formerly common in many barrens areas throughout the eastern United States, including the Shawangunks of New York, Panther Knob in West Virginia, and the Waterboro Barrens in Maine (Batcher et al., 1997; Copenheaver et al., 2000), and it is possible that fire was similarly used on Mt. Everett. Charcoal on exposed summits such as Mt. Everett is frequently washed or blown from the site or concentrated in small topographic depressions (W. Patterson, pers. comm.), perhaps contributing to our ability to find only small amounts of macroscopic charcoal. Similarly, despite the absence of historical references to cutting of vegetation, it is possible that woody vegetation that obstructed views or limited berry production was occasionally removed from the summit (see Table 4: MESRC, 1936). In addition, some clearing of vegetation presumably occurred in the twentieth century during construction of two fire towers and trails on the summit.

The Shawangunk Mountains in New York support perhaps the best-studied rocky barrens in the northeastern United States (McIntosh, 1959; Olsvig, 1980; Laing, 1994; Abrams and Orwig, 1995; Seischab and Bernard, 1996; Batcher et al., 1997), with little detailed information available for most other sites. Unlike Mt. Everett, numerous documentary sources as well as Laing's (1994) paleoecological reconstruction confirm the historical importance of fire in the Shawangunks, although substantial variation exists in fire regimes across the area (Batcher et al., 1997). In addition, cone serotiny, which is most common on pitch pines in Northeastern barrens thought to have very high fire frequencies (e.g., the dwarf pine plains of New Jersey and Long Island; Ledig and Fryer, 1972; Givnish, 1981), does not occur on Mt. Everett but is common in the Shawangunks, further suggesting the long-term importance of fire in that area.

As a result of the intensive fire history in the Shawangunks, conceptual ecological models developed for that area emphasize fire effects on vegetation dynamics and composition and, to a lesser extent, edaphic, climatic, and pathogen driven dynamics (Batcher et al., 1997). Similarly, the development and persistence of dwarf pitch pines in the pine plains of New Jersey and Long Island are strongly related to frequent fires (Lutz, 1934; Anderson, 1959; Givnish, 1981; Jordan, 1999). In contrast, we have been unable to document fires on the summit of Mt. Everett during the historical period. Although we did find small amounts of macroscopic charcoal in our plots, we do not know whether such charcoal resulted from fire in the early historical period or before European settlement. Despite this uncertainty, the historical record is sufficiently complete that we believe it to be highly unlikely that significant fires occurred during the twentieth century but were unrecorded. The fact that we did not find any charring or fire scars on live or dead stems further suggests that fires were absent or unimportant over at least the past century. Therefore, our data from the summit indicating that most stems are less than 100 years old provide strong evidence that current pitch pine and other species became established (or developed as sprouts) in the absence of fire. Such establishment is not well-incorporated into previous conceptual models of Northeastern barrens (though *see* Good and Good, 1975).

Although we have no long-term climatic or storm data from Mt. Everett, numerous anecdotal accounts refer to frequent ice and other storms on the summit. It is likely that the dwarf growth form of pitch pines on Mt. Everett developed at least in part in response to such storms, as evidenced by the frequent branch breakage and epicormic sprouting of broken stems. Such storm damage may also occasionally result in basal sprouting (Del Tredici, 2001). Winter storms, in combination with

harsh conditions resulting from limited soil development, wind, drought stress, etc. on this extremely rocky site, apparently contribute significantly to the structure and long-term persistence of the unusual vegetation on Mt. Everett. We have initiated a detailed examination of tree-ring dynamics in order to further investigate the influence of past disturbance events on current composition and age structure.

Perspectives on the Conservation Importance of Mt. Everett

Mt. Everett has long been recognized as a regionally significant conservation area. In a review of important ecological and geological sites throughout the New England-Adirondack region, Siccama et al. (1982) identified Mt. Everett as a potential National Natural Landmark. More recently, the greater Taconic Region that includes Mt. Everett has been identified as among the highest priorities for conservation in the Northeast by The Nature Conservancy and the Massachusetts Natural Heritage and Endangered Species Program, recognizing both the unfragmented nature of the region and its many unusual features, including the dwarf pitch pine communities of Mt. Everett and nearby summits (BioMap, 2001). In addition, the Southern Taconics Research and Conservation Center was recently initiated to coordinate research and conservation efforts in this ecologically significant region. Based on our experience with barrens throughout the northeastern United States, we consider Mt. Everett to be an exemplary site worthy of the most stringent conservation measures. The summit supports several rare and/or highly disjunct species, and the dwarf pitch pines of Mt. Everett and nearby summits in the Taconic Range are extremely uncommon, occurring at very few sites elsewhere in the Northeast. Mt. Everett and nearby summits also comprise critical components of the greater Taconic Region which represents one of the largest and most intact natural areas in central New England.

The summit of Mt. Everett is also significant regionally for its unusual history and dynamics. The persistence of the dwarf pitch pine community on Mt. Everett and nearby summits in the southern Taconics in the absence of frequent fires (and the associated lack of cone serotiny) has not been previously documented and appears to be highly unusual among Northeastern barrens. In addition, few sites in the northeastern United States have experienced such limited disturbance by human activity over the past few centuries, with no documented history of cutting, grazing, or agriculture. This unusual history stems from the harsh and rocky conditions of the summit and has resulted in a relatively intact natural area with little evidence of alteration of vegetation or ecological process by historical land use. In fact, the processes that have contributed to the persistence of unusual dwarf vegetation for at least several centuries, especially the extremely rocky, exposed conditions and frequent ice and other storms, continue to be operative and to allow for some establishment of dwarf pines and associated vegetation.

Although further investigation is warranted to determine the extent to which oaks are increasing on portions of the summit relative to pitch pine, there is no indication that this is occurring at a sufficiently rapid rate to warrant widespread active management in the immediate future. However, long-term monitoring and re-evaluation are warranted to insure the long-term persistence of the dwarf pitch pine community. Because the sprouting ability of pitch pines may decrease substantially with age (Lutz, 1934; Anderson, 1959; Little and Garrett, 1990; and Jordan, 1998), extreme caution is necessary in evaluating management activities that may negatively impact the existing dwarf pines. In summary, the summit of Mt. Everett is a highly unusual site that is regionally significant and should be afforded the strictest of conservation protection.

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Appendix 1. Additional historical references to Mt. Everett State Reservation (modified from Tillinghast, 1999 and unpubl. data). Not included are numerous references from Mt. Everett State Reservation Commissioners reports noting: (a) years with no fires, and (b) times of high fire danger when the Reservation was closed but no fires were reported.

1908 "On June 2, 1908 (St. 1908, c. 571), the Legislature 'authorized and directed' a commission 'to take, or acquire by purchase, gift or otherwise, land situated in the Mount Everett mountain range . . .' In pursuance of this direction and authorization the commission appointed under the act took from the petitioner [Elizabeth P. MacNaughton] two parcels of land, one known as the 'Dome tract,' containing about two hundred and fifty acres, including the summit of the mountain, and the other known as the 'Pond tract' containing about sixty-two acres, including a pond of sixteen acres, situated on the mountain a few hundred feet from the summit. The value of these tracts did not consist so much in the land itself as in its 'sentimental value . . . as a sight seeing place,' or in the lake except 'as an attraction to such a property.'

"Between these two parcels and extending beyond them down the other side of the mountain was the Whitbeck land . . . [B]ecause of its wood and timber, and because of its connection with other properties, it [Whitbeck land] had a greater value as land and a less value due to location than the parcels taken." (MacNaughton v. Massachusetts 220 Mass. 550, 108 N.E. 357, 1915)

1918 "From its round top, on which now stands an iron observation tower . . ." (MESRC, 1919)

"During the few years since the State acquired this reservation a good road has been built from the public highway that passes through the town of Mount Washington up the mountain and for some distance beyond Lake Undine [Guilder Pond] to the end of an old wood road where a good parking place for cars and carriages has been made. From this point up the mountain the grade is somewhat steeper and more expensive to build as it necessarily winds around the side of the mountain, and considerable rock blasting and building of abutments is required." (MESRC, 1919)

1928 "As stated in our last report, the floods of 1927 so badly damaged the upper portion of the road on the Mt. Everett Reservation that it could only be put into good shape by the expenditure of a great deal of money. . . . As the appropriation for 1929 was quite insufficient for this work, the road as far as the turn-out above Guilder Pond was put in good shape, and the upper portion made passable for those who cared to submit their cars (and themselves) to it . . ." (MESRC, 1929)

"The Elbow Trail to Sheffield, and the new Race Mountain Trail, first built by the Berkshire School Outing Club, were brushed out to the limits of the Reservation. Both trails are much used, and both are parts of the projected Appalachian Trail through Massachusetts." (MESRC, 1929)

1929 ". . . no fires occurred in the Reservation. There was a fire in June on Race Mt. but it did not reach our bounds." (MESRC, 1930)

"The Elbow Trail from Sheffield, the Guilder Pond path, and the new trail south to the summit of Race Mountain were in fine condition all the season. Volunteer work took the trail beyond the Reservation bounds, to the top of Race, and thence on to Bare Rock Falls, so that now it is possible to traverse the entire mountain range, from Connecticut to the Jug End in So. Egremont, by a spectacular foot path." (MESRC, 1930)

1930 "the severe forest fire last Spring, which burned clear across the southerly portion of the range, from Boston Corners to the Undermountain Road in Salisbury. A north wind and Sage's Ravine brook enabled the fighters to back fire and keep the flames out of Massachusetts on the east side of the range . . ." (MESRC, 1931)

"Our new portion [of purchased land] also includes Black Rock, the boldest cliff on the east side of the range, and some acres of pine woods above and northwest of the Rock. . . . Much of the new purchase is coming back to white birch and hemlock, and will ultimately be a fine forest. It contains a spring of pure water near the Black Rock trail . . ." (MESRC, 1931)

"The trail down the wild Glen Brook, through virgin hemlock, was badly washed out in the June cloud burst . . ." (MESRC, 1931)

1931 "All the foot trails on the Reservation have been brushed out wide, and signed, and we have made direct connections with the Appalachian Trail, which will come

up from Salisbury, over Bear Mountain, Race Mountain, the Dome, and the Jug End Ridge, to South Egremont. . . . The Reservation is co-operating in building this trail, from the Jug End to Race Mountain with the permission of private owners . . . When the work is completed, we hope next summer, there will be further signing of the trails . . ." (MESRC, 1932)

"The new land acquired last Spring by the Reservation, including the Roys property behind the Berkshire School and the woods above Black Rock, has been surveyed, and we have begun to open other trails than the existing Elbow Trail and the Black Rock Trail. We have also improved our right of way from the Berkshire School to the property, and cleared a parking space. Much of this land was cut over about fifteen years ago, and a problem will be to bring it back to the best possible forest for recreational purposes. We do not wish to be in a hurry to open it too much for picnic parties till the young growth has developed a bit more. But the new growth is showing a rich variety and there are two pretty brooks on the property, and many wild flowers." (MESRC, 1932)

1932 "During the summer the Berkshire Trail Club and our trail cutter, Kenneth Osman, completed the Jug End Trail and it has been signed, giving a footpath from South Egremont to the summit and also completing this link of the Appalachian Trail. Other existing foot trails were brushed out; and late this autumn the Berkshire Trail Club began the construction of a new trail from the head of the Glen on the Elbow Trail, running southeast to Boys' Ravine. This trail slabs the eastern part of the mountain . . ." (MESRC, 1933)

1933 "On May second a fire broke out on the Elbow Trail, along the so-called Laurel Cut-Off, which might have been disastrous, especially as the Mt. Washington men were busy at the time with a fire in their own township . . . Not more than two acres were burned. It is the first fire we have ever had to report of any consequence. The cause is unknown, but as it apparently started close to the trail, it was probably caused by a careless smoker." (MESRC, 1934)

"The year was marked by the purchase, with funds appropriated by the Legislature, of approximately 150 additional acres of land, lying to the south and southwest of the present Reservation. This purchase brings our holdings down the southern slope of the Dome, to the Race ravine, and still further protects the Appalachian Trail." (MESRC, 1934)

1934 "The laurel along the Reservation road was more beautiful, because of larger growth, than ever before, and it should be possible to cut a few vistas into the woods here and there to bring still more into view." (MESRC, 1935)

1935 ". . . we have no damage to report from visitors or from fire. What damage was done came regrettably from the Federal Gypsy Moth Control. After giving those in charge permission to clear passages through the brush on the north-eastern part of the Reservation, to enable them to get hose in to spray the infestation of egg clusters, we were amazed to discover, two or three weeks later, that a gang of CCC boys had been turned into the woods, all the underbrush, including laurel and hobble bushes, had been cut down, all dead wood taken out, and several acres adjoining the beautiful Elbow Trail made to look like Central Park. All the material cut down had been piled into heaps, and many of the heaps burned, some of them on top of clusters of arbutus. The result was certainly quite as bad as any Gypsy Moths could achieve, and it will take that section of the mountain many years to recover its former wildness and natural beauty." (MESRC, 1936)

1936 "Aided by the increased appropriation alloted [*sic*] to our Commission, in the past open season, we have been able to complete some very necessary improvements, particularly in the steeper part of the roadway above Guilder Pond. Two additional turnouts were built on this section and a new guard rail constructed for about half the way up. Many dead trees and much underbrush were cut out in order to open up better views from the cabin and above." (MESRC, 1937)

"Dead trees as well as underbrush overhanging the shores of Guilder Pond have been cleared out, which with the usual brushing out of the trail around the lake has made this easy mile walk more attractive than ever." (MESRC, 1937)

1937 "During September, the following fish were put into Guilder Pond: 175 pickerel, 500 yellow perch, 500 shiners, and 4,580 bull heads . . . Fishing will be prohibited in this pond till June next." (MESRC, 1938)

"The work accomplished on the Reservation . . . had as its main objective the fostering of more luxuriant laurel growth and the improvement of the roads and trails . . ." (MESRC, 1938)

"Laurel was planted in dead areas along the road leading to Guilder Pond and the log cabin. Dead trees and scrub growth which interfered with the spread of the mountain laurel were removed wherever possible." (MESRC, 1938)

"Fortunately there is a fire tower on the Reservation summit." (MESRC, 1938)

1938 "Road work is constantly required on the steep main road. Gravel must be hauled to the high slopes and, however carefully laid and packed, much of it is displaced during heavy storms. (MESRC, 1939)

1939 ". . . forest fire which broke out in the early morning of July 5 last, on the easterly slope of the Taconic range in the Town of Sheffield — one of those lightning-set blazes . . . [however, fire fighters] drove the fire back down the ridge and no damage whatever was done to the Reservation." (MESRC, 1940)

1948 ". . . Turkey vultures, southern birds which are gradually moving their range northward, have been observed from and around Mount Everett more frequently than anywhere else in Massachusetts." ". . . [worm-eating warbler] has been seen so frequently about Mount Everett that we have every right to expect its nest will eventually be discovered." (Hendricks 1948)

1970 Construction of fire tower: ". . . you are hereby authorized to commence work on June 1, 1970 and complete same on November 28, 1970 which is 180 days from the starting date." (DNR Contract No. 602-70 with Phillip Formel Company, Inc., Lenox, Mass.)