Wildlands and Woodlands

A Vision for the Forests of Massachusetts

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A Vision for the Forests of Massachusetts




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Petersham, Massachusetts

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Executive Summary

Massachusetts offers an unusual and urgent opportunity for forest conservation. Following widespread agricultural decline in the 19th century, the landscape reforested naturally and currently supports a wide expanse of maturing forest. Despite its large population, the state has more natural vegetation today than at nearly any time in the last three centuries. With its extensive forests supporting ecosystem processes, thriving wildlife populations, and critical environmental services for society, there is a great need to protect this landscape for the future.

However, this historic window of opportunity is closing as forests face relentless development pressure. After decades of forest protection by state agencies and private organizations, patterns of land conservation and forest management are still inadequate to meet future societal and environmental needs. Large areas of protected forestland are uncommon, conserved forests are largely disconnected, important natural and cultural resources (including many plant and animal species) are vulnerable to loss, logging is often poorly planned and managed, and old-growth forests and reserves isolated from human impact are rare.

We urge the people and Commonwealth of Massachusetts to launch a bold, comprehensive initiative to conserve these precious Wildlands and Woodlands and the ecological and social values they possess.

We propose a forest conservation strategy that extends a simple design from conservation biology in important new ways. This approach consists of large forest reserves in which natural processes dominate and human impact is minimized (**Wildlands**), embedded within expansive forestland that is protected from development but is actively managed in an ecologically sustainable manner (**Woodlands**).

The Wildlands and Woodlands approach has many benefits:

- It employs a two-pronged strategy in which Wildland reserves and managed Woodlands *together* form continuous expanses protected from development and provide the full range of ecological and social benefits.
- It calls for large Wildland reserves (5,000 to 50,000 acres), predominantly on public lands, which support natural forest dynamics, landscape-scale processes, mature forests, and interior forest habitats and wildlife.
- It promotes extensive areas of Woodlands on private and public land managed for diverse conservation, economic and aesthetic purposes.
- It complements "smart growth" that concentrates residential and commercial development by permanently protecting the surrounding forest.
- It is consistent with previous plans, including the Statewide Land Conservation Plan and BioMap, and expands on the recent reserves proposal by the Commonwealth of Massachusetts.

To understand the forests of Massachusetts, it is vital to appreciate the history of New England. Over the past 10,000 years, the New England forest has experienced many natural disturbances including hurricanes, ice storms, tornadoes, downbursts and thunderstorms, insect and disease outbreaks, and fire. Native people populated the region for millennia, subsisting by hunting, gathering and horticulture. Although they had an impact on forest structure and composition, the overall rate of forest disturbance was low prior to European arrival. Mature forests were widespread in a landscape broken primarily by wetlands and water. Forest composition has shifted with climate change and other disturbances since the last Ice Age, but for thousand-year intervals it remained relatively stable.

European settlement transformed this landscape by converting forests to farmland and leaving less than 40 percent of New England's land in forests (Foster and O'Keefe 2000, Donahue 2004). These lands were largely areas too wet, steep, rocky or remote to warrant clearing. At the height of agriculture in the 19th century, most of New England was comprised of isolated patches of forest in an expanse of farmland (Figure 1a). Beginning in the mid-1800s, the regional abandonment of farming initiated broad-scale reforestation in Massachusetts and other New England states (Figure 1b). Despite periodic impacts from cutting and other disturbances, forest area continued to expand until recently, when forest cover again began to decline as suburbanization increased.

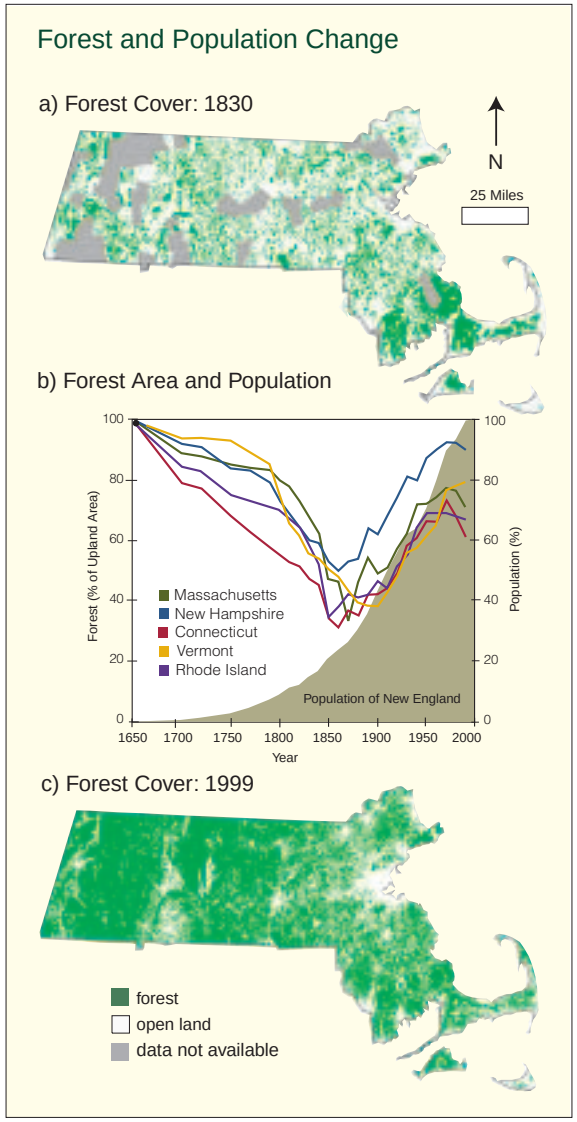


Figure 1. *Historical changes in forest cover and human population. Sources: Hall et al. 2002, Foster and Aber 2004.*

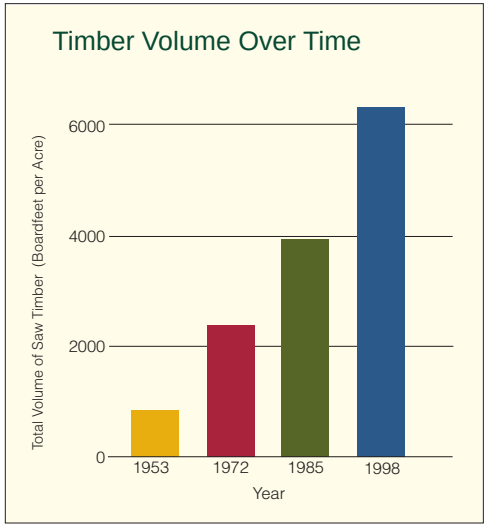


Figure 2: *Change in forest volume in Massachusetts during the past half-century. Source: modified from Berlik et al. 2002.*

Today Massachusetts is more than 60 percent forested and ranks eighth nationwide in percentage of forest cover (Figure 1c; Alerich 2000). Some parts of western Massachusetts reach nearly 90 percent. Across the state, forests contain more wood than at any time in the past 200 years (Figure 2; MISER 2002, Berlik et al. 2002, Foster and Aber 2004). The forest itself is relatively diverse as it supports northern tree species (e.g. sugar maple, beech, yellow and white birch), southern species (e.g. oak, hickories and chestnut), and wide-ranging species (e.g. red maple). Hemlock and white pine are the dominant conifers, along with pitch pine on sandy soils and rocky outcrops.

The remarkable return of the New England forest conveys a deceptive sense of human accomplishment and environmental security (McKibben 1995). Just as forest recovery a century ago was an inadvertent consequence of decisions made by thousands of independent individuals, uncoordinated human activity in the absence of a regional conservation plan now threatens these forests. Currently, Massachusetts loses approximately 40 acres of open space daily to development (MAS 2003). As Massachusetts Audubon's *Losing Ground* report shows, between 1971 and 1999 developed land increased from 17 to 24 percent of Massachusetts, while "wildlife habitat" (defined as forest, wetlands and open water) declined from 70 to 64 percent. Massachusetts Audubon has also identified a "sprawl frontier" where there is high potential for intense development in the near future (Figure 3).

Fortunately, approximately 20 percent (one million acres) of Massachusetts is already protected from development (Figure 4). More than half of this protected land is publicly owned and provides a strong foundation for future conservation efforts. The Executive Office of Environmental Affairs (EOEA) is the largest landowner in Massachusetts, with more than 500,000 acres managed by three agencies. The Division of Water Supply Protection manages approximately 100,000 acres to provide water to more than 2.5 million residents of metropolitan Boston. The Department of Conservation and Recreation manages nearly 300,000 acres for multiple uses, and the Division of Fisheries and Wildlife manages 120,000 acres for habitat and biodiversity. Cities and towns own another 257,000 forested acres primarily for water supply and open space. Federal ownership includes Cape Cod National Seashore (43,604 acres), small parks, and flood-control lands of the Army Corps of Engineers.

Nevertheless, the existing protected lands do not provide a sufficient number of large forest blocks, reserves of old and naturally functioning forest, or adequate natural resources. Given the extraordinary environmental, social and economic values of the forests and their current condition – expansive but inadequately protected from development and unsustainable forest practices – there is a clear need for a broad-scale approach to forest conservation. Unless the state and its citizens change course, the cumulative effects of many uncoordinated decisions will undermine the future sustainability of Massachusetts forests and environment.

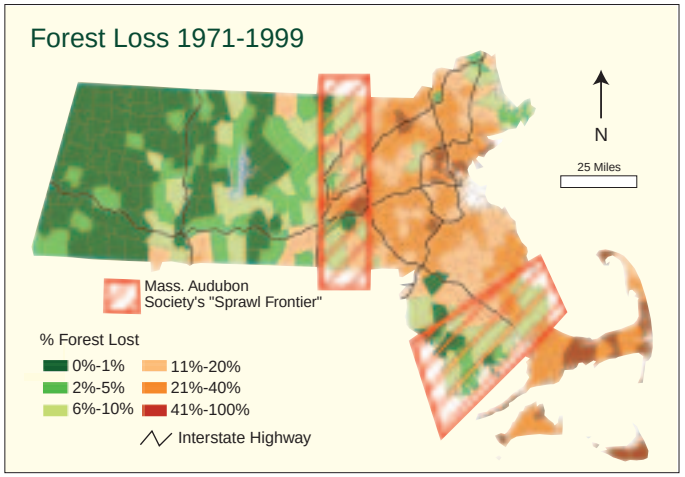


Figure 3: *Loss of forest cover in Massachusetts, 1971-1999, and areas of high-potential development based on building permits issued between 2000 and 2002, known as the "sprawl frontier". Sources: MassGIS and MAS 2003.*

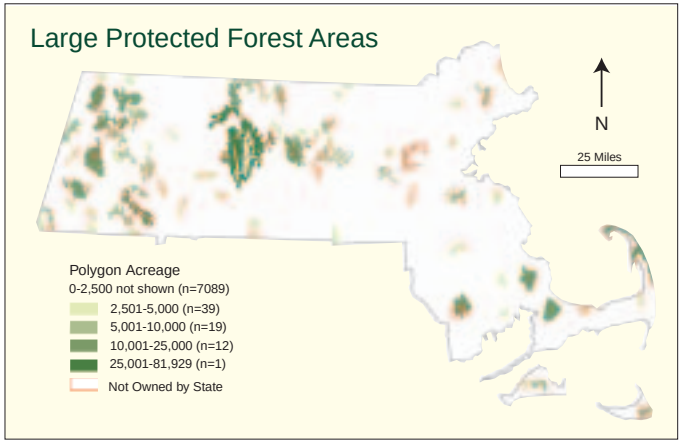


Figure 4: *Large (> 2500 acres) continuous forest areas that are protected from development on state-owned and private lands. Most of the larger areas and 69% of the total area shown are owned by the state of Massachusetts. Source: modified from MassGIS.*

We propose a bold vision to add approximately 1.5 million acres to the state's existing protected land base of one million acres, to reach a target of 2.5 million acres – half of the state of Massachusetts. We further propose that 250,000 of these acres should be large Wildland reserves that would be embedded within 2.25 million acres of managed Woodlands. This framework for conservation relies on mutually reinforcing public/private collaboration to provide both labor and funding. Together, Wildland reserves and managed Woodlands will maintain and enhance the state's biodiversity while offering future generations environmental services, recreational opportunities and economic benefits in a permanently forested landscape.

Here are the details of the vision:

Wildland reserves: 250,000 acres

Wildland reserves would be large, "unmanaged" lands (5,000 to 50,000 acres) situated predominantly on existing public land. Wildlands would be selected to accomplish five objectives:

- To promote natural landscape-level processes, ecological patterns and biodiversity across the region's range of forest and environmental conditions;
- To protect water supplies;
- To protect, connect and enhance existing old-growth forests;
- To provide opportunities for the scientific study of natural processes and reference for the changes occurring in actively managed forests; and
- To afford special educational, recreational, aesthetic and spiritual experiences.

Managed Woodlands: 2.25 million acres

The Woodlands will comprise the remaining state-owned forests and conservation land and an additional 1.5 million acres of currently unprotected land largely in private ownership. Woodlands will accomplish four objectives:

- To support biodiversity by reinforcing the Wildlands, providing habitat variation and supporting assemblages of plants and animals that do not occur on the reserves;
- To enable sustainable resource production such as timber, wildlife and clean water;
- To provide ecosystem services that sustain life and generate many direct and indirect economic benefits, including productive soils, clean air and natural flood control; and
- To provide extensive recreational, educational, aesthetic and spiritual experiences.

Overall, this vision:

- Ensures that substantial areas of actively managed forests *and* reserves will be protected in perpetuity to provide environmental, recreational, educational, economic and aesthetic benefits that the state and its citizens need;
- Provides for statewide distribution of forest conservation lands to accommodate the range of forest ecosystems, species and values;
- Encourages leadership and involvement by local communities and landowners to enable flexibility in the design of forest conservation areas;
- Leaves more than half of already protected state-owned lands available for timber harvesting; and
- Complements other initiatives that are designed to focus development and economic growth.

Wildland Reserves

The Value of Wildlands

Wildlands (definition):

Protected landscapes of forest, aquatic and wetland ecosystems that are allowed to develop, maintain and promote natural processes and conditions with minimal human impact.

For decades, ecologists have recognized the need for networks of reserves to meet a wide range of conservation objectives (Baker 1992, Noss and Cooperrider 1994, Poiani et al. 2000). Small reserves are often critical for the protection of rare species, uncommon habitats, biological "hot spots" and common species with restricted ranges. They may also provide important educational opportunities in populated areas. However, these small areas must be augmented with substantially larger reserves in order to support wide-ranging wildlife and to allow landscape-scale natural processes to unfold.

Large Wildland reserves provide several essential functions. They:

- Enable natural processes including disturbance regimes to operate and drive ecosystem dynamics in complex and varied ways at a landscape scale;
- Minimize extinctions by maintaining colonization sources for species to re-establish following disturbance;
- Protect and promote natural landscape structural patterns that are altered elsewhere by management and fragmentation;
- Provide adequate habitat for viable source populations of wide-ranging interior-forest species; and
- Protect examples of natural ecosystem function unaltered by direct human impact.

Another critical role of large Wildland reserves is to provide unbroken tracts of forest with the potential to develop old-growth structure. Although few plant or animal species appear to be exclusively dependent on old-growth ecosystems, some species occur in greater abundance or are more productive in forests with old-growth characteristics (Cooper-Ellis 1998, Aber et al. 2000). Given the relatively uniform age and structure of modern forests, large Wildland reserves will eventually enhance overall habitat diversity through the addition of complex patterns of dead and downed wood, increased variation in forest canopies, and greater habitat complexity in forest streams. It is important to allow the development of extensive ancient forests, which were once among the most common features of the landscape.

Wildland reserves also provide critical reference areas for evaluating the consequences of human impacts on other forestlands. The reserves will become a focus for enlightening studies of long-term forest dynamics (Peterken 1996, Aber et al. 2000). Although many forests worldwide have recovered from intense human impacts, including forest clearance and agriculture, there have been no studies of the processes by which large areas become increasingly controlled by natural dynamics (Turner et al. 2004).

As other Northeastern forests continue to be fragmented by development, a well-conceived system of protected Wildlands would distinguish Massachusetts as a destination in which scenery, recreation and natural history can be appreciated. This anticipated use is one important reason for designating numerous large reserves. Another benefit arising from wild landscapes is the opportunity for meditative enjoyment of nature free from human domination, operating at its own pace and rhythm. Large Wildland reserves would provide such natural spaces in perpetuity. Over time these landscapes will become invaluable as the human population increases and life's pace continues to ratchet upward.

Wildland reserves would also honor places of long-standing reverence and cultural significance, including Native American sacred areas, trails, archaeological sites and icons of colonial history (Leverett and Beluzo 2004). Whether they focus the mind on natural history, cultural history or aesthetic and spiritual reflection, reserves are special places for contemplation and peaceful enjoyment.

Another critical value of large Wildland reserves is their role in providing unbroken tracts of forest with the potential to develop old-growth structure.

The intent of the Wildlands network is to designate large areas that can operate without human intervention in order to encourage natural characteristics, processes and species to thrive.

Despite the laudable history of conservation in Massachusetts, the current pattern of ownership and management leaves forests vulnerable to fragmentation. Although exact figures are lacking, substantially less than one percent of forestland in the state is permanently protected from harvesting and other human impacts (The Nature Conservancy and Sweet Water Trust, unpublished data). These areas are primarily small forest patches, often poorly buffered from outside activities.

Moreover, old-growth and unmanaged mature forests are among the most poorly represented ecosystems in the region. Massachusetts has fewer than 3,000 acres of old-growth forest scattered over 25 sites (Figure 5; Dunwiddie and Leverett 1996; Orwig, D'Amato and Leverett, personal communication). These isolated tracts are mainly restricted to a few locations in western Massachusetts, are largely dominated by hemlock, and capture only a small fraction of the state's variation in forest types and biodiversity (Dunwiddie et al. 1996, Orwig et al. 2001).

To remedy this situation, we suggest that Massachusetts establish a statewide network of large Wildland reserves embedded in a landscape of managed Woodlands that would encompass five percent of the State's land area. The reserves would be carefully conceived and legally designated as Wildlands where natural dynamics would prevail.

With a Wildlands network there would once again be forest expanses where organisms and ecosystems grow, mature and die according to biological and environmental constraints and the vagaries of natural disturbance. The establishment of such a network would signal a great shift in philosophy from a past in which reserves were either relegated to unproductive sites or were actively managed for specific human ends, to a future in which representative forests are allowed to develop without human impact.

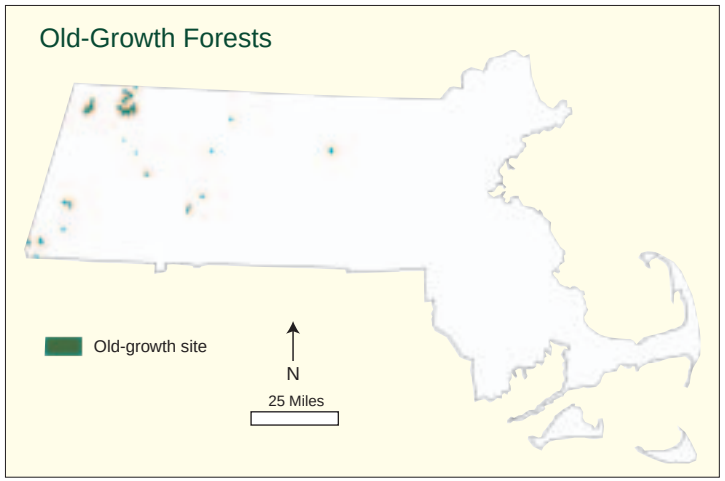


Figure 5: *The distribution of old-growth forests in Massachusetts. Sources: R. Leverett and G. Beluzo (unpublished data).*

How large?

We propose that Wildland reserves in Massachusetts span the range from 5,000 to 50,000 acres or more.

While many small reserves (hundreds to a few thousand acres) are necessary to address biodiversity conservation priorities across the state (Land Conservation Plan Task Force 2003), we consider those to be part of the Woodlands and limit our discussion here to *large* reserves intended to protect dynamic ecological systems and processes. Many attempts have been made to determine the *right* size for Wildlands in order to support landscape-level processes, natural disturbance regimes, forest interior animals and wide-ranging wildlife. In one notable example, Anderson (1999) set 25,000 acres as the *minimum* area needed when identifying priority forest blocks to be conserved in the northern Appalachian region, recognizing that even these areas would be unlikely to ensure the viability of wide-ranging species. Here we take a more general approach and suggest that, given the much greater level of fragmentation and more frequent broad-scale disturbances in Massachusetts, Wildland reserves should span a range of sizes and must include large reserves of 50,000 acres or more. Reserve sizes ranging from 5,000 to 50,000 acres are modest from the perspective of conservation biology and Wildlands criteria (Noss and Cooperrider 1994, NFA 1997), but exceed the size of existing old-growth forests and reserves by orders of magnitude.

How many?

We suggest that a target figure of 15 to 20 large Wildland reserves represents a reasonable initial goal for Massachusetts.

Numerous reserves are needed to capture a broad spectrum of environmental conditions, vegetation types and biodiversity; safeguard the system from the impacts of large events (e.g., hurricanes, downbursts, ice storms, pests/pathogens) that might alter any single area; and moderate the recreational pressure on individual areas (Baker 1992, Foreman and Daly 2000, NFA 2001). Based on the range of variation in physiographic and environmental conditions in Massachusetts (Griffith et al. 1994), we suggest that 15 to 20 large Wildland reserves represents a reasonable goal.

Where should they be located?

Current ownership patterns argue for the majority of the Wildlands to be located on existing state-owned lands.

The large blocks of land in state-owned forests, parks, recreation areas, wildlife management areas, and watershed management areas are well distributed throughout Massachusetts and contain many natural, cultural and environmental features that warrant Wildland reserve status. Given public ownership and the responsibility to manage these lands for the public good, there is a solid rationale for designating a sizable portion of these lands to provide the ecological, aesthetic, recreational, educational and economic values of Wildlands. These public lands represent exactly the qualities that are needed to allow exemplary natural landscapes to flourish.

In addition, a regional effort led by The Nature Conservancy identified large forest blocks throughout New England with high ecological value (Figure 6). Western and central Massachusetts emerged as important regions for conservation and are identified here as areas that contain potential Wildland reserves (Figure 7a, c and d).

Finally, there are excellent candidate reserves on properties held by municipalities (especially water districts), conservation organizations, utility companies and private landowners. In some places, the most effective design will involve cooperation among abutting landowners; for example, between conservation organizations, utilities and the State. In other situations, individuals may decide to devote their land to extending the effective size of an adjacent public reserve. In many instances, the land required is already owned in its entirety by effective stewards and could be designated as Wildland immediately. In other places, the continuity, shape and effectiveness of reserves may be enhanced through the strategic acquisition of additional land.

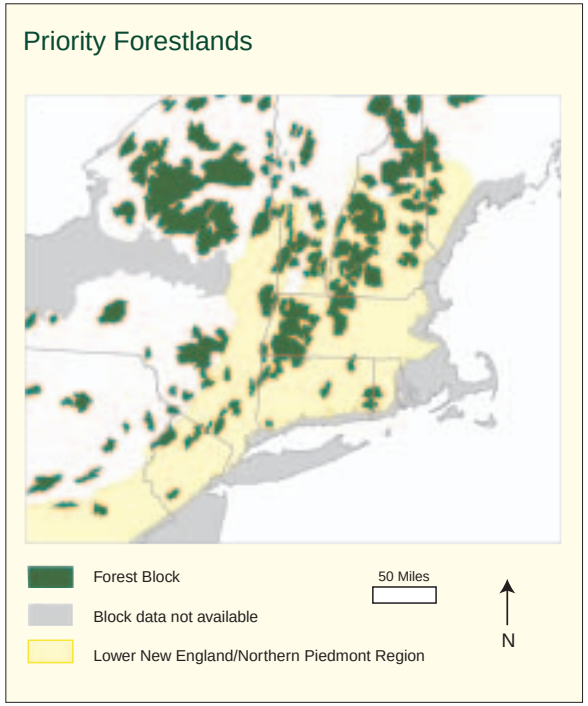


Figure 6: *Large, continuous blocks of forestland that have been identified as priorities for conservation. Source: The Nature Conservancy.*

Box 1. Potential Wildland Reserves

Many of the strongest candidates for Wildland reserves exist on public lands that are already protected from development. Here we highlight just a few of the many possible areas for consideration statewide (Figure 7a-d).

- Large reserves in the northwestern corner of Massachusetts would protect and enhance existing old-growth areas. These reserves could be designated across a series of existing state-owned lands managed by the Department of Fish and Game and Department of Conservation and Recreation (Figure 7a).
- A single large reserve, providing access to a large urban community, could be established in southeastern Massachusetts within the Southeastern Bioreserve recently created through a partnership between the city of Fall River, Greater Fall River Land Conservancy, the Commonwealth of Massachusetts and The Trustees of Reservations (Figure 7b).
- Large reserves capturing interesting and varied forest types, diverse physiography, and unusual plant and animal assemblages could be established on state-owned land in the Southern Taconic Mountains (Figure 7c).
- The largest reserve in southern New England could be created in central Massachusetts on the Quabbin Reservation. This is the single largest conservation area in the region, and it is currently actively harvested for timber by the Division of Water Supply Protection (Figure 7d and 8).

Although these properties are all large, they span a range of ecological, geographic and management conditions. In addition, they underscore contrasting mechanisms for assembling reserves across diverse ownership and management. We do not suggest that all of these examples should necessarily become reserves – there may be good reasons why some of them should not. We suggest that they, and others like them, should be considered as part of an open public discussion on Wildland reserve selection.

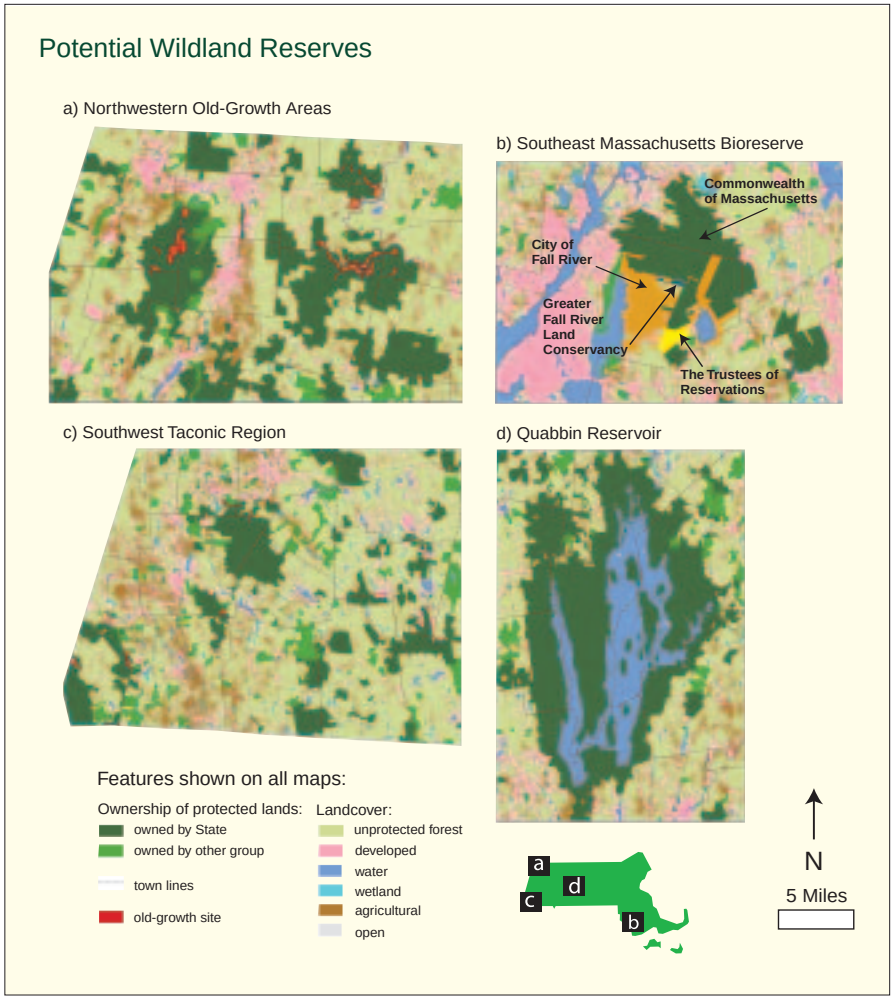


Figure 7: *Examples of potential Wildland reserves: a) Northwestern corner of Massachusetts, b) Southeastern Bioreserve, c) southern Taconics, and d) the Quabbin Reservoir Reservation.*

How should they be managed?

The primary objective of reserve management should be to allow natural processes to determine the long-term structure, composition, function and dynamics of the forests and landscape.

Given the focus on natural processes in Wildland reserves, there should be a prohibition on all direct human impact including all forms of forest harvesting. Most emphatically, there should be a proscription against salvage or pre-emptive logging associated with disturbance (e.g., fire, wind storm, ice storm) or pest and pathogen outbreaks (Lindenmayer and Franklin 2002). We strongly advocate that Wildland managers assume a humble and hands-off approach. Elsewhere, this proposal calls for 2.25 million acres of protected Woodlands where people can manage for the particular vision they wish to achieve. Wildlands should be left unmanaged to allow natural responses to disturbance to proceed unimpeded.

As in federal wilderness areas, motorized vehicles should be prohibited from the Wildlands. In many cases, opportunities may arise to remove roads and to replace them with walking paths. Virtually all reserve areas will retain legacies of past land-use activity for decades or centuries (McLachlan et al. 2000, Goodale and Aber 2001, Foster et al. 2003). Nonetheless, we do not regard this history as an impediment to the future development of Wildlands, old-growth forests, or dynamic landscapes (Box 2). Individual decisions will need to be made regarding the disposition of human structures; for example, it may be desirable to remove dams that alter critical aquatic habitat. However, we believe there is little justification for removing artifacts such as stone walls, cellar holes and cemeteries. Indeed, these structures are often legally protected and provide important historical, scientific and cultural information. Moreover, historical artifacts are a reminder of the great ecological and cultural transformation of the landscape and the ability of nature to change. They are not foreign, but part of the fabric of Wildlands in New England.

The intent of Wildland reserves is not to return to an idealized wilderness past, nor to re-create a prehistoric landscape or particular reference condition. Rather, the intent is to maximize the natural quality of the landscape in representative locations and to provide broad lessons and experiences to humans. Persistent human artifacts may yield thoughtful insights and will, like stone walls throughout the forests, provide a subtle reminder of the past.

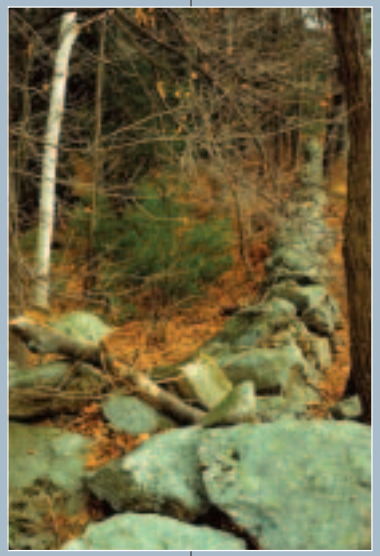
Passive recreation, educational activities and non-destructive scientific inquiry should be allowed in most, although not necessarily all, reserves. Vulnerable watershed lands, areas of intense research using delicate equipment, or sensitive wildlife habitats might require limits on access or recreation.

One fortunate characteristic of the moist climate and temperate forest conditions of New England is that frequent fire is not an integral process in most ecosystems here (Patterson and Backman 1988, Parshall and Foster 2002). Consequently, in most reserves there will be no need for managers to wrestle with the difficult issue of how to deal with fire. Where fire or the application of other management prescriptions is desired, the forest can be designated as a Woodland.

By leaving these Wildlands alone to follow their independent trajectories, the reserves will diverge in quality and character from the surrounding Woodlands and take on an increasingly natural and wild appearance. Many will be dominated by large live and dead trees and downed wood on the ground as well as in streams, lakeshores and wetlands. Not all areas will become old-growth forest: there will be wind-thrown stands that develop into dense thickets of regenerating saplings, areas heavily browsed by moose, and messy tangles of snapped and uprooted trees in areas damaged by insects or ice. The reserves will clearly display the message that nature is dynamic, that it does not always progress to, and remain in, a majestic state, and that it can be challenging to people.

Box 2. Wildlands from Human Lands: Reconciling Stone Walls in Old-Growth Forests

To some people the notion may seem incongruous: encouraging natural processes to predominate in areas like New England that bear widespread evidence of past human history. After all, over the next century or two, what will be made of a series of reserves that support old-growth forests along with stone walls, ancient cellar holes and woodland paths? Will these areas be true Wildlands and will they provide the ecological and social benefits of natural forest ecosystems?



Three lines of evidence argue that such reserves will have great ecological and social value and that their cultural history will not detract from their Wildland status. First is the recognition that nature recovers and obscures its history with remarkable speed. Across New England lie countless ancient woodlots that were cut, burned and grazed repeatedly in their colonial past, but which today exhibit little evidence of these impacts to even the careful eye (Stephens 1956, Foster et al. 1992). Indeed, painstaking studies of soils, tree rings, fossil pollen and charcoal are required to obtain conclusive evidence of this history (Oliver and Stephens 1977, McLachlan et al. 2000). When forests are left alone and subject to natural processes, many old-growth attributes develop in the span of a few human generations or less (Foster et al. 1996).

Results from such historical research yield a second argument for the establishment of Wildlands in humanized landscapes. Studies from around the globe reveal that few landscapes are truly pristine and that cherished and diverse forest ecosystems have supported large human populations and witnessed intense human activity in the past (Gomez-Pompa and Kaus 1992, Sanford and Horn 2000). Across the Amazon Basin from Brazil to Bolivia, thick soil layers are blackened with charcoal and laden with pottery shards – evidence of thriving civilizations and tumultuous landscape changes. Estimates suggest that 10 to 20 percent of the Amazon lowlands were drastically altered by human activity (Mann 2002). Further north in the Yucatan peninsula, the expansive forest landscape once supported a highly advanced agricultural society (Turner et al. 2004). To even a trained eye, the modern forests and land appear natural and ageless, but close scrutiny uncovers ancient stone walls, house mounds and magnificent temple sites. Despite a past of intense human activity, these landscapes support extraordinary biodiversity and thriving natural processes today (Gomez-Pompa et al. 2003, Turner et. al 2004).

Finally, the designation of reserves in the cultural landscape of Massachusetts has magnificent precedent elsewhere in New England. In the White Mountain and Green Mountain National Forests of New Hampshire and Vermont, harvesting is prohibited from nearly 50 percent of the forests, including broad areas designated as federal wilderness areas. Although small portions of these areas support old-growth forest, the vast majority experienced intensive logging or fire in the 19th and 20th centuries (Gore and Patterson 1985, Goodale et al. 2000). Despite the presence of abandoned roadways and rail beds and other reminders of this human history, the wilderness areas promote critical ecological processes and dispersed recreational use that make these national forests among the premier conservation landscapes in New England.

Studies ranging from the tropics to the temperate region confirm the ability of forests to recover from past disturbance, to support natural processes and rich assemblages of native organisms, and to develop old-growth characteristics. The assumption that nature lacks a human past or presence denies the history of New England. In creating new wild places in the landscape, we seek to incorporate and embrace, rather than deny, this history of the land.

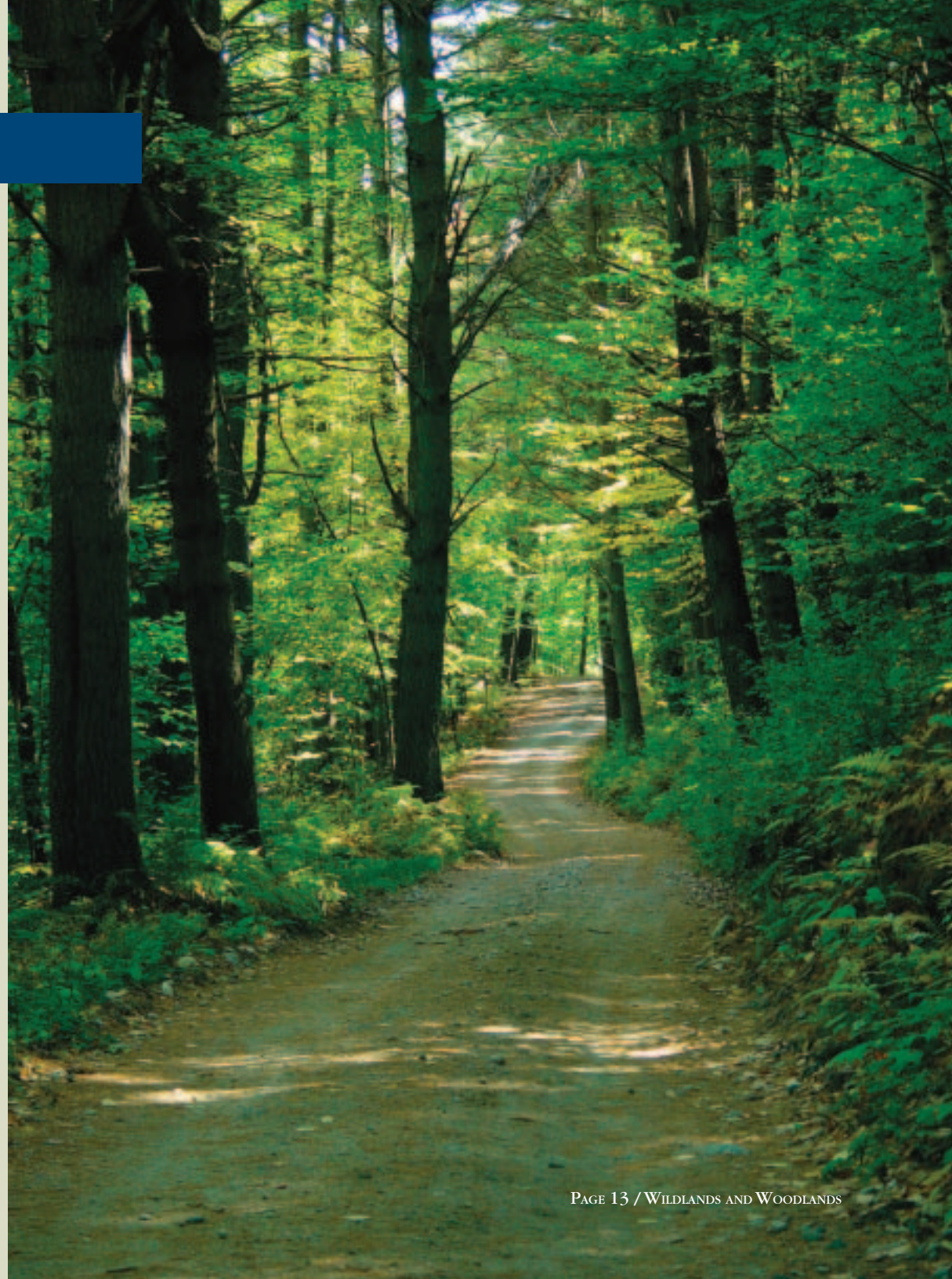
Managed Woodlands

The Value of Managed Woodlands

Woodlands (definition):

Well-managed forests of mixed ages and species that provide a wide array of benefits from habitat diversity to locally grown wood products.

Managed Woodlands provide many important benefits, including wildlife habitat, clean air, clean water, value-added wood products, employment, recreation, educational opportunities, spiritual connection and beauty. These Woodland values are strongest in conjunction with Wildland reserves. We believe that managed Woodlands and Wildland reserves should not be viewed separately, but as part of a connected landscape that protects all forest values. Here we focus on the conservation of extensive well-managed Woodlands in Massachusetts on public and private land with the goal of increasing the one million acres that are protected today to 2.25 million acres within the next three decades.



In the long term, protecting large blocks of forest land is crucial to retaining the greatest numbers and diversity of forest plants and animals (Lindenmayer and Franklin 2002). Large areas of Woodlands are critical to maintaining viable populations as plants and wildlife respond to environmental disturbances such as climate change. A primary goal of Woodlands protection should be to facilitate the dynamics and movement of species, and to allow the ongoing formation of new assemblages of plants and animals as has occurred throughout time (Foster et al. 1990). To be effective, biodiversity protection must go beyond simply preserving species in their current location; it must anticipate the changes that will occur in the future (e.g. Davis and Shaw 2001). Managed Woodlands will bear much of the burden for long-term protection of biodiversity and a sound environment. The Woodlands are not simply "buffers" for reserves; they are the means to accommodate forest species in the face of future change.

Managed Woodlands also play a central role in the provision of other ecosystem services, such as water quality and supply, aquatic habitat, regulation of stream flow and recharging of aquifers. Forests help moderate the climate and improve air quality, critical benefits in densely populated areas. While Wildlands cannot be equaled in providing these services, in most cases well-managed Woodlands do nearly as well (Barten et al. 1998, Aber et al. 2000) and, as a practical matter, encompass a much larger land area.

At the same time, managed Woodlands in Massachusetts can help bridge the divide between wood supply and demand. At the present time, roughly 98 percent of the paper and timber products consumed in Massachusetts come from beyond its borders. Yet landowners are harvesting only a small fraction of the sustainable yield of wood from within the region. Failing to harvest the forests effectively, we place a disproportionate burden on other parts of the world, from British Columbia to Brazil, and from Chile and Malaysia to Siberia (Berlik et al. 2002). This approach also forfeits the economic benefits and jobs, so vital to rural towns, which come from producing value-added wood products here at home.

Lastly, managed Woodlands are important in fulfilling connections between people and nature (Donahue 1999, Foster 1999). Given their greater extent, availability, and tolerance for human influence, Woodlands can accommodate more people and a greater range of recreational activity than Wildlands. The Woodlands are a place for daily walks, a picnic, a bike or snowmobile ride. Woodlands can handle more intensive recreation without losing their distinctive qualities and thus can provide frequent enjoyment of nature to many people. A surprising degree of solitude can be found even in heavily used suburban Woodlands, such as Walden Woods in Concord, simply by walking at odd hours, during the off-seasons or by following the paths "less taken."

The intent of the Woodlands network is to protect managed Woodlands that will augment Wildland reserves and promote diverse conditions through ecosystem management, especially sustainable forestry.

Despite concerted efforts to promote forest stewardship, sprawling development and the lack of an effective system to reach landowners have led inexorably toward fragmented forests and uncoordinated timber harvesting (Kittredge et al. 2003) (Figure 8). A century of government programs seeking to cajole individuals into forest protection and management has made only modest progress. Only a small percentage of Massachusetts landowners manage their forests under the guidance of a long-term plan or professional assistance. Fewer than 20 percent of eligible owners participate in the current-use tax program, which provides as much as a 95 percent reduction in property taxes but requires a long-term commitment and a state-approved management plan. Across the Northeast, only five percent of private owners (representing 29 percent of the forest) have forest management plans (Birch 1996). Consequently, many decisions are made in response to immediate need, which often results in "high grading" – cut the best and leave the rest. Moreover, forests continually change hands. The average duration of land ownership in Massachusetts is about 20 years, and the ongoing division of properties results in more owners holding ever-smaller parcels (DeCoster 2000, White 2001).

To improve this condition, we suggest that Massachusetts establish a network of Woodlands that are protected from development and managed sustainably for diverse objectives. These Woodlands would be protected through conservation easements established by willing landowners, fee acquisition and legal designation. Achieving this vision poses two distinct but related challenges: protection and management. Doubling the million or so acres of protected forest may take decades; the responsibility of caring for these lands will extend indefinitely.

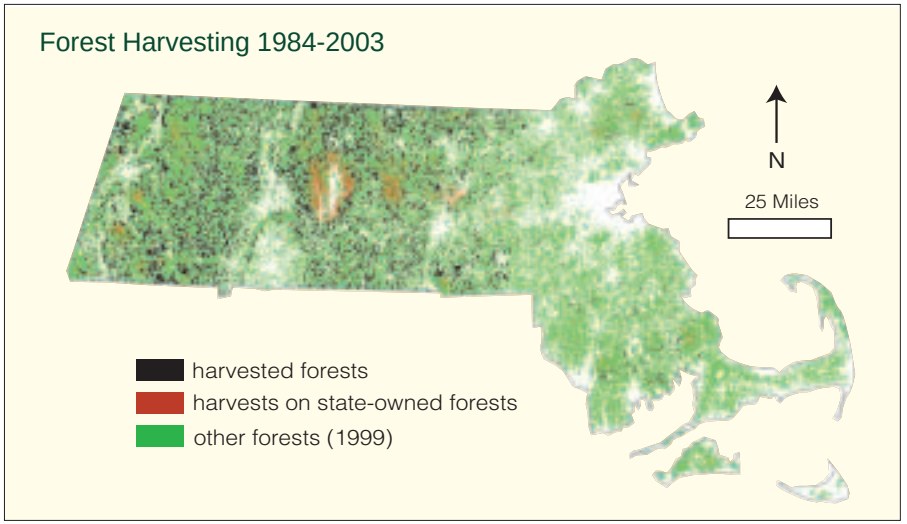


Figure 8: *Forest harvesting in Massachusetts conducted from 1984 to 2003 shown with 1999 forest cover. Sources: Harvard Forest (unpublished archives) and MassGIS.*

How much?

There may be no objective way of determining exactly how much managed Woodland we need, but we submit that a reasonable and achievable goal is 45 percent of Massachusetts, or 2.25 million acres.

Protecting nearly half of Massachusetts in forest is consistent with the goals of other studies such as the Statewide Land Conservation Plan (SLCP) (Figure 9) and Biomap (Land Conservation Plan Task Force 2003, EOEA 2001). Aiming to protect more forest may be unrealistic given current development trends and the parallel need to save farmland and other habitats. But with 50 percent of the landscape in forest (even more in the western part of the state), it will be possible to maintain landscape-level connectivity between many large tracts. Once Wildland reserves have been demarcated, we believe that a broad array of ecological and social goals will be best served by devoting the remaining forest to diverse, well-managed Woodlands.

Today, the bulk of the region's forest belongs to tens of thousands of owners. Even after they are protected, these Woodlands will remain a mosaic of owners and objectives: federal and state-owned lands; town forests and municipal water-supply lands; tracts owned by land trusts, conservation organizations and other non-profits; and many thousands of privately-owned parcels protected by conservation restrictions. Although this diverse ownership poses a challenge to coherent management, on balance it represents a remarkable landscape to work and thrive with into the future.

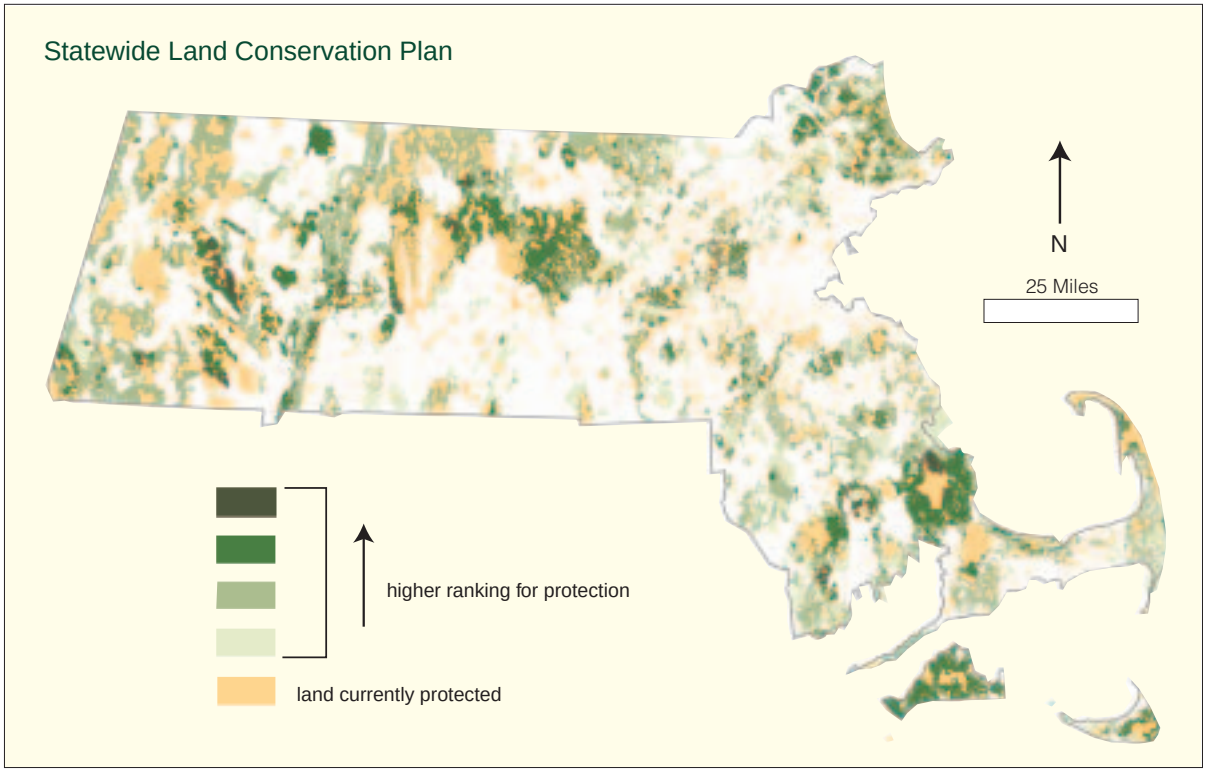


Figure 9: *Statewide Land Conservation Plan map. Source: Land Conservation Plan Task Force (2003) and MassGIS.*

Where should they be located?

Groups in Massachusetts have completed a land protection plan that provides a guide to conservation in the State.

Through a multi-year collaborative effort, the Statewide Land Conservation Plan (SLCP) identified 1.5 million acres of high priority lands that should be protected from development (by acquisition or easements) in the next two decades (Land Conservation Plan Task Force 2003). Of this, approximately one million acres are "buildable" and therefore most at risk. The SLCP lands include farmland and other open space that is not wooded, but that certainly satisfy a complementary objective. In addition to the SLCP, lands of conservation interest have been defined by The Nature Conservancy's Forest Matrix and Northern Appalachians Initiatives, The Trustees of Reservations' Highlands Initiative, the Quabbin-to-Cardigan collaborative and other efforts. We are confident that the common elements of these plans have already set forth the main lines of a statewide network of Woodlands. Guided by these plans, the Woodland Councils described on the following page would identify additional lands of local priority and help drive forward the work of coordinated protection.

Sustainable forestry allows diverse forests to supply a steady stream of quality wood products while maintaining and enhancing environmental values.

How should they be managed?

Protected Woodlands will experience a range of management, from benign neglect to sustainable forestry and habitat improvement, to address specific ecological and conservation goals.

Once large reserves have been designated, a wide diversity of management across the surrounding Woodlands can be beneficial. We anticipate an array of ecosystem management efforts aimed at encouraging certain species and combating others, such as targeted cutting, prescribed burning and control of invasive plant species. We also urge that the bulk of the Woodlands be devoted to sustainable wood production consistent with the large volume of timber available in Massachusetts forests.

Sustainable forestry allows diverse forests to supply a steady stream of quality wood products while environmental values are maintained or enhanced. Low-value trees are removed from maturing stands, leaving the best to grow. High quality timber is then harvested in a planned and sustainable fashion using low-impact logging

methods that do not damage remaining trees, lower the future timber value of the stand, degrade wetlands and streams, or leave an unsightly mess (Lansky 2003, McEvoy 2004). The vast majority of forest species present in Massachusetts will thrive under such conditions. There are many foresters and loggers across the region skilled in these practices, and many landowners who already employ them. What is sorely needed is a widespread culture of stewardship that encourages sustainable forestry to spread across the landscape, and makes it economically viable.

We propose the formation of five pilot Woodland Councils to promote the protection and sustainable management of working Woodlands.

Protecting and sustainably managing more than two million acres of Woodlands in thousands of intermingled ownerships is a daunting proposition. This cannot be accomplished by sweeping public acquisition or regulatory fiat. What is needed is a collaborative, bottom-up and voluntary approach that provides structure and guidance for those who aspire to conserve and manage their forests as part of a coherent program. We propose the establishment of regional Woodland Councils to lend new energy and focus to this effort.

Regional planning agencies assist Massachusetts communities with town planning, and watershed councils or associations help address water issues, but neither focuses on forests. The importance of forests to quality of life warrants the formation of regional groups devoted to forest stewardship. While current programs such as Tree Farm, current-use tax programs and government-underwritten free or cost-shared management activities have for decades reached out to a small segment of landowners, a much larger portion of the landowner population has been disinterested in these approaches. Moreover, with over 350 towns and 100 land trusts in Massachusetts, an improved structure is needed to facilitate communication and coordination among the many groups protecting and managing forests at the local level. Woodland Councils would help meet these needs by serving as an information *resource* and a project *catalyst.*

As an information *resource,* Woodland Councils would gather thorough information on their region's forests, compile maps and natural resource inventories, and provide landowners with access to current forest research and knowledgeable professionals in order to assist with land protection and management. Regional reports such as the recent SuAsCo Biodiversity Protection and Stewardship Plan (Clark 2000) provide a useful model for what could be accomplished in other regions.

As project *catalysts,* Woodland Councils would work with individuals and organizations to identify lands for conservation, advance sustainable forestry practices, and help interested individuals and organizations locate financial assistance to conserve and manage Woodlands. In the long term, they would provide timely assistance and up-to-date information to landowners and local communities, and help monitor the growing Woodland base.

Woodland Councils would be structured to involve local people and, like some existing partnerships, might include representatives of conservation organizations, land trusts, other non-profits, town conservation commissions, state agencies, licensed foresters, private land owners, forest industries and interested citizens. The Councils might be housed within a watershed association, land trust or conservation organization depending on the circumstances in each region. They could be organized geographically according to ecological divisions, such as the 13 eco-regions or 28 major watersheds. Eventually, Woodland Councils would cover the State in an ecologically coherent fashion at a practical scale for working on Woodland issues.

Several organizations are currently involved in the types of activities we hope to encourage through the establishment of Woodland Councils (Box 3). This call to form Woodland Councils is not intended to create more organizations; rather, it is meant to help these activities flourish, and to encourage better informed forestry and land protection in Woodlands.

We envision that Woodland Councils will be funded through public/private partnerships and established through a competitive process open to any organization. We propose that a five-year pilot program be established with five Woodland Councils distributed across the state. This pilot effort should be highly flexible: selection criteria should be based on a combination of diversity, creativity and promise for success. If the model Councils demonstrate success, as measured by increased Woodland protection, sustainable management and landowner and community involvement, the program could be expanded to all regions of the State.

If the citizens of Massachusetts desire to move proactively, conserve half of the state in forest, and bring to it a coherent, overarching strategy of ecological protection and sustainable production, it will be because the majority of landowners are actively involved in the destiny of these managed Woodlands.

Box 3. Woodland Council Examples

Although we know of no example of a functional Woodland Council operating in all the ways we suggest, there are several organizations that engage in activities characteristic of Woodland Councils, including:

- Outreach and education to private forest owners at a community or regional level as exemplified by the New England Forestry Foundation's North Quabbin Woods Community Forestry project, Nashua River Watershed Association, Eastern Connecticut Forest Landowner's Association, and the Windham County Woodland Owner's Association (Vermont);
- Information on wood marketing for a network of private landowners as accomplished through the Massachusetts Woodlands Cooperative, Athol Forestry Cooperative, Ltd., Southern New Brunswick Wood Cooperative, and many international efforts (e.g., Scandinavian and Japanese forest owner cooperatives);
- Land protection activities at the local level and holding of easements on managed forestlands, such as the work of the Mount Grace Land Conservation Trust, Society for the Protection of New Hampshire Forests, and New England Forestry Foundation;
- Coordination of regional land protection activities among organizations, such as the North Quabbin Regional Landscape Partnership (Figure 10), the Quabbin-to-Cardigan initiative, and the Southeast Bioreserve in Massachusetts;
- Networking of stakeholders (e.g., private landowners, industrial owners, citizens, environmental groups), sharing spatial information, and developing a shared vision for the forest in their region as developed by the Fundy and Eastern Ontario Model Forest and Nova Forest Alliance (Nova Scotia) in Canada;
- Production of wood and agricultural products from community land, and involvement of schoolchildren in management activities for purposes of environmental education, such as at Land's Sake in Weston, Massachusetts; and
- Facilitating local environmental restoration activities between private owners and environmental activists, as is done by LandCare groups in Australia, the Sylvan Trust in England, and other woodland associations in France and the Netherlands.

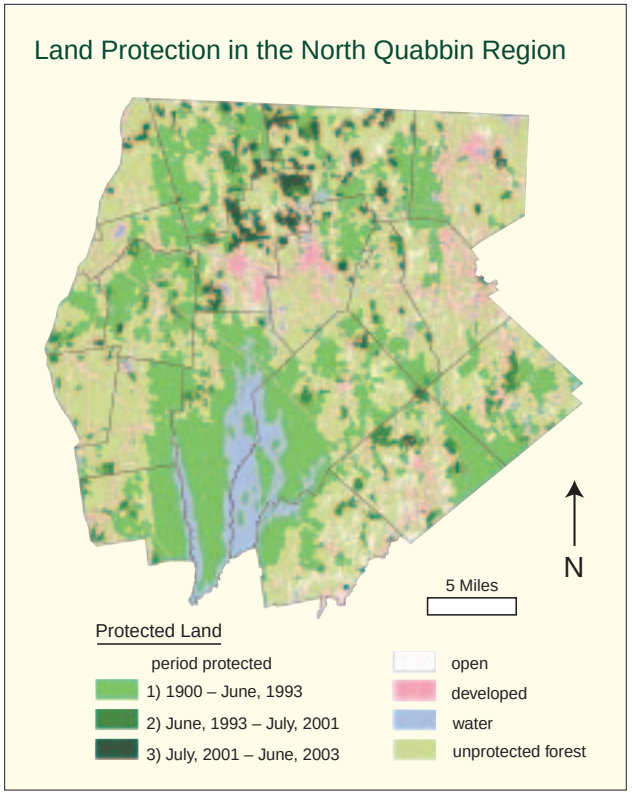


Figure 10: *Formation of a system of forest conservation lands over time in the North Quabbin Region of central Massachusetts. Sources: Golodetz and Foster (1997), Kittredge et al. (2003) and Malizia et al. (unpublished data).*

Wildlands and Woodlands: The Outlook

Massachusetts, like most of the Northeastern U.S., is at an environmental crossroads. After more than a century of reforestation, development is rapidly eroding and fragmenting its remarkable forest base. At a regional scale, the current conservation framework is neither adequate to protect large expanses of forest, nor able to manage the remaining forest in ways that fully realize its many benefits. As a consequence, the environmental, ecological, recreational, economic and social values of Massachusetts forestlands are being frittered away due to lack of foresight and action. This slow and permanent deterioration of the Commonwealth's natural infrastructure must be prevented for the good of the environment and human society.

Our call for the protection of 2.25 million acres of managed Woodlands on private and public lands and the designation of 250,000 acres of Wildland reserves is a bold proposition. Fortunately, the forests of Massachusetts will not vanish in the next few decades, although they may become increasingly fragmented and ecologically degraded. Recent analysis suggests that even if development continues at its current rapid pace, by 2027 approximately 31 percent of the state will be developed, while 57 percent will remain as wildlife habitat (MAS 2003). Half of the state will still be forested, as we propose it should remain in perpetuity. The difference is that under the Wildlands and Woodlands proposal, forest areas will be distributed and maintained in a planned, cohesive, productive and ecologically sound fashion in perpetuity. At the same time, these ambitious conservation goals leave ample land available for residential and commercial development, re-development and forest harvesting (Figures 11 and 12).

What steps must be taken?

We propose that the citizens and the Commonwealth of Massachusetts act now to initiate a sustained three-decade effort to achieve this Wildlands and Woodlands vision. Meeting these goals will depend on strong partnerships and the work of others who have come before us.

We envision several means of implementing and supporting the Wildlands and Woodlands vision. The following outline identifies some specific actions that could be taken by state and local government, the non-profit sector, citizens and landowners over the next five years to help make this vision a reality. Elements of this Wildlands and Woodlands vision may be implemented singly or jointly, depending on leadership, financial resources and decision-making authority.

However, beyond any specific actions, this vision is an outlook that fosters equal regard for both Wildlands and Woodlands, recognizing the important and intertwined nature of both.

The Wildlands and Woodlands approach fully recognizes the roles of private owners, organizations and agencies, and promotes cooperation and communication to conserve both Wildlands and Woodlands for the future.

Finally, it is critical to think across spatial scales, and protect and connect Wildlands and Woodlands across towns, watersheds, ecoregions and states.

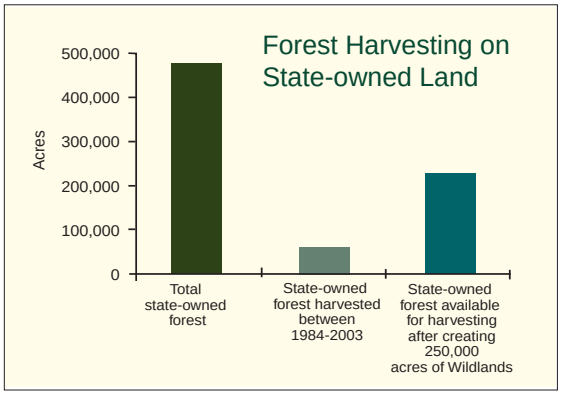


Figure 12: *The availability of state-owned land for harvesting after proposed protection. Source: Harvard Forest (unpublished archives).*

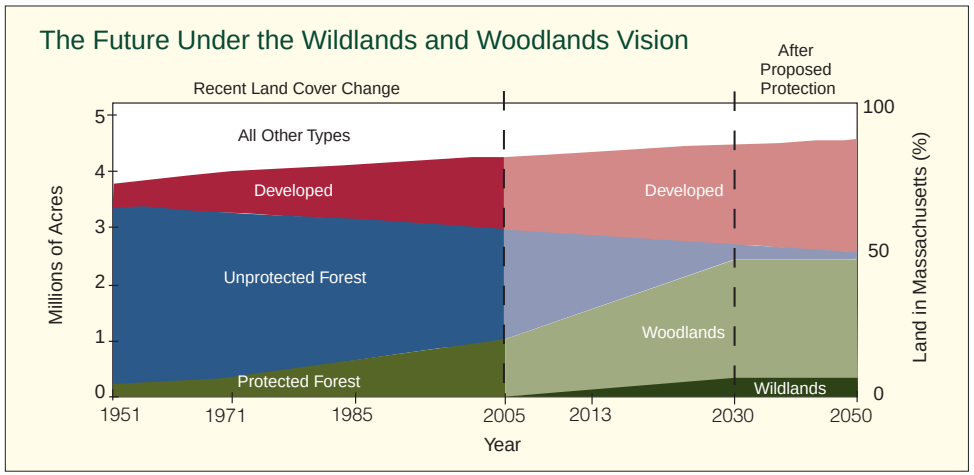


Figure 11: *Trends in land cover from 1951 to 2005 and a projection of the implementation of the Wildlands and Woodlands vision in 2050.*

State and local government:

1. Establish a dedicated line of funding for a network of Woodland Councils starting with a five-year pilot program of five Councils distributed across the state.
2. Establish a secure, dedicated source of land protection funds at the state level to buy conservation easements and establish Woodlands on high priority forestlands.
3. Evaluate existing public lands in order to designate a substantial portion as large Wildland reserves.
4. Propose and adopt statutory language for the establishment, monitoring and preservation of large reserves on public lands.
5. Support a functional current-use property tax program (modified Chapter 61) that provides annual tax relief to private landowners in return for maintaining land as open space.
6. Encourage and promote high quality management of public and private Woodlands by licensed foresters and trained loggers.

Non-profit sector:

1. Advocate for and augment the funding and activities described in the "State and local government" section.
2. Purchase, hold and/or monitor additional protected land and conservation easements.
3. Promote the vision of protecting half of the land base in Massachusetts through the interconnected approach of Wildlands and Woodlands.
4. Organize a partnership in your region to identify land protection needs and opportunities at the landscape scale.
5. Initiate or join a Woodland Council.
6. Match the public investment with contributions from private individuals and foundations to provide additional dedicated funding to oversee and manage Wildlands and Woodlands and develop the infrastructure needed to sustain them in perpetuity.
7. Work to improve communication and collaboration between diverse conservation groups and forest products organizations.

Landowners & other interested citizens:

1. Donate land to a land trust to protect as either Wildlands or Woodlands.
2. Donate a conservation easement to protect your forestland from development in perpetuity.
3. Learn about land management options and develop a plan for the sustained management and permanent protection of your land, whether for natural resources, biodiversity, aesthetics or natural processes.
4. Join or create a local Woodland Council.
5. Take an active role in state land protection policy and funding.

In Conclusion

We hope our proposal for an interconnected Wildlands and Woodlands approach will stimulate discussion that will build the collaborative spirit needed to reach these goals. Achieving the long-term vision will require investment by many generations, as stewardship of land demands a permanent human commitment. This enterprise can only succeed if it inspires the widespread dedication of individual landowners, communities, businesses and non-profit organizations, and receives the support and encouragement of state and local governments. To retain and enhance the diverse values of the forest will require us to forge new connections with the land and new collaborations across the landscape. The people and forests of Massachusetts deserve nothing less.

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