April 21, 2010

Richard K. Sullivan Jr.
Commissioner
Massachusetts Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114-2104

RE: Forest Futures Visioning Process Recommendations

Dear Commissioner Sullivan,

We, the members of the Technical Steering Committee (TSC) of the Forest Futures Visioning Process (FFVP), respectfully submit our final report and recommendations.

In the Spring of 2009, you initiated the FFVP and appointed the eleven-member TSC to develop recommendations for a renewed vision for stewardship and management of DCR forest lands. In an effort to fully understand the broad range of issues surrounding the stewardship and management of DCR forest lands, the TSC met several times over the past year and sought advice and input from many outside experts as well as the 23-member Advisory Group of Stakeholders. Also, we feel very fortunate to have received feedback and input from hundreds of private citizens from across the Commonwealth through our public forums, online surveys and through a dedicated website. The visioning process revealed just how deeply Massachusetts citizens care about their state forests and parks and how eager they are to engage issues surrounding their stewardship and management

Although many key on-the-ground details remain to be worked out, it is our hope that the TSC recommendations, particularly the land use zoning system, provide DCR with a broad vision and framework for balancing the public's demand for the full array of ecosystem services from the state forests and parks. We believe that implementation of the TSC's package of land use and organizational recommendations, in parallel with a strong and on-going DCR commitment to public process, will greatly enhance the Department's fundamental stewardship mission and help to guarantee the future availability of a sustainable stream of public benefits. For this to occur, DCR will undoubtedly require additional financial and human resources. Consequently, the TSC strongly encourages you and Secretary Bowles to work closely with the legislature to ensure that DCR's budgets are adequate to implement the recommendations and accomplish the Department's stewardship mission.

We wish to express our appreciation for the leadership that you have provided throughout this process. We would also like to recognize the hard work of the AGS, the staff of EEA and DCR and others who provided ongoing support for this process. Although this report is the most obvious product of our efforts, we believe this intensive

process of collaboration, outreach and engagement with the public and subject matter experts will yield benefits both now and well into the future.

Thank you for initiating and supporting the Forest Futures process.

Sincerely,

Lisa Vernegaard, Chairwoman
Forest Futures Visioning Process
Technical Steering Committee

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Conservation and Recreation

Forest Futures Visioning Process Recommendations of the Technical Steering Committee

April 21, 2010

Final Report

FOREST FUTURES VISIONING PROCESS
TECHNICAL STEERING COMMITTEE RECOMMENDATIONS

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LIST OF ACRONYMS

AGS	-	Advisory Group of Stakeholders
ATV	-	All-Terrain Vehicle
BMP	-	Best Management Practice
CFI	-	Continuous Forest Inventory
DAR	-	Department of Agricultural Resources
DCR	-	Department of Conservation & Recreation
DEM	-	Department of Environmental Management
DEP	-	Department of Environmental Protection
DFW	-	Division of Fisheries & Wildlife
DSPR	-	Division of State Parks & Recreation
DUPR	-	Division of Urban Parks & Recreation
DWSP	-	Division of Water Supply Protection
EEA	-	Energy & Environmental Affairs (Executive Office of)
ELU	-	Ecological Land Unit
EOEA	-	Executive Office of Environmental Affairs (Replaced by EEA)
FAC	-	Farmland Advisory Committee
FCPA	-	Forest Cutting Practices Act
FFVP	-	Forest Futures Visioning Process
FIA	-	Forest Inventory & Analysis
FSC	-	Forest Stewardship Council
GIS	-	Geographic Information System
LTEM	-	Long-Term Ecological Monitoring
MACC	-	MA Association of Conservation Commissions
MESA	-	MA Endangered Species Act
MODR	-	MA Office of Dispute Resolution & Public Collaboration
NEON	-	National Ecological Observatory Network
NHESP	-	Natural Heritage Endangered Species Program
NSF	-	National Science Foundation
OHV	-	Off-Highway Vehicle
ORV	-	Off-Road Vehicle
QSTAC	-	Quabbin Science & Technical Advisory Committee
RNA	-	Representative Natural Area
TNC	-	The Nature Conservancy
TSC	-	Technical Steering Committee
TTOR	-	The Trustees of Reservations
WPA	-	Wetlands Protection Act

I. Executive Summary

The Massachusetts Department of Conservation and Recreation (DCR) initiated the Forest Futures Visioning Process in the spring of 2009 to develop a long-term strategy for managing the 308,000 acres of lands in the State and Urban Parks system, taking into account the attributes of these forests and their place in the overall context of the state's three million acres of public and private forests. An eleven member Technical Steering Committee developed the recommendations in this report. The recommendations were informed by input from an Advisory Group of Stakeholders (AGS) and by an extensive public comment process that included five public forums that collectively attracted over 500 participants, approximately 450 written submissions, and over 250 responses to an on-line survey.

Members of the Technical Steering Committee (TSC) were selected by representatives of the stakeholder community for their technical expertise in a wide array of disciplines relevant to managing Massachusetts forests -- climate change, forest conservation, forest ecology, invasive species, landscape ecology, natural resource economics, natural resource law, recreation, silviculture, social policy, visual/aesthetics, watershed management, and wildlife habitat. In this regard, the expert views of the TSC are as members in their individual capacity rather than as representatives of any organization or entity. On the other hand, the AGS was explicitly selected to be a representative body, composed of members from the citizen stewardship, economic development, environmental, forestry, government/municipal, landowner, recreational, and wildlife/habitat stakeholder interest group communities. The role of the AGS was to surface and discuss the issues, develop ideas and suggestions for the TSC, and provide feedback on draft recommendations.

This Executive Summary provides an overview of the vision and ten supporting recommendations from the TSC report. The recommendations focus on near-term changes that DCR can implement and should be viewed as laying out a plan for the next five to ten years, informed by a long-term vision that is grounded in a scientifically rigorous adaptive management approach that anticipates careful on-the-ground monitoring to ensure modification of management approaches when ecosystem service objectives are not met. The full TSC report includes many insights that are beyond the scope of this executive summary; the reader is strongly encouraged to read the recommendations in their entirety for further detail and clarification. In a limited number of instances the TSC did not achieve consensus on elements of a certain recommendation. These differing viewpoints are highlighted in the main body of the report.

Key Elements of the Vision for Massachusetts Forests in 2110

In order to define the role of DCR lands and make near-term recommendations, the TSC needed to consider the role these lands might play within the broader forested landscape of the state -- this is the reason for including a long-term vision for all Massachusetts forests. The vision for the year 2110 contemplates more than half the land area of the Commonwealth will remain in forests, with large blocks of reserves surrounded by parks and woodlands actively managed for a diverse set of ecosystem services. These forests provide numerous economic and social benefits to local communities, the state and nation -- clean air and water, biodiversity, recreation, tourism, climate change adaptation and mitigation, wood products, and a high quality of life for Massachusetts citizens. The protection of these areas will have been accomplished by reducing stresses on the

forests such as: conversion to other uses, ecological and ownership fragmentation, high grading harvest practices, invasive insects and diseases, climate change and atmospheric deposition. State forests will be embedded in a landscape of privately owned forests that will be sustainably managed, and for which many acres will be protected through conservation restrictions. State policies will promote innovative and sustainable management on all forested lands, which will produce a wide array of ecosystem services.

Publicly-owned forests will promote ecosystem services that private landowners are unable or less likely to provide consistently or in sufficient amounts – public recreation, large and small forest reserves, aesthetically pleasing landscapes, and demonstrations of innovative state-of-the-art forest management -- particularly management designed to promote uneven-aged, complex and resilient forests that support the full breadth of biodiversity and natural processes, while maximizing the contribution of our forests to climate change mitigation and adaptation.

Shifting the Forest Management Paradigm

The TSC's recommendations are intended to encourage a land management paradigm shift at DCR -- a process that actually began before the creation of the Forest Futures process with the development of district-level forest resource management plans -- moving the Department's forest management towards a vision based on a more comprehensive suite of ecosystem services and implementation of a more balanced portfolio of management approaches. This reflects the TSC's view that the natural and social sciences underlying several key land management debates continue to evolve with the development of new information and knowledge and consequently the public interest is best served by policies that keep open a range of management options.

A key element of the TSC management paradigm is the concept of ecosystem services that forests provide, including maintenance of important natural processes as well as provision of additional economic and cultural services. Forest ecosystem services include carbon sequestration; soil, air and water quality; biological and ecosystem diversity; nutrient cycling; culture, history and spiritual values; public recreation; and forest products. Forest products are just one among many ecosystem services, and must not dominate or diminish the others. The long-term public ownership of state forests and parks allow these lands to reflect priorities for ecosystem services that are not expected to be provided sufficiently by private lands.

The TSC recommends three land use zones for DCR forests: forest reserves, parklands, and woodlands. This allows a clear articulation and prioritization of the ecosystem service goals for each zone and specification of appropriate management strategies for realizing these goals. The recommendations call for large increases in land set-aside from commercial timber management, either as forest reserves or parklands. Woodlands will serve as examples of sustainable practices, designed to demonstrate sustainable timber production along with other ecosystem services and become models for good stewardship on private forests.

Large permanently protected forest reserves of 15,000 acres or more in the state's major ecological settings will be a prominent feature of the DCR forests. These reserves will ensure long-term ecological integrity and biodiversity values and will be places where natural processes dominate to provide important ecological, educational and cultural services. Large reserves will be supplemented by smaller 'patch' reserves for ecologically and culturally significant areas. The remainder of DCR state forests and parks will be devoted to parklands and woodlands. A primary

goal of the parklands is to deliver high quality and diverse public recreational opportunities that benefit from some active recreation and landscape management, and to provide additional ecosystem services in a manner that is insulated from more intensive silvicultural manipulations and timber harvesting. Managed woodlands will also be a valuable source of ecological services, through the application of silvicultural approaches that emphasize carbon sequestration, wood production, clean water, creation of early successional habitat, and restoration of late successional habitat. The recommendations put forth a range for allocation of acres to each of these types of uses.

The implementation of these recommendations will require changes within DCR to reshape goals and planning processes and ensure implementation of improved forest stewardship, planning from a broad based perspective, and better communication and partnerships with friends groups and the non-profit sector.

Summary of Recommendations

Recommendation 1: Adoption of an Ecosystem Services Model to Guide Forest Protection and Management *-- The fundamental guiding principle for all forest protection and management policies in the Commonwealth should be to ensure the sustainable provision of a comprehensive suite of forest ecosystem services. Moreover, DCR should adopt a planning framework for the state parks and forests that focuses on the provision of key ecosystem services not expected to be provided, or not provided in adequate amounts, from private lands in the Commonwealth.*

The adoption and prioritization of ecosystem services is intended, in part, to address conflicts inherent in competing demands on our forests. *Essential ecosystem services* represent primary management goals for DCR lands. These include biodiversity protection, clean water, carbon sequestration, soil formation and nutrient cycling, and public recreation including wilderness/old growth/spiritual experiences. In addition to these services, some DCR lands will serve to demonstrate how forests can be managed to provide sustainably grown wood products, and others will emphasize quality outdoor recreation experiences.

Recommendation 2: Elevated Role for Massachusetts Forests in the Commonwealth Environmental Decision-making Processes *-- In implementing its environmental priorities, the Commonwealth should focus increased attention on the protection and stewardship of the state's public and private forests through a reorganization that elevates the state's chief forest stewardship official to a more prominent decision-making role.*

Given the enormous importance of public and private forests in providing these critical environmental services to the public, the TSC recommends that the DCR Commissioner consider converting the existing Chief Forester position into a Director of Forest Stewardship, and elevate this position in the DCR organizational structure to be on a par with the Director of State Parks and Recreation. The Director of Forest Stewardship would have primary responsibility for the long term protection of the state's forest resources through implementation of programs to (1) oversee the management of the 308,000 acres currently in the DCR State Park and Forest system, and (2) promote sustainable forestry practices on private lands through DCR's Service Forestry Program and through oversight under the Chapter 132 Forest Cutting Practices Act and other forest regulatory programs.

Recommendation 3: New DCR Landscape Planning Model *-- As an overarching template for organizing its land management activities, DCR should adopt a management structure that sub-divides its State and Urban Park lands into three zones: (1) Forest Reserves, (2) Parklands and (3) Woodlands.*

The three zones are intended to enhance the provision of ecosystem services by segregating incompatible activities and allowing for prioritization of goals.

Forest Reserves are areas of 15,000 acres or more, representative of the Commonwealth's diverse forest settings, where the dominant ecosystem service objectives are biodiversity maintenance and the underlying supporting services of nutrient cycling and soil formation, watershed protection, and long-term carbon sequestration; important secondary services include provision of wilderness/spiritual values and recreation. Initial designations of reserves may include areas smaller than 15,000 acres depending upon available land, but it is anticipated that these will be added to at a later time. Large reserves are recommended to receive some form of permanent protection to allow development and perpetuation of late successional forest ('old growth'). Within one or two reserves an area might receive a designation as wilderness. Additional patch reserves based on ecological, social and cultural criteria will also be designated in the two other zones.

Parklands are areas where the primary ecosystem service objectives are provision of public recreational opportunities that depend on natural areas, preservation of ecologically significant areas and 'special places,' and promotion of cultural values (aesthetic, historical, educational and tribal). These goals are also compatible with the maintenance of a wide range of additional important ecosystem services. Parkland management approaches are expected to range from areas where natural processes dominate to highly modified environments where use is intensively managed. Parklands are identified based on density of officially designated trails, campsites and level of recreation use/visitation, unique natural features and surrounding population density.

Woodlands would emphasize the provision of ecosystem services that require management prescriptions with intensities that are less compatible with the activities in the parklands or forest reserves. One role for woodlands would be demonstrating, to private and municipal landowners and the general public, the practice of sustainable forestry. This would be done through active forest management targeting sustainable production of timber for local markets, protection of water supplies through active watershed manipulation, management to promote early successional habitat, and carbon sequestration through options that focus on active forest management and lifecycle carbon impacts. Woodlands forest management also has a role to play in the ecological restoration of areas that have been dramatically altered by previous management (*e.g.*, plantations of non-native species) or to restore unproductive woodlands damaged by natural disturbance.

Land Allocation to the Zones. The TSC recommends ranges for the allocation of existing DCR State and Urban Park land to the three zones. DCR currently has approximately 40,000 acres designated as large forest reserves; the TSC recommends increasing this to a total of between 90,000 and 120,000 acres; for parklands, the recommended allocation is 70,000 to 90,000 acres; and for woodlands the TSC finds that 100,000 to 150,000 acres would be appropriate. The TSC is not recommending specific properties for these categories. Instead, DCR should implement a detailed planning process to identify feasible on-the-ground configurations for reserves, parklands

and woodlands, and solicit expert and broad public input before finalizing the designations. Moreover, the TSC finds that in the future an additional 90,000 to 130,000 acres must be added to the forest reserves because current DCR acreage is insufficient for creating an ecologically functional system of representative large reserves. Additional acquisitions of parklands and woodlands are also anticipated to meet increasing public demands for ecosystem services from these zones. A means of ensuring that communities in which DCR lands are located receive appropriate revenues from the State in lieu of taxes must be a high priority.

The TSC recommends that DCR immediately implement a process to finalize the allocation of land to each of the zones. Determining these final allocations will require (1) a spatial analysis using objective criteria for large forest reserves, parklands, and woodlands to guide the layout of the zones across the full set of existing DCR properties; (2) comprehensive delineation of each zone, including optimizing each zone, making difficult decisions for properties identified as important for two or more zones, and ground-truthing characteristics before designating areas; and (3) implementation of a robust public process to vet and finalize the allocations, including discussions with towns where DCR forests account for a large portion of the town's area. Overall, the zoning process should give adequate consideration to economic analyses of potential impacts in those communities that are most dependent on the local forest economy.

The TSC recommends that the current suspension of new timber sales be continued until the zoning process, including public review, is complete. This will be followed by a period when DCR develops revised Forest Resource Management plans including guidelines for each of the zones. During this period, timber sales could be reinstated, but until such time as the guidance and management plans are complete, all timber sales should focus on less controversial silvicultural prescriptions (*e.g.*, uneven-aged management for late successional characteristics).

Recommendation 4: Management Approaches for Large Forest Reserves -- *Management of large forest reserves should allow ecological processes to determine the long-term structure, composition, function, and dynamics of the forest to the maximum extent possible. However, the areas that have been considered for large reserves range widely in their natural and historical disturbance regimes. In this context, flexible yet thoroughly vetted reserve management will support ecological functions in the varied forest ecosystems of the Commonwealth and under the ecological and climatic uncertainties of the future.*

Ecosystem Management in Reserves: The TSC recommends forest reserve management with the least amount of human intervention. The goal should be to maintain and enhance a full suite of ecosystem services including biodiversity maintenance and the underlying supporting services of nutrient cycling and soil formation, watershed protection, and long-term carbon sequestration; important secondary services include provision of wilderness/spiritual values and recreation. When in doubt, or where there is disagreement among qualified ecologists and foresters, the default management prescription should be to do nothing. The TSC recommends that no sales of wood should occur on forest reserves beyond revenue collected **incidentally** from restoration and management activities directly within the restored or managed area. Some specific situations may call for ecological restoration and vegetation management in reserves. Each reserve will have an operational plan established with opportunities for public input and to determine in advance how managers will coordinate with local officials in response to events. The TSC also recommends that a 'Science Advisory Board' be established to inform, review, and approve all major restoration and management activities in reserves.

Recreation and Infrastructure Management: State land in forest reserves should be accessible and useable by people in keeping with both the original intent of state lands and certain important ecosystem service values associated with them *(i.e*., aesthetic, recreational, historic and spiritual). Human activities, however, should be managed to minimize their impact on the other intended values of forest reserves (*i.e*., biodiversity, wildlife, acoustic and visual aesthetics, etc.).

Recommendation 5: Management Approaches for Parklands -- *DCR should develop and implement management guidelines for Parklands that focus on enhancing recreation, while continuing to provide additional ecosystem services, including those identified for reserves as well as the aesthetic and cultural values of the property.*

The parkland zones should be managed in a manner that is similar to what currently occurs at DCR's forested urban park properties so as to optimize quality outdoor recreation and maintain other important ecosystem services. Tree work should be conducted only as needed to support the recreational, aesthetic and cultural uses and values of the property. All recreational use decisions should be made on a property-by-property basis. Production of wood for wood products or energy should not be a management objective on parklands. Management planning and implementation should be coordinated with trail stewards and public 'friends groups.'

Recommendation 6: Management Approaches for Woodlands -- *DCR should develop and implement management guidelines for Woodlands that demonstrate excellent forest management practices for sustainable production of wood, restoration of late successional habitat, active management of drinking water quantity and quality, creation of early successional habitat, and promotion of carbon sequestration and any other ecosystem services that benefit from relatively active manipulation of the forest. Over time, these guidelines should promote a greater emphasis on uneven-aged forests across the DCR system. At the same time, woodlands management should include guidelines to protect rare species habitat and other natural resources, as well as the integrity and scenic quality of trails and scenic roads in the woodlands zone.*

The goal is for DCR to have 'model forests' to demonstrate ecologically and economically sustainable practices to private landowners and the public. The recommendations for woodlands management encourage a shift towards greater reliance on uneven-aged silviculture. As a first step, DCR will need to assemble additional information on the origin, age, and condition of the forest stands into three classifications to help in determining how they are managed. **Primary** forests are those areas that have always been in forest growth and never pastured or cleared. **Secondary** forests are those areas that were in agricultural use but have grown back to forest, been harvested once, and have re-grown. **Tertiary** forests are the first stands to grow after agricultural abandonment.

The TSC recommends DCR develop long-term management approaches that are based on silviculture that has as its goal the replication of natural disturbance patterns designed to ensure the regeneration of an age and species diverse forested landscape in Massachusetts. Under such an approach, DCR foresters would implement harvests across the landscape in patterns that are representative of the size and frequency of canopy openings occurring as a result of (non-catastrophic) natural disturbance.

The TSC recognizes the potential for controversy and public distrust when larger openings are created. To reconcile these issues, the TSC recommends that DCR adopt silvicultural guidelines, based on three alternative levels of woodlands management that require a high degree of public consultation and acceptance for harvests that would create larger openings. **Level 1 management** is designed for protecting ecologically sensitive or culturally significant patch reserves. It allows for ecological restoration including control of invasive plants, insects, and herbivores. Hazardous trees along trails and roads could be cut and trees could be removed to maintain rare habitats. Timber management for production of wood and wood products would not be a management objective in these areas. **Level 2 management** applies uneven-aged silvicultural prescriptions – including single-tree and group-patch selection methods – in high productivity primary and secondary forests in order to promote multi-aged and late successional stands (up to 150 to 200 years of age). Harvested patches should not exceed 1/3 of an acre. **Level 3** management is recommended for use in lower productivity and damaged primary, secondary and tertiary stands where a variety of uneven- and even-aged silvicultural prescriptions might be employed. Uneven-aged methods, both those which seek a complete distribution of age and size classes and those that may be more irregular, would be used to harvest single trees, groups of trees and patches up to 1/3 acre in both primary and secondary stands. Irregular shelterwood systems would also be available to restore the structure, composition and function of these lower productivity primary, secondary and tertiary stands. The use of even-aged shelterwood methods would be limited to low productivity and damaged tertiary stands with opening sizes not to exceed five acres, unless after consultation with the interested public (see Recommendation 8), DCR concludes that there is a need to expand this size limit for ecological reasons at a specific site. All Level 2 and 3 harvests would leave tops and branches in the forest, an appropriately conservative approach for ensuring the continued ability of harvested state lands to provide a full suite of ecosystem services.

The highest standards and enhanced best management practices would apply. These include marking of individual trees for harvest, mapping of wetlands, buffers, and full compliance with the Massachusetts Endangered Species Act, in order to continue delivery of multiple additional ecosystem services along with sustainable production of wood products. Harvesting equipment will be specified to minimize damage to remaining trees and soils. The recommendations address management for recreation in the woodlands through collaborative planning, trail buffers and improved practices where recreation and silvicultural areas intersect.

Early Successional Habitat. The TSC, rather than designating a specific acreage target for early successional habitat, recommends that DCR establish a formal ongoing planning and adaptive management process for addressing these habitat needs. This process should include consideration of background levels of early successional habitat creation due to natural disturbance across all DCR forests and close coordination with the Deparrtment of Fisheries & Wildlife (DFW), academic experts and the public to address habitat creation needs beyond what will occur via natural disturbance and expected harvests on DCR woodlands. The DCR/DFW plans should configure any habitat creation projects to minimize clearing while addressing DFW goals for state lands, to the extent this is compatible with other ecosystem service objectives for DCR woodlands. Cutting in unfragmented forest should be avoided and to the extent possible priority given to management of overgrown fields and expansion of existing open areas. Essentially, under the TSC's proposal DCR's integrated resource management planning process would be the locus for periodically reviewed decisions about the amount of cutting needed to support early successional species; but this would be informed by better data on current and likely

future levels of natural disturbance on DCR lands and should be divorced from decisions relating to timber production in the woodlands zone.

Green Certification. While acknowledging general concern about certification of public lands – a program designed to provide the state with independent, third-party audits and evaluations of its forest management practices -- the TSC finds that FSC certification is a potentially valuable tool for advancing the ecosystem service goals outlined for DCR woodlands in these recommendations. Third-party verification provides additional impetus for public input, has an overlay of additional standards which aid in protection of ecosystem services, provides impetus for planning, helps educate staff on the broader array of approaches, and makes wood products more marketable/valuable. But this will require that DCR's goals for forest management be developed through a robust public process that provides legitimacy for the plans that FSC auditors are asked to review.

Biomass. The TSC finds that the expansion of biomass energy facilities in the state could pose a potentially significant risk to the ecosystem services that are so important to maintain within DCR forests. The woodland zone recommendations reflect a conservative approach for avoiding adverse impacts of biomass removals through a general requirement that tops and branches be left in the woods. In light of the many uncertainties about the potential ecosystem impacts of wood production for biomass fuel, a cautious approach -- requiring that 'forestry residues' be left in place to build soil carbon and protect nutrient stocks and habitat -- is called for to ensure the sustainable delivery of ecosystem services from DCR's woodlands.

Recommendation 7: DCR Organizational Structure, Decision-making, and Planning *-- The DCR Commissioner should establish a fully integrated planning and management structure focused on long-term stewardship and adaptive management for the complex and inter-related set of ecosystem service priorities established for DCR parks and forests.*

The recommendations intend to make clear that long-term stewardship of the forest resource is the fundamental purpose of DCR's land management. Further, based on the observation that DCR forest planning is not adequately integrated across the Department, the TSC recommends creation of a single, unified planning and adaptive management system that addresses the full suite of ecosystem service priorities across the three zones. DCR needs to expand current efforts and formalize methods for incorporating into its planning and land management activities: (1) information collected from forest resource data; (2) advances in scientific knowledge; (3) alternatives analysis; and (4) a means to gauge the success of its activities and make changes based on results of a formal feedback mechanism.

Recommendation 8: Improving Public Process *-- Create a robust process that gives members of the public an opportunity for their concerns and values to be addressed and incorporated throughout the planning and implementation of management of the publicly owned land under DCR's care.*

The TSC recognizes that no management decision will be universally accepted by the public. Broad public acceptance of DCR's management will therefore need to acknowledge and address the full range of public views, and DCR must enlist a broader cross-section of society in its work to ensure that the full range of views is represented in the decision making process. There is a need for open, transparent, authentic and broad based public participation in decision making for

allocation of land to large forest reserves, parklands and woodlands, and at the full range of planning scales for forest management and implementation - from the broadest, state-wide and district-level forest resource management planning, down to the much finer-scale, stand-level forest cutting plans. There is also a need to address internal processes to improve public participation and better address the concerns of those engaged in the decision making process. The recommendation calls for implementation of best practices for public participation, dedication of management staff to improving participation, clear timelines for projects and policy decisions, and improved tools for reaching the public. Measurement and feedback loops and incorporation of public engagement in project and performance management reviews will ensure better processes.

Recommendation 9: Policies for Privately Owned Forests in the Commonwealth *– A prominent part of DCR's mandates include oversight of all forests in Massachusetts. Due to the importance of private forests to public forest function and integrity, and the high level of public benefits provided by private forests in Massachusetts, the Commonwealth should adopt measures to prevent further forest fragmentation and conversion to other land uses, and promote better stewardship of private forests, including the implementation of a requirement that all forest harvesting plans be prepared by a licensed forester.*

Conservation and protection of the public values provided by private forests in Massachusetts requires increased leadership, education, public investment and alignment of incentives to ensure that these forests will continue to exist in the future and that private landowners make informed decisions about the stewardship of their forest lands. To accomplish these goals, the Commonwealth should support programs and policies that prevent forest conversion. These should include further evaluation of cost share and conservation finance programs, as well as further evaluation of measures to improve stewardship on private lands -- including promulgation of the revised Chapter 132 regulations; better tabulation and dissemination of information collected from harvests in Massachusetts forests (including analysis of and access to GIS data); improved public/private partnerships; legislation concerning tax credits and support for local wood products; and requirements that all cutting plans required under M.G.L. 132 be prepared by a licensed forester.

Recommendation 10: Resources Needed to Implement the TSC Recommendations *-- The DCR Commissioner should develop and implement strategies for funding the specific recommendations from the Forest Futures process.*

Implementing the Forest Futures recommendations will require both reprogramming of existing resources and development of new revenue streams. While it would be convenient to assume that all the proposed changes could be put in place through reallocation and re-assignment of existing DCR staff, this is simply not the case. Increases in DCR staff are needed to support creation of the three zone system, development of new management guidelines and plans, implementation of expanded public participation process, and for both short and long-term management and monitoring of forest reserves, parklands and woodlands. The recommendations in this report form an integrated package of changes that are needed to assure effective management of DCR lands. Many of the recommendations address areas that have been severely under-funded or not funded at all in the past (e.g., preparation of integrated resource management plans, collection and analysis of data to support adaptive management). Consequently, it is critical that the Executive Office of Energy and Environmental Affairs (EEA) and DCR seek additional funding from the

legislature to support implementation of the recommendations in this report. Absent new funding, major portions of the recommendation package cannot be implemented. This includes not only funding for DCR staff but also funds for acquisition of the additional lands needed to (1) ensure the future build-out ecologically functional system of large forest reserves and (2) provide adequate parkland and woodlands to meet the public's future ecosystem service demands.

Finally, although beyond the original charge of the Committee and therefore not included as one of our ten recommendations, the TSC urges the Secretary of Energy and Environmental Affairs to consider the potential benefits of adapting and applying the recommendations and insights from our work more broadly to all forest lands owned by the state. This would result in a more fully integrated vision and management approach for state lands, consistent with the TSC's long-term vision for the forests of the Commonwealth.

II. Introduction

The Massachusetts Department of Conservation and Recreation (DCR), an agency of the Executive Office of Energy and Environmental Affairs, oversees 450,000 acres of parks and forests, beaches, bike trails, watersheds, and dams, in addition to approximately 150 pedestrian and roadway bridges and miles of roadways. Led by Commissioner Richard K. Sullivan Jr., the agency's mission is to protect, promote, and enhance our common wealth of natural, cultural, and recreational resources.

At the February 2009 monthly meeting of the Stewardship Council, the legislatively established oversight board for DCR, Commissioner Sullivan presented a plan for the Forest Futures Visioning Process -- a public involvement initiative to be undertaken by the agency to develop a renewed vision for stewardship and management of DCR forests. The proposed plan was prepared in response to a recommendation from the Stewardship Council -- included as part of its fall 2008 approval of the Berkshires and Western Connecticut Valley forest resource management plans – to develop a vision for DCR forests based on insights from an outside group of experts, as well as stakeholders and the broader public, including citizen stewards, 'friends groups' associated with a number of DCR parks, and several environmental organizations.

These groups expressed serious concern and disappointment with management practices on DCR lands and the manner in which DCR interacted with and responded to the interested public. The complaints and concerns were rooted not only in silvicultural practices but also in the perception that the culture of the organization did not value public participation and collaborative efforts, and in differing interpretations of mandates and responsibilities. Most of these disaffected individuals and organizations felt that a mindset of land management for timber production was the lens through which responsibilities and mandates were interpreted and decisions were made. The critics also recognized that limited resources were hampering planning at a site-based level that might have addressed the potential controversies in advance. Additional concerns arose over the intensity of cutting, particularly the use of clearcuts and similar management methods, and some stakeholders felt this would continue under DCR's new Forest Resource Management Plans,. At the same time some private forest landowners felt that the negative public image associated with some DCR actions was affecting the way the management of their lands was perceived. As the controversies continued, DCR suspended some planned timber harvests causing timber sale contractors to become frustrated with the agency's actions.

The concerns arose around a number of issues including the justifications for timber harvesting; the size of openings created by harvesting ('clearcuts'); the location of harvests; the choice of silvicultural methods and aesthetic impacts (including clear-cutting and cutting of plantations); lack of enforcement of, or insufficiently strong, best management practices (BMPs) resulting in negative impacts on vernal pools and other sensitive environmental and cultural resources; the limited manner in which cutting plans and information were available; insufficient public participation; the potential availability of significant portions of DCR lands for harvesting for biomass energy production; and concerns that Forest Stewardship Council (FSC) certification has increased timber extraction as a primary underlying goal. The concerned stakeholders felt that DCR was not acknowledging or correcting errors in its management practices and that there was no accountability within the agency when errors were made. As a result, some members of the public expressed very low levels of trust and a lack of respect for the agency. Strenuous objections were voiced to what were seen as commercial levels of timber harvests or

inappropriate decisions at parks and forests including, among others: Beartown State Forest, Boxford State Forest, Chester-Blandford State Forest, Chicopee State Park, Georgetown-Rowley State Forest, Mount Holyoke Range State Park, Mt. Grace State Forest, October Mountain State Forest, Robinson State Park, Savoy Mountain State Forest, Rutland State Park, and Windsor State Forest. DCR commissioned a report that provided more detailed analysis of forestry and management practices that led to many of these disputes, and recommendations for changes to DCR practices aimed at improving practices and ensuring the best possible stewardship in the future (a summary of the report's key findings is included as Annex 1).

To implement the Forest Futures Visioning Process, DCR established a Technical Steering Committee (TSC) tasked with developing a long-term strategy for managing lands in the 308,000 acre State and Urban Parks system and formulating recommendations for addressing issues raised by the public. DCR also established an Advisory Group of Stakeholders (AGS) to provide input to the TSC as it developed its recommendations.

This report, beginning with a brief overview of the parks and forests in the DCR system, presents the recommendations of the TSC. The recommendations were informed by input from the AGS and from an extensive public comment process that included five public forums that collectively attracted over 500 participants, approximately 450 written submissions, and 253 responses to an on-line survey. To guide the recommendation process, the TSC first developed a vision for all Massachusetts forests in the year 2110. *The Committee finds that only in this broader context is it possible to define the role of forests owned and managed by the state.* The 2110 vision is followed by an overview of the major changes that DCR must make if the Department is to implement the land management changes that the TSC is recommending. This overview is followed by ten detailed recommendations for change.

- Recommendations 1 and 2 focus on the broader state-wide forest policy issues and the DCR Commissioner's role as State Forester, both of which set the context for DCR's activities on public lands.

- Recommendations 3 through 6 provide specific guidance on managing the 308,000 acres of DCR's State and Urban Park lands.

- Recommendation 7 discusses changes needed to DCR's organizational and planning structure to facilitate implementation of the land management recommendations.

- Recommendation 8 provides the TSC's suggestions for improving DCR policies for involving the public in its planning and land management decision-making processes.

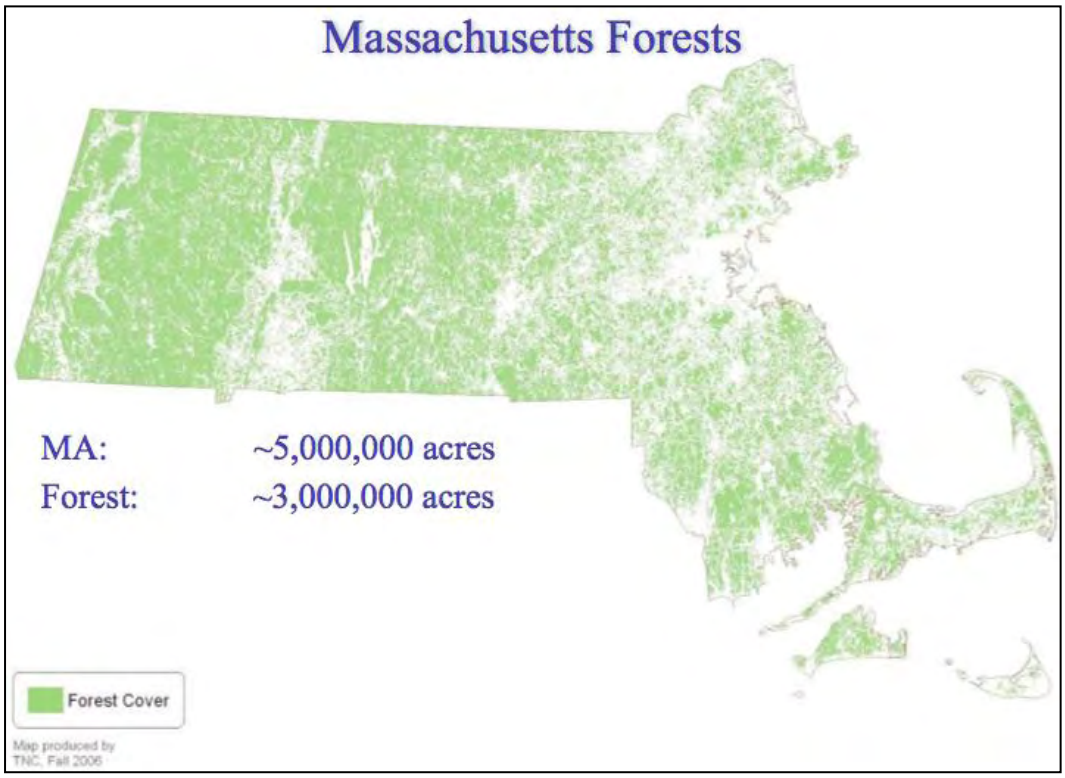
- Recommendation 9 discusses additional forest protection and stewardship policies for private lands that are a primary focus of the DCR Commissioner in his/her capacity as State Forester and that are necessary to ensure that the public lands remain embedded in a connected system of well-managed private forests, largely protected from fragmentation and conversion to other uses.

- Recommendation 10 discusses the budgetary implications of Recommendations 1 through 9 and suggests possible strategies for mobilizing the additional resources that DCR will need in order to implement the TSC recommendations.

Each recommendation is followed by implementation guidance and brief discussion. In a limited number of instances the TSC did not achieve consensus on elements of a recommendation. These differing viewpoints are highlighted in the final section of the main report. The report also includes nine annexes that provide more detailed background information on the recommendations. Annexes 2 through 4 provide more detailed background on the Forest Futures Visioning Process itself.

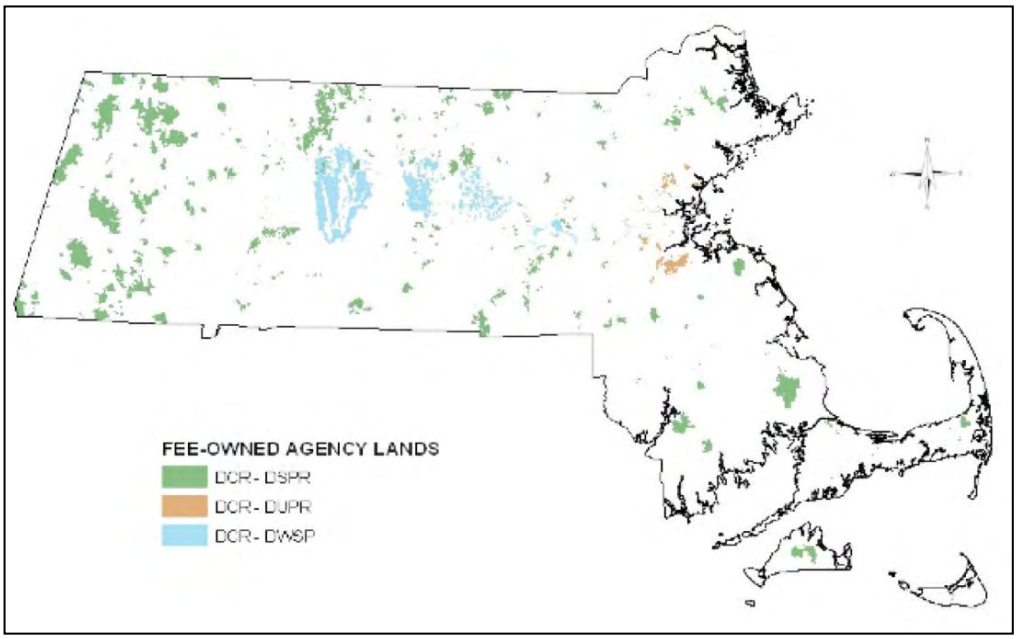
III. Overview of Massachusetts Forests and Parks

Forests cover approximately 63 percent of the landscape in Massachusetts and represent a critically important public resource that provides a wide array of environmental goods and services (referred to throughout this report as 'ecosystem services' and discussed in more detail in Recommendation 1).



The Massachusetts Department of Conservation and Recreation is steward for approximately 450,000 acres (including private lands where it oversees conservation restrictions) widely distributed across the Commonwealth. DCR's direct ownership is approximately 415,000 acres. The agency's Divisions of State and Urban Parks and Recreation oversee over 308,000 acres within this system. These lands are the primary focus of the Forest Futures Visioning Process, although the Committee's recommendations recognize the broader role of DCR in promoting good forest stewardship on private and other state lands.

State Lands Managed by DCR



Management responsibilities for the DCR lands are distributed across three divisions within the Department, as outlined in the table below.

DCR Land Management Responsibilities[1]	
DCR Division	**Acres Managed**
Division of State Parks and Recreation (DSPR)[2]	290,072
Division of Urban Parks and Recreation (DUPR)	18,250
State & Urban Park Total	308,323
Division of Water Supply Protection	105,272

Note 1: The primary focus of the Forest Futures Visioning Process is management of the State and Urban Park lands, although the Committee's recommendations recognize the DCR's broader role in promoting good forest stewardship on private and other state lands.

Note 2: DSPR lands currently include approximately 38,000 acres designated as forest reserves.

Historically these DCR lands have provided extensive public recreational opportunities, protection for major drinking water supplies in the Commonwealth, habitat for rare and endangered species, and forests managed to supply locally grown sawlogs, pulpwood and firewood.

- DCR properties provide opportunities for swimming, camping, hiking, walking, canoeing, horseback riding, sailing, wind-surfing, rock climbing, skiing, golfing and other recreational activities. A recent statewide survey indicated that 54 percent of Massachusetts citizens had visited a public park, recreation facility, or state forest in the previous 12 months (The Insight Group and Dorr Research Corp., 2004). Even applying very conservative valuations (Loomis, 2005), these public recreational benefits have a value to the citizens of the Commonwealth in the tens of millions of dollars each year, and perhaps more.

- DCR watershed lands protect clean drinking water supplies for 2.2 million residents of the state.

- DCR lands are representative of 68 natural community types and provide habitat for 67 percent of the listed rare species in the Commonwealth (291 out of 435 listed species); 24 percent of DCR lands are designated as Priority Habitat of Rare Species (NHESP data summarized by Ricci, 2009).

- Sales of timber from DCR state parks and forests over the past decade have involved harvesting on approximately 1,250 acres per year – indicating cutting on approximately 0.5 percent of DCR's 308,000 acres of state park and forest lands. These harvests on average have accounted for approximately 5 percent of all planned timber harvests in the state. On average, an additional 800 acres of DCR water supply lands are also harvested each year (DCR, 2009). In recent years, timber sales from the DCR forests and parks have generated annual revenues of approximately $1 million for the Commonwealth.

- Growth of DCR forests, as well as other forests in the state, plays an important role in sequestering carbon and mitigating climate change. Studies at Harvard Forest suggest central Massachusetts forests can sequester between 0.4 and 1.3 tons of carbon per acre each year – in total DCR forests are offsetting hundreds of thousands of tons of greenhouse gas emissions each year (O'Donnell, 2007; Massachusetts Department of Environmental Protection, 2009; Munger, Barford, & Wofsy, 2004).

Included in the DCR properties are many of the Commonwealth's largest blocks of forest that remain unfragmented by development. These forest blocks represent an enormously important resource for current and future generations, providing critical habitat for protection of biodiversity and important opportunities for mitigation of climate change through capture and storage of carbon in trees and soils.

IV. A Vision for Massachusetts Forests in 2110

To guide its deliberations, the TSC developed a long-term vision for the forests of Massachusetts -- both private and public. The purpose of the vision is to articulate the Committee's consensus view of long-term objectives for the Commonwealth's forest protection and management policies. The recommendations in this report are aimed primarily at developing a long-term management strategy for the 308,000 acres of DCR park and forest lands. In order to define the role of the DCR lands and make near-term recommendations, however, the Committee needed to consider the role these lands might play within the broader forested landscape of the state, and this is the reason for including a long-term vision for all Massachusetts forests. Of course, history suggests that new information will make any long-term vision obsolete over time in many fundamental ways, and there is no reason to believe ours will be different. But the TSC includes this vision to help make clear the context and assumptions about state-wide land use that frame our recommendations for DCR lands. Major changes in the extent or management of private forests in the future would likely necessitate revisiting the assumptions about the role of the DCR lands.

* * *

The TSC envisions a future where forests continue to comprise over half the land area of the Commonwealth, forming a permanent and connected system of undisturbed ecological reserves surrounded by parks and woodlands managed for a diverse set of ecosystem services. This system of public and private forests will provide numerous economic and social benefits to local communities, the state and nation -- clean air and water, biodiversity, recreation, tourism, climate change adaptation and mitigation, wood products, and a high quality of life for Massachusetts citizens.

To accomplish this, the current and anticipated suite of stresses on our forests must be reduced. These include (1) conversion of forests to other land use types *(i.e.*, development), (2) fragmentation, both ecological fragmentation of forest patches by roads and other infrastructure, and ownership fragmentation through the creation of smaller parcels, (3) invasive plants, insects and diseases, (4) the direct and indirect impacts of climate change, (5) atmospheric deposition that alters the chemistry of forest soils, and (6) poor silvicultural practices such as 'high grading.' Implementation of this vision and the TSC's recommendations that follow are intended to directly and indirectly address many of these threats by defining and protecting a resilient network of well-connected forests able to resist and recover from disturbance.

The TSC envisions a world one hundred years from now where privately owned forests will continue to account for the majority of forested land in the Commonwealth. These forests will have been permanently protected from development, predominately through conservation restrictions that encourage excellent land stewardship. Private forests will include the majority of the state's actively managed woodlands and serve as the engine for an invigorated local wood products industry and supply of local forest products. For these actively managed woodlands, a Director of Forest Stewardship will oversee the development and implementation of policies that promote innovative and sustainable forest management, empowering landowners and communities to make informed decisions about the future of their lands so as to protect the public values while respecting the needs and rights of a large diverse ownership base. The goal is a system of private forests that *continues* to deliver a wide array of essential ecosystem services, including wildlife habitat, carbon sequestration, water storage and purification, flood attenuation,

scenic values, and significant amounts of locally produced timber and wood products, to a public that is well-educated about the contributions of forests to their well-being. To compensate landowners for providing public benefits through good stewardship, the Commonwealth will reward private landowners with increased incentives for protecting and managing their forests to enhance these public values.

While private forests will provide a broad suite of valuable ecosystem services, the role of the Commonwealth's public forests will be to promote ecosystem services that private landowners are unable or less likely to provide well or in sufficient amounts – public recreation, large and small forest reserves, aesthetically pleasing landscapes, and demonstrations of innovative, state-of-the-art forest management -- ideally management designed to promote a landscape characterized by complex, resilient forests that support the full breadth of biodiversity and natural processes, and maximize the contribution of our forests to climate change mitigation and adaptation. State forests and parks will be better able to provide a full suite of ecosystem services if they are embedded in a well-managed continuous landscape of private and town owned forest lands.

Permanently protected large forest reserves – each one 15,000 acres or greater and located to represent the most intact examples of the state's major forest ecological landscapes -- are a particularly prominent and innovative feature of the Massachusetts forested landscape in 2110. The reserves will be owned and conserved primarily by public and non-profit entities to promote long-term ecological integrity and biodiversity values (Klyza, 2001). The reserves are intended to provide areas where evolving natural processes can be expressed, observed, recorded and appreciated -- including opportunities to observe and monitor the indirect human influences of climate change, acid rain and invasive plants, insects and diseases. An expansive network of smaller 'patch' reserves, designed to protect other ecologically sensitive or culturally significant sites, will complement the system of large forest reserves. Reserves will be distributed widely across the state and where possible link with abutting state parks, private reserves, conservation lands and actively managed woodlands so as to allow easy access to quiet refuges from the state's more developed urban and suburban landscapes. Active management for the purpose of timber production will be prohibited in the reserves. Statewide, the goal is to have between 90,000 and 120,000 acres of the land owned by DCR in 2010 designated as large forest reserves. Acquisitions and conversions of existing protected open space will push the total for DCR large reserves to at least 180,000 acres by 2035.

The remainder of the state system will be devoted to managed woodlands and parklands. The TSC is recommending that between 100,000 to 150,000 acres be designated as woodlands and 70,000 and 90,000 acres be as allocated to parklands. Managed woodlands will be a valuable source of ecological services, through the application of silvicultural approaches that emphasize carbon sequestration, wood production, clean water, creation of early successional habitat, and restoration of late successional habitat. The goal of the parklands is to deliver high quality and diverse public recreational opportunities that benefit from some active recreation and landscape management, but are insulated from more intensive silvicultural manipulations and harvesting operations that occur in the woodlands. When parklands are combined with the forest reserves, between 160,000 and 210,000 acres of DCR lands would be unavailable for timber harvesting, in addition to small 'patch' reserves that will be designated within the woodlands. Over the century between 2010 and 2110, however, we anticipate that the state will need to have added acreage to the parkland/woodlands system to meet the ecosystem service demands of a growing population.

This ambitious and integrated future for private and public lands is intended to make Massachusetts a national leader in forest conservation and stewardship, and will advance and complement the Commonwealth's future in terms of environment, energy, local resource production and quality of life in a world where these values will be in great demand, but also in increasingly short supply. In this broad context, DCR lands should set the standard for all landowners through demonstration of the very best possible land management approaches for delivering the full range of ecosystem services valued by the citizens of the Commonwealth. The citizens of Massachusetts should expect nothing less than the best possible management for the state's forest reserves, parklands, and woodlands to ensure a continuing flow of multiple ecosystem services into the distant future.

V. Recommendations of the Technical Steering Committee

Overview -- Shifting DCR's Forest Management Paradigm

The setting of forest policies is very much a product of their historic times. When 'sustainable forestry' was proposed in the early 20th century, the doctrine of Conservation advocated by Gifford Pinchot and President Theodore Roosevelt was a radical departure from the highly destructive practices that had been the norm since the first European settlement. Sustainable forestry came to mean primarily sustaining the production of wood for lumber, fuel, pulp and paper and even for industrial chemicals. Pinchot also argued for conserving forests for additional purposes such as water, wildlife and soils protection, but the production of timber often dominated forest management practices. The forest management practices that evolved to produce that outcome were appropriate for their time, but times change along with public values.

The extensive cutting of forests was justified by those who did it in the days of early settlement because forests were so vast, dwarfing human settlements and preventing the establishment of agriculture. Today, it is human settlements and agriculture that surround and fragment natural forests. While Massachusetts is fortunate to retain 63 percent of its lands in forests, the vast majority of these lands are in private hands and thousands of acres are lost to development every year (Mass Audubon, 2009). As forest land is converted and fragmented through development of (or expansion of) housing, commercial buildings and highways, we are experiencing the loss of many ecosystem services that were previously taken for granted. There is increasing public pressure to maintain these services on both public and private lands, and for the state to take the lead in demonstrating how to do this with its own lands while encouraging private landowners to do the same.

In this report, the TSC recommends new priorities and perspectives for conserving and managing forests in Massachusetts. The primary focus is the 308,000 acres managed by DCR's Division of State Parks and Recreation (DSPR) and the Division of Urban Parks and Recreation (DUPR). But the TSC recognizes that management of the State and Urban Park lands takes place in the context of a landscape of other public and private lands, and that decisions about state lands cannot be made in a vacuum. Consequently, the TSC provides several overview recommendations focused on conserving and managing the entire forested landscape of the state -- the Committee intends that these broader recommendations articulate the need for policy measures that ensure DCR lands remain embedded in a broader system of protected and well-managed forests and therefore serve the purposes on which this report's recommendations are premised.

The TSC's recommendations are intended to encourage a paradigm shift at DCR, moving the Department's forest management towards a vision based on a more comprehensive suite of ecosystem services and implementation of a more balanced portfolio of management approaches – a process that actually began before the creation of the Forest Futures process with the development of more comprehensive district-level forest resource management plans. A key premise of the TSC's recommendations is that the science, both natural and social, underlying land management debates is constantly evolving in response to new information and knowledge – for example the Committee notes the wide range of views on optimal strategies for managing forests in the face of climate change (Luyssaert, et al., 2008; Perez-Garcia, Lippke, Comnick, & Manriquez, 2005; Harmon, 2009).

Recognizing that the science informing our understanding of forest ecology and management currently allows a range of interpretations and applications and continues to evolve, the recommendations in this report reflect a public lands management philosophy that explicitly and intentionally relies on a variety of potential approaches for ensuring the continued provision of ecosystem services -- these range from active silvicultural management of some lands to a 'hands off' approach on others. The future is uncertain and the TSC therefore finds that it is critical to ensure a full assortment of tools remain in the land manager's toolbox. To this end, the Committee has tried to make recommendations that, while encouraging the adoption and ongoing evaluation of innovative approaches and current 'best' practices, leave open the use of a range of alternative approaches for managing DCR lands based on site specific needs, future refinements of our understanding of how ecosystems function, and changes in public values. For these reasons, the TSC recommends that DCR adopt a process of adaptive management that will rely upon insights gained from outcomes of practices implemented in this report.

Central to this new paradigm is the concept of ecosystem services -- where ecosystem services are defined as all the ecological, economic and cultural values provided by our forests. The TSC adopted the general ecosystem services model developed for the Millennium Ecosystem Assessment (2005), an international effort by scientists from around the world. Among the services identified are those that maintain important natural processes and others that are economic or cultural in nature. The former include carbon sequestration, soil, air and water quality, biological and ecosystem diversity, nutrient cycling, while the latter include culture, history, education and spiritual values, public recreation, and forest products. While many of these services are compatible, some are mutually exclusive. Our recommendations seek to include robust delivery of each.

The new paradigm more explicitly recognizes that state ownership of forests and parks is different from private ownership because of the assured very long-term stewardship of landscapes secured by one owner and because these lands are held in trust for the public. Hence state owned lands can reflect priorities that may require centuries to accomplish, such as development and protection of old growth forests. We propose a set of priorities for state forests that recognizes the unique potential of these lands to ensure the continued provision of the subset of ecosystem services that are not expected to be provided from private lands -- for example large unfragmented forest blocks managed as ecological reserves and parks managed for public recreation (Klyza, 2001).

Another element of the paradigm shift is the TSC's recommendation that DCR classify its lands into three zones -- forest reserves, parklands, and woodlands -- and develop integrated resource management guidelines for each zone that will be implemented in the form of management plans for all DCR properties. This allows a clear articulation of the ecosystem service goals for each zone and specification of appropriate site-specific strategies for realizing these goals. At the broadest level, our intent is that forest reserves provide for maintenance of ecological process and biodiversity services; parklands focus on recreational services; and woodlands are areas managed for services that benefit from active silvicultural manipulation of the forest, including demonstrations of sustainable forest management practices to produce forest products, restoration of late successional conditions that increase carbon sequestration, creation of early successional habitat for species that are currently in decline across the state, and promotion of effective watershed management.

The end result of the TSC's zoning deliberations is a recommendation for substantial increases in land set-aside from timber production, either as forest reserves or parklands. Our recommendation for forest reserves indicates the Committee's preference for a significantly expanded system of large reserves. The recommended management guidelines for reserves and parklands reflect the Committee's recognition of the need to provide clear direction while allowing a certain amount of flexibility, in the form of available management tools, to respond to future ecological restoration needs or recreation management challenges caused by events such as ice storms, hurricanes and disease infestations. *But the overall intent is that forest management activities in the reserves and parklands occur only as needed to support ecological and recreational objectives, respectively.*

Management of woodlands is also an area where the TSC is recommending changes to DCR policies. The Committee fully recognizes the potential contribution of active silvicultural management in the provision of valuable ecosystem services (Aber, et al., 2000), but also is aware that active silviculture is only one of several management approaches providing ecosystem services -- hence the Committee's recommendation is to significantly reduce the area of State and Urban Park lands open for active forestry and timber management. On the woodlands, the goal is to create examples of sustainable forest management that will both lead the way to improved management practices for supplying ecosystem services on private lands as well as highlight the importance of sustainably produced wood products to the public at large. To achieve this objective, the Committee is calling for a reduced emphasis on even-aged management and, where compatible with effective stand regeneration, a greater emphasis on uneven-aged selection methods that result in a more complex and potentially more resilient forest, one that is also likely to provide more continuous cover and high aesthetic values (Puettmann, Coates, & Messier, 2009). This will promote the development of a forested landscape that represents a more diverse set of age classes, including late successional stands that are seriously under-represented in the state's current forests (Keeton, 2006; D'Amato & Catanzaro, 2007).

Inherent in the TSC's land management recommendations is an inevitable tension between the need to clearly specify management methods without at the same time taking away from land managers the flexibility needed to achieve desired outcomes and adapt to changing ecological or social conditions. Such flexibility, however, requires an atmosphere of trust between the land managers and the public. Our management recommendations assume a basic level of trust, but it is clear to the TSC that DCR needs to rebuild and maintain this trust with the stakeholder community. The recommended land management approaches should therefore be viewed as part of a broader set of changes that must be implemented as a package to be successful.

For example, successful implementation of the ecosystem services approach will require major changes in the organizational culture at DCR. Strong and visionary leadership will be needed to reshape the agency's goals and planning processes and to insure new policies are implemented in the field. The new paradigm requires that all DCR staff understand and support the ecosystem services model and adopt a new way of thinking about the role of the public in forest stewardship. In the past the public has not always been adequately consulted on forest stewardship issues. This must change in the future if DCR is to successfully implement the TSC's vision for state lands. The state's current budget shortfall is certainly challenging but it also creates opportunities for DCR to partner effectively with 'friends' groups, non-governmental organizations (NGOs),

other agencies and entities to implement many of the planning, implementation, oversight and monitoring activities that are essential elements of the new vision.

The TSC is also recommending that forests -- and the full array of ecosystem services provided by them -- be elevated to a higher profile within state government. Without specifying details of such a bureaucratic reorganization, the TSC recommends elevating and broadening the responsibilities of DCR's Chief Forester, converting the position to a more prominent Director of Forest Stewardship.

Finally, although beyond the original charge of the Committee and therefore not included as one of our ten recommendations, the TSC urges the Secretary of Energy and Environmental Affairs to consider the potential benefits of adapting and applying the recommendations and insights from our work more broadly to all forest lands owned by the state. This would result in a more fully integrated vision and management approach for state lands, consistent with the TSC's long-term vision for the forests of the Commonwealth.

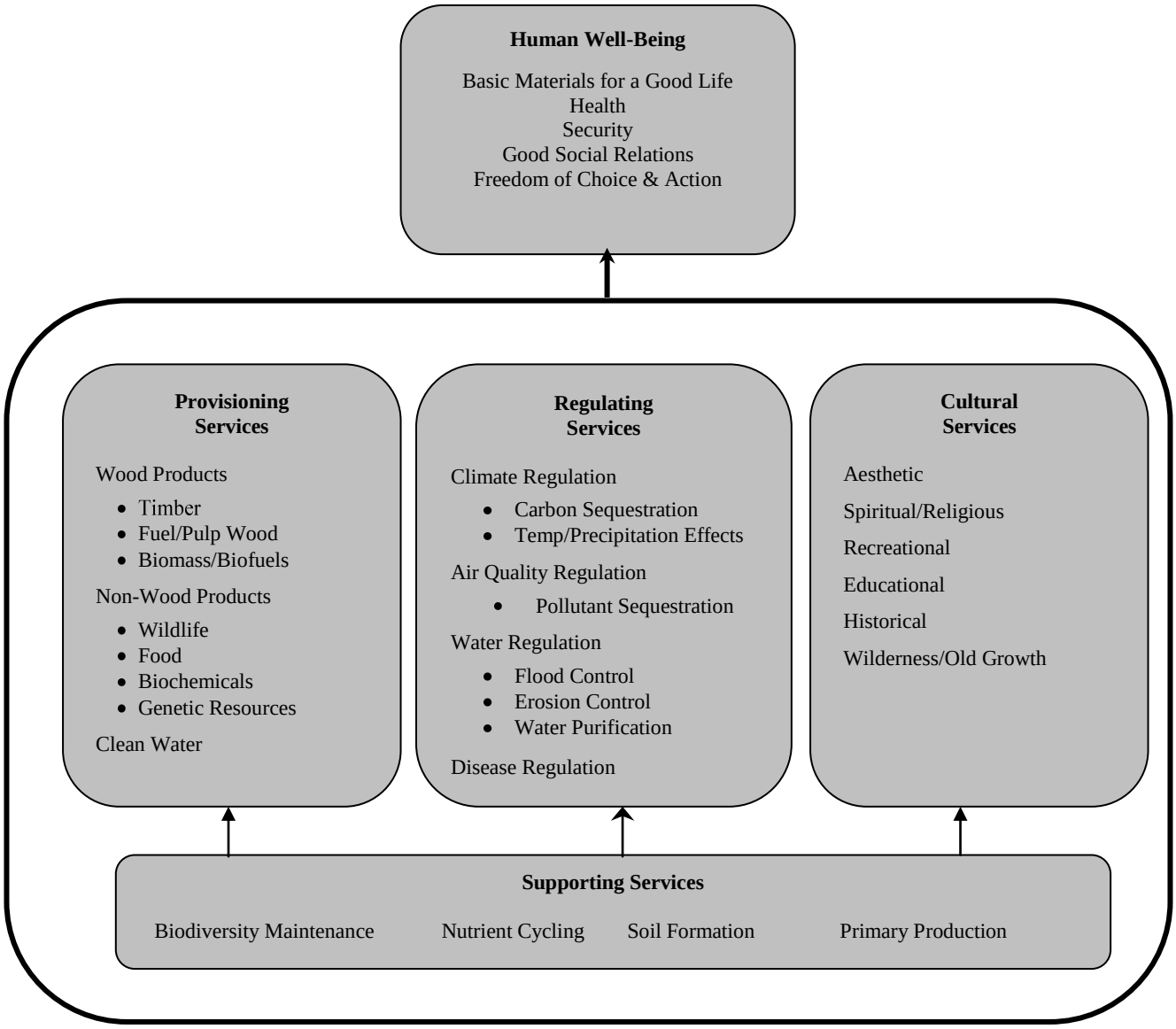
The remainder of this report outlines the details of our recommendations. Readers are urged to bear in mind that TSC intends its work as a roadmap designed to help DCR begin the journey of implementing the new paradigm. Full implementation of the vision embodied in these recommendations requires substantial DCR staff work, partnerships with other agencies and organizations, and public process. The three zones must be delineated on the ground, management guidelines and management plans rewritten, staff and financial resources found to support the new planning and monitoring requirements, and funds secured for acquiring additional lands needed to complete an ecologically functional system of forest reserves. In addition, the DCR Commissioner and the new Director of Forest Stewardship must dedicate themselves to providing strong leadership that shifts the forest management culture through clear articulation of the Forest Futures vision, training of department staff to implement the vision, and more effective communication with the public over planning and implementation details. Full realization of the vision will take time and DCR will require broad public support *and increased funding* to achieve these ends.

Although the TSC has not conducted extensive analysis of which laws and regulations governing DCR's forest land management will require modification to fulfill this vision, it is clear that numerous inconsistencies and ambiguities exist in these mandates. Interpretation and prioritization of these mandates and regulations has clearly been a factor in the diminished trust in DCR by segments of the public. Many of these mandates and regulations confer broad discretion or latitude for interpretation on the agency. In order for DCR to move forward, differences should be clarified and harmonized to align with the principles underlying these recommendations and to enable consistent implementation. Doing so will assist DCR staff in fulfilling the mission and reduce confusion and confrontation with the public. An example illustrating the need for this deeper legal analysis is Chapter 132A Section 2B provisions on acquired lands, which states "that they shall be in so far as possible collectively self-supporting; and that no commercial activities except those essential to the quiet enjoyment of the facilities by the people shall be permitted." This can be read to be in conflict with Chapter 132 Section 40, which states "and providing a continuing and increasing supply of forest products for public consumption, farm use, and for the woodusing industries of the commonwealth." To ensure the state's legal framework is fully supportive of the vision expressed in the TSC's recommendations, we suggest that the responsible agencies seek changes to existing laws and regulations as necessary to clarify the state's legal mandates for forest protection and stewardship.

Recommendation 1: Adoption of an Ecosystem Services Model to Guide Forest Protection and Management

Recommendation: *The fundamental guiding principle for all forest protection and management policies in the Commonwealth should be to ensure the sustainable provision of a comprehensive suite of forest ecosystem services. Moreover, DCR should adopt a planning framework for the state parks and forests that focuses on the provision of key ecosystem services not expected to be provided, or not provided in adequate amounts, from private lands in the Commonwealth.*

The forests of Massachusetts provide a wide array of goods and services to the citizens of the state. The TSC finds that the fundamental basis for forest policy in the state should be a planning and management model that recognizes the importance of the full range of these values and the need to ensure their sustainable provision for current and future citizens of the Commonwealth. To guide its recommendations, the TSC used the ecosystem services framework shown in the diagram below to systematically account for all of the potential ecological, economic and social benefits provided by forests in the Commonwealth. This diagram represents the TSC's adaptation of the ecosystem services framework originally proposed in the Millennium Ecosystems Assessment (2005).



Implementation Guidance: Many competing demands are being placed on all public lands, and recently there has been significant public controversy over current priorities and management practices for DCR forest lands. To address these issues, the TSC recommends that DCR, as it establishes its land management priorities, consider the following five organizing principles:

- Forests provide a host of valuable ecosystem services. Many of these services -- public recreation, carbon sequestration, soil and water quality, and habitat that promotes biological diversity -- have little or no market value, and are therefore unlikely to be supplied in sufficient quantities from private forests.

- Even though they account for only about 10 percent of the Commonwealth's forested land, DCR's state parks and forests include some of the state's largest continuously forested tracts, providing an opportunity for long-term ecosystem management that is not possible on more fragmented forest lands.

- To maintain ecosystem services for future generations requires that forest lands be managed with these goals in mind and on time scales of centuries or longer. The enduring ownership and responsibility for DCR lands by state government is a unique responsibility that no other institution or individual can fulfill.

- Over time climatic zones will shift, surrounding land use patterns will be altered, public values may change, and our understanding of forest and climate science will evolve. State ownership of forests provides an important, and perhaps unique, opportunity for managing and monitoring the adaptation of our forests to these changes and the uncertainties that surround them.

- The state should serve as the guardian of our collective future and forests represent a unique component of that future. DCR lands need management plans that can meet the goals inherent in a very long-term future and that will not necessarily be met by other forms of land ownership.

In the context of these five organizing principles, the TSC identified ecosystem services that it recommends take precedence in the management of DCR's state forests and parks, primarily because private forests are unlikely to provide adequate supplies of these services. These *essential ecosystem services* represent primary management goals for DCR lands. In the view of the TSC, these must include biodiversity protection (including both early and late successional species), clean water, carbon sequestration, soil formation and nutrient cycling, and public recreation including wilderness/old growth/spiritual experiences. In addition, demonstrations of how forests can be managed to provide sustainably grown wood products are an essential service on the subset of DCR properties classified as woodlands (see Recommendation 3).

The TSC further recommends that future DCR resource management plans for forest reserves, parklands, and woodlands explicitly propose priorities and goals for each of the essential ecosystem services and establish appropriate metrics for judging whether the goals are being met.

Discussion: In recent years, a number of planned and actual harvests on DCR lands have resulted in public controversies due to the scale of harvests, the large size of openings created by the

harvests, claims of poor oversight resulting in site degradation, and harvesting plans that conflicted with other public and ecosystem values of the site. These incidents were a major factor leading to the formation of the TSC by DCR Commissioner Sullivan.

The TSC recognizes that implementation of silvicultural prescriptions designed to produce quality timber and certain other valuable ecosystem services will sometimes conflict with other public values, particularly the recreational and aesthetic experiences provided by state parks and forests. Nonetheless, the TSC finds that production of timber and other related ecosystem services through sustainable forest management is desirable on a portion of DCR lands explicitly designated for these purposes. The reasons for this are not primarily economic. DCR lands represent a small portion of the state's public and private forests, and hence make a relatively minor contribution to overall forest sector economic activity in the state (although the contribution may be significant for some small towns and this 'community context' is a relevant consideration of the management planning process for specific properties). Moreover, revenues from timber sales are small and unavailable to DCR as the legislature currently requires these sale proceeds be returned to the general treasury – hence they make no substantial contribution to meeting the Department's budgetary needs.

In the TSC's view, the primary role of wood production on DCR lands should be an educational one. Silviculture on DCR forests provides an important opportunity for public education, outreach and training on sustainable forest and ecosystem management practices. The focus of forest management on DCR woodlands should be the creation of 'model forests' capable of demonstrating absolute 'best practices' to private landowners and the broader public. Through the collection of long-term ecological and economic data, this will allow state land managers to test both the efficacy and economic viability of sustainable forest management approaches that private landowners may currently believe to be too risky, unproven or uneconomic to adopt. Ultimately, demonstration efforts to identify and show the results of applying best practices should be judged based on how successful they are in improving the sustainable delivery of ecosystem services from private forests. Another important benefit of conducting silvicultural treatments on these lands is to create or restore ecological functions and processes that are in decline, for example valuable early successional or fire-dependent wildlife habitat. Finally, by allowing timber production on some of its lands, DCR can contribute to building a public sector program that encourages the use of locally produced wood and wood products, an initiative that would help promote economic development in the Commonwealth's rural areas. It is in light of these various considerations that the TSC has determined that wood production is one essential ecosystem service among several on DCR lands classified as woodlands.

Recommendation 2: Elevated Role for Massachusetts Forests in the Commonwealth Environmental Decision-making Processes

Recommendation: *In implementing its environmental priorities, the Commonwealth should focus increased attention on the protection and stewardship of the state's public and private forests through a reorganization that elevates the state's chief forest stewardship official to a more prominent decision-making role.*

Currently, forest stewardship decisions, affecting hundreds of thousands of acres across the Commonwealth, are spread across several state agencies and are often decided in a manner that does not adequately support and encourage forest protection and stewardship in the competition for the state's limited environmental resources and dollars. Relegating the responsibility for forests to agencies with other primary purposes has resulted in a lack of knowledgeable and effective leadership, often leading to poor accountability across the existing bureaucratic structure. Given the enormous importance of public and private forests in providing these critical environmental services to the public, the TSC recommends that DCR/EEA create a new organizational structure that results in more integrated and coordinated stewardship policies for Massachusetts forests. Specifically, the reorganization should support provision of a complete and non-declining suite of forest ecosystem services to current and future residents of the Commonwealth. This will require an organizational structure that:

- Results in a high degree of coordination for land protection and forest stewardship policies across the three million acres of public and private forests in the state.

- Creates a senior level leadership position in state government that serves as the focal point for innovative forest protection and stewardship of state lands.

- Improves integration of planning activities for both natural and cultural resource protection and recreation management through a strong focus on the development of integrated resource management plans for public lands and full implementation of an adaptive management framework to ensure their success.

- Fosters better communication and public participation in the development and implementation of state land management policies with the goal of ensuring broad-based public understanding of and trust in state land management policies.

- Elevates to key leadership positions staff with training, expertise and experience in forest ecology and other ecosystem services required to plan and implement land management policies.

- Allocates adequate funding to accomplish these goals.

Implementation Guidance: Specifying the details for a reorganization of the state land management system to achieve these objectives will be a complex and challenging task -- one that many believe is beyond the scope and expertise of the TSC. Nonetheless, the Committee is

clear that significant changes are needed in how the state organizes its forest stewardship and management functions. Changes could be implemented at a number of different levels within the EEA bureaucracy, and the TSC recommends that the Secretary consider how best to reorganize EEA to achieve the above objectives. Given the TSC's charge, we focus our specific comments on organizational changes needed to ensure improved management of DCR's 308,000 acres of DCR state parks and forests.

The principal organizational challenge at DCR is the coordination of resource stewardship and recreation management policies. Currently, responsibility for resource management is fragmented and isolated across the Department's organizational structure. This arrangement has contributed to less-than-ideal stewardship decisions and has certainly not provided adequate prominence to forest policy and decision-making. Consequently, the TSC is recommending reorganization of DCR to create a resource stewardship position on an equal footing with the Directors of the state (DSPR) and urban (DUPR) park systems This however raises the question of who is ultimately responsible for the management of specific properties – a *Director of Forest Stewardship* or the parks and recreation director. The TSC's review suggests there is no simple answer to this question. Instead, some form of matrix management or joint responsibility is likely needed to ensure balanced and integrated consideration of natural resource and recreation policies.

In this context, the TSC recommends that the DCR Commissioner consider converting the existing Chief Forester position into a Director of Forest Stewardship, and elevate this position in the DCR organizational structure to be on a par with the DSPR and DUPR Directors. The Director of Forest Stewardship would have direct responsibility and oversight for Service Forestry on private lands, and for management of DCR woodlands and forest reserves; his/her department staff would also work collaboratively with the staff in State Parks and Recreation to carry out any necessary management of forests in state parks. It is critical for the person in this position to have an extensive background in forest ecology and conservation biology, a demonstrated understanding of the full breadth of ecosystem services that the state is advancing on its public and private forest lands, and a proven track record of working successfully with the diverse interest groups involved in forest policy. Creation of a new forest stewardship director would increase the prominence of forest policy within DCR's decision-making processes, thereby providing a stronger internal DCR voice for protection and stewardship of public and private forests in the Commonwealth. While not addressing the broader need for leadership and coordination of forest policies within EEA, a DCR Director of Forest Stewardship should provide greater assurance that the state's public and private forests are managed to provide a continuing and never declining stream of forest ecosystem services to current and future residents of the Commonwealth.

The TSC also notes the critical importance of selecting an individual with exceptionally strong leadership and public outreach skills for the Director of Forest Stewardship position. The person in this job will need to restore morale amongst the foresters at DCR, motivate foresters and planning staff to adopt and implement the new vision, and prove to skeptical segments of the public that DCR is committed to a new and ambitious course. This is a daunting set of challenges and will require leadership skills of the highest order.

Discussion: The TSC is fully aware that its recommendations leave open the details of reporting relationships within DCR for forest stewardship and parks and recreation. Our intent is to foster a

dialog about the best way to achieve the broad objectives outlined at the beginning of this recommendation. From the TSC's perspective, this dialog ideally would include discussion of how to ensure integrated policies based on a consistent vision across all DCR policies affecting forests – including management of Division of Water Supply Protection lands and the DCR Commissioner's role as State Forester overseeing policies promoting good stewardship of private forest lands. While not making any specific recommendations in this regard, the TSC suggests that organizational changes should include as a goal broader coordination of forest policies within DCR. In a similar context, the Committee recommends the EEA Secretary consider mechanisms for further ensuring implementation of a unified policy framework for all the forests owned by the state.

The recommendations discussed here focus on elevating the prominence of forest stewardship within DCR. Within the context of a reorganized DCR, a wide array of other planning and management issues will need to be addressed. The TSC discusses these in Recommendation 7.

Recommendation 3: New DCR Landscape Planning Model

Recommendation: *As an overarching template for organizing its land management activities, DCR should adopt a management structure that sub-divides its State and Urban Park lands into three categories: (1) Forest Reserves, (2) Parklands and (3) Woodlands.*

This categorization recognizes and supports the broad set of ecosystem service priorities that the TSC has identified, refining the Harvard Forest's 'wildlands and woodlands' concept (Foster, et al., 2005) for application to the State and Urban Park lands, and segregating incompatible activities into different land use zones. Creation of these zones should help to more clearly articulate dominant ecosystem services and set priorities across different lands in the DCR system:

- **Forest Reserves:** These lands are areas where the dominant ecosystem service objectives are biodiversity maintenance and the underlying supporting services of nutrient cycling and soil formation, watershed protection, and long-term carbon sequestration (Luyssaert, et al., 2008); important secondary services include provision of wilderness/spiritual values and recreation. Management would generally consist of letting natural processes take their course (Foster & Orwig, 2006), although in some cases more active management might be permitted (Soule & Terborgh, 1999), for example fuels management may be necessary for forest reserves in the southeastern part of the state.

- **Parklands:** The dominant ecosystem service objectives for parklands are provision of public recreational opportunities that depend on natural areas, preservation of ecologically significant areas and 'special places,' and promotion of cultural values (aesthetic, historical, educational and tribal). These goals should also be compatible with the maintenance of a wide range of other important ecological values. Parkland management approaches are expected to range from areas where natural processes dominate to highly modified environments where use is intensively managed.

- **Woodlands:** Planning for these areas should emphasize the provision of ecosystem services that require management prescriptions with intensities that are less compatible with the activities in the parklands (or forest reserves). An over-riding emphasis for woodlands should be educating other landowners and the general public about sustainable forestry. This would be done through active forest management targeting sustainable production of timber for local markets, protection of water supplies through active watershed manipulation, management to promote early successional habitat (Massachusetts Division of Fisheries & Wildlife, 2006), and carbon sequestration through options that focus on late successional habitat restoration (Keeton, 2006; D'Amato & Catanzaro, 2007) and lifecycle carbon impacts (Perez-Garcia, Lippke, Comnick, & Manriquez, 2005). In addition, active forest management may play a role in the ecological restoration of areas that have been significantly altered by previous management (*e.g.*, plantations of non-native species).

Implementation Guidance: The DCR Commissioner should immediately establish processes (both internal and public input) for mapping the 308,000 acres of DCR State and Urban Park lands into the three land use zones and then proceed with the development of integrated resource

management plans for these areas. As described below, DCR should continue its suspension of timber sales until the re-zoning process is complete. Similarly, until forest management plans are subsequently revised and/or completed for the woodlands, any timber sales should focus on uneven-aged management.

- **Overview --** the TSC reviewed a number of preliminary analyses to evaluate the appropriate allocation of currently owned State and Urban Park lands to forest reserves, parklands, and woodlands. These analyses do not point to a single 'correct' allocation but the TSC agreed on general ranges for each zone based on the professional judgment of the Committee members and informed by various allocation scenarios presented in Annex 5.

Recommended Allocation of DCR Land to Zones		
Zone	**Acres Range**	
	Low	**High**
Forest Reserves	90,000	120,000
Parklands	70,000	90,000
Woodlands	100,000	150,000

Implementation still requires (1) a spatial analysis using objective criteria for large forest reserves, parklands, and woodlands to guide the layout of the zones across the full set of existing DCR properties; (2) comprehensive delineation of each zone including optimizing each zone, making difficult decisions for properties identified as important for two or more zones, and ground-truthing; and (3) implementation of a robust public process to vet and finalize the allocations, including discussions with towns where DCR forests account for a large portion of the town's area. Overall, the zoning process should give adequate consideration to economic analyses of potential impacts in those communities that are most dependent on the local forest economy.

To guarantee the ecological integrity of the forest system and its capacity to deliver the described ecosystem services, the TSC finds that it is necessary to add to the protected forested land base, emphasizing the expansion of large forest reserves to 15,000 acres each. The TSC strongly recommends that the state also take action to add permanence to the reserve designation, which for example might include codification of forest reserves in legislation, via constitutional amendment, or through other appropriate means for maintaining reserve values in perpetuity.

The remainder of this section discusses the details underlying the TSC's recommended zoning allocations. Management approaches for each of the zones are specified in Recommendations 4 through 6.

- **Large Forest Reserves** are intended to return significantly under-represented late successional forests to the Massachusetts landscape. Lorimer and White (2003) estimate that for eastern oak forests on the pre-settlement landscape, multi-cohort stands with a

component of mature and old trees would have been common, occupying roughly 25–40 percent of the landscape, and for northern hardwood forests, the estimated pre-settlement proportion of the landscape in old-growth forest (>150 years old) is 70–89 percent. D'Amato et al (2006) estimate that there are currently 1,119 acres of old growth in the Commonwealth, less than 0.04 percent of the state's forests. Therefore, a key goal for DCR forest management should include restoration of missing late successional structure and function.

Forest reserves are a widely recommended approach to restoring and maintaining ecosystem functions associated with late successional forests, which provide unique ecosystem services and support resilience in the face of future uncertainties such as climate change. Norton (1999) stated that "On scientific grounds, reserves are important because they contribute to protecting the full range of biodiversity, including ecosystem processes that characterize the forest." He mentions the extensive documentation of species benefiting from old-growth forest stands, highlighting "the value of having some areas free from all production management." Norton concludes that "a primary reason for reserves is to ensure that representative examples of biodiversity indigenous to an area are protected. While many indigenous species can persist in forests managed for timber, changes in composition and age structure of forest stands resulting from forest management alter habitat availability for many species," and that "if our overriding goal for managing a reserve is to protect the full range of biodiversity within it, then the changes that result from sustainable management, no matter how subtle, are not compatible with this goal."

Examples of late successional forests supporting biodiversity include breeding bird densities that are significantly higher in old forests (Haney and Schaadt, 1996). Selva (1996) found that older forests yielded a greater diversity of lichens than younger forests and that some species were only found at sites that had supported mature trees for many centuries. Chandler (1987) found that many insect species were more abundant in old forest. These findings are especially important in the context of the fact that vascular plants and vertebrates make up only 20 percent of the species in our forests (Anderson, 2008). The remaining invertebrates, lichens, mosses, fungi, bacteria and other taxa represent 'unknown biodiversity' that place an imperative on protecting the full complement of forest structures and functions.

Unmanaged forests have recently been shown to play a crucial role in forest carbon sequestration and storage. Nunery and Keeton (2010) "showed that even with consideration of C sequestered in harvested wood products, unmanaged northern hardwood forests will sequester 39 to 118 percent more C than any of the active management options evaluated. This finding suggests that reserve-based approaches will have significant C storage value." Reserves also provide important benchmarks against which to compare changes in managed ecosystems (e.g., for assessing the long term effects of sustained-yield harvesting on biodiversity (Norton 1999).

For the **large forest reserves**, DCR should build on the recent and successful analysis that identified and designated the nine existing large forest reserves by DSPR, DWSP and the Department of Fisheries and Wildlife (DFW), totaling approximately 50,000 acres (approximately 40,000 of which was on DSPR lands). This process emphasized large,

intact forest blocks and representation of Massachusetts forest biodiversity. Ideal large reserve design should be based on the principles of conservation biology that direct us to develop a connected network of large, well-buffered forest reserves with minimal internal fragmentation. Applying these concepts will require careful reserve selection and design analyses. To finalize the strategy for reserves, DCR should appoint a committee of forest ecologists and biodiversity experts to review and recommend the final layout of the forest reserve system. This should then be the subject of a broader public process.

To guarantee the ecological integrity of the forest reserve system, the TSC finds it is necessary to create large, intact forest reserves in each of the major ecological settings in the state (Anderson, 2008). Beier and Brost (2010) support this stating "a reserve or linkage designed to encompass the full diversity of dominant land facets at multiple spatial scales will encompass the full diversity of land-cover types and species, today and in the future, and will conserve ecological and evolutionary processes." These principles would result in the following overarching large reserve selection criteria. Large reserves should be:

- located in the least fragmented forests with the highest amount of forest interior habitat.

- representative of the state's diverse ecological settings (based on geology and elevation) which are the drivers of long term ecological and evolutionary processes, and as such are surrogates for forest biodiversity even under changing conditions such as those anticipated under climate change.

- large enough to capture the full range of ecological processes, such as infrequent but severe natural disturbances, and serve as source habitat for forest dependent species. The TSC has adopted The Nature Conservancy's recommendation of 15,000 acres as a minimum size goal for large forest reserves. These large reserves will in some cases initially be smaller where there is currently not a protected area of 15,000 acres, but the goal should be to reach this size in a timely manner to capture the full benefits of having reserves.

In developing its allocation recommendations for large forest reserves, the TSC considered a number of alternative reserve scenarios. These included an analysis of the minimum acreage and reserve configuration required to represent forest settings in the Commonwealth, as well as review of configurations that provide greater redundancy across the major ecological settings and representation of smaller forests that no longer occur in 15,000 acre patches. Also reviewed were suggestions from a subgroup of the AGS that 80 percent of all DCR land be designated forest reserves and parklands. These various analyses are presented in greater detail in Annex 5.

Because the current arrangement of public lands does not represent an ideal reserve network, ultimately large reserves will need to be designated through a combination of existing protected lands and future acquisitions. Therefore, building on the approximately 40,000 acres currently designated as large reserves on DSPR land, DCR can achieve forest reserve goals through a combination of the following: (1) designation as reserves of additional currently owned DCR lands, plus (2) legal protection of adjacent

lands, through acquisitions of land or conservation restrictions, and incorporation into the reserves management plan of adjacent already protected lands held by other organizations. Even with addition of existing DCR protected lands, expanding each reserve to 15,000 protected acres will require the addition of at least 90,000 and perhaps as much as 130,000 more acres to the system (for a total of between 180,000 and 250,000 acres of large forest reserves). However, some of this land is already protected, for instance the Division of Fisheries and Wildlife and the Division of Water Supply Protection have already designated over 11,000 acres of large forest reserves that augment the DCR reserve system, and non-profit organization lands also can contribute to this reserve system through collaborative agreements.

Designation of a total of 90,000 to 120,000 acres of existing DCR lands to large forest reserves, which represents an acreage increase of between 125 and 200 percent over current acreage in reserves (40,000), would result in a reserve system on between 30 and 40 percent of DCR's existing State and Urban Park lands, or between 3 and 4 percent of total state forest lands. In addition, the TSC recommendations for future acquisitions and incorporation of other already protected lands into the reserve system – an essential action needed to ensure the ecological integrity of the system -- would eventually result in a state forest reserve system of between 180,000 and 250,000 acres, approximately 6 to 8 percent of all forested land in the state. This is necessary to provide protection for the full complement of the multiple, diverse forest ecosystems and their services within the Commonwealth, and provide the resiliency required as climate changes and development of land areas continues.

Within the system of forest reserves, the TSC also suggests that the Commissioner establish a wilderness designation -- perhaps through adaptation of the existing 'wildlands' and 'nature preserves' designations. The TSC envisions one or two such areas, embedded within other reserves and in total encompassing approximately 5,000 acres. In these areas, old growth forest would be a prominent feature, and human interventions would be subject to certain additional use restrictions designed to protect a sense of remoteness, as discussed below in Recommendation 4. In the view of the Committee, creating one or two wilderness areas of this type would provide important recreational and spiritual values that would not necessarily be present across other areas in the forest reserve system. The TSC anticipates that wilderness areas might be established as protected cores within individual forest reserves.

Because it takes centuries to develop many of the old growth structures, functions, and ecosystem services provided by forest reserves, some degree of permanence is needed to ensure these forest reserves are allowed to mature protected from political forces. Therefore, once the initial process of identifying and designating the reserves is complete, the TSC strongly recommends that the Secretary of Energy and Environmental Affairs evaluate how best to make reserve designation permanent, which may include a request that the legislature codify the forest reserves by law or advance a constitutional amendment, and then implement the most effective approach for maintaining reserve values in perpetuity, with provisions to add to the reserve network through land acquisition over time.

Finally, as part of the planning processes for the zones, DCR should designate additional **patch reserves** designed to provide greater protection to valuable natural or cultural assets. Typically, these would be areas where standard best management practices for the land-use zone are not adequate to fully protect these embedded areas (*e.g.*, highly sensitive ecological or cultural assets within any of the three zones where certain human uses or management might need to be discouraged to fully protect the resource). These areas will have altogether different selection criteria than large forest reserves (e.g., old growth patches, forest dependent rare species habitat, important historical sites, etc.). The acre totals for large forest reserves discussed at the beginning of this recommendation do not include these areas. Management of these patch reserves is discussed in Recommendations 5 and 6.

- For **parklands**, the Commissioner should direct DCR's planners to establish an approach and further public process for designating parklands throughout the DCR system. These should include all DCR lands in heavily populated areas and other forested areas with high recreational values while retaining other important ecosystem services. Potential criteria for identifying these other areas might include:

  - Density of officially designated trails (as opposed to bootleg or rogue trails), with denser or more extensive trail systems being most appropriate for parklands. DCR should consider whether motorized trail networks are more compatible with the woodlands zone than with the parklands for reasons of trail flow and experience.

  - Areas surrounding campsites and other control points such as water access and day use areas.

  - Nationally or regionally significant trail corridors.

  - Level of recreational visitation (how popular is an area?) with areas of high visitation -- both day and overnight use -- being most appropriate for parklands.

  - Availability of unique natural or cultural features, such as views, water features, chasms, unusual forest types, historical or cultural features.

  - Extent to which the setting is unique to the surrounding landscape – for example native forest habitat (or even just a forested setting) amid a suburban landscape – or where slopes, soils, etc. are not appropriate for timber harvesting.

  - Parklands should be situated on the land to provide adequate buffering from more actively managed woodlands, with particular attention given to aesthetically pleasing views and segregation of access roads for the woodlands. Parklands should explicitly incorporate and buffer the 'special places' with ecologically or culturally significant features.

  - DCR should consider partnering with local municipalities to manage recreational facilities that are not inherently dependent on the natural setting. These types of facilities do not enhance DCR's important role in providing nature-based

recreation to the citizens of the Commonwealth, and indeed, these facilities likely diminish staffing resources and funding that should otherwise be allocated to nature-based recreation functions.

The TSC's recommended allocation of between 70,000 and 90,000 acres to parklands reflects the Committee's review of preliminary analyses from DCR and the AGS. At the TSC's request, DCR provided information on the acreage of existing State and Urban Parks that meets the parkland criteria discussed above. The most recent DCR analysis indicated that approximately 81,000 acres would fall into this category, but the TSC finds this still might be an underestimate and as a result increased the upper end of the range to 90,000 acres to ensure the possibility of full protection for lands where the primary ecosystem service is recreation. Details of DCR's analysis, as well as recommendations from the AGS working group, are included in Annex 5.

- **Woodlands** would be designated by DCR planners and vetted through the same public process as reserves and parklands. Criteria for woodlands include (1) areas suited for wood production, including wood to support DCR's home fuelwood program; (2) lands well situated for the creation of early successional wildlife habitat; (3) watersheds that will benefit from active manipulation of the forest; (4) areas where forest management has the potential to increase carbon storage through substitution of wood for more energy intensive materials such as steel and concrete, and (5) areas that will benefit from active silviculture to restore late succession characteristics. It is important to note that the goal of woodlands designation is to maintain sustainable delivery of multiple ecosystem services <u>including</u> wood products by utilizing management techniques. The selection criteria for woodlands might include location considerations such as proximity to wood processing facilities, as well as whether sites provide good access for model forest demonstration activities. Sites requiring ecological restoration and sites that have been subject to recent silvicultural treatments might also be good candidates for woodlands designation.

  In light of the ecosystem service priorities highlighted in Recommendation 1 (*e.g.*, sustainable forest management demonstration and training, early and late successional habitat creation, manipulation of watersheds, and active carbon management strategies), the TSC is recommending that between 100,000 and 150,000 acres be allocated to woodlands. The TSC requested and reviewed an analysis from DCR that suggested the need for 155,000 acres of woodlands, which included 20,000 acres for watershed management, 30,000 acres for early successional habitat and the remainder for demonstration of sustainable forestry, including forestry aimed at restoration of late successional conditions and carbon sequestration (Annex 5 -- note that the DCR estimate in the Annex is 140,000 acres, reflecting a further focus on the most highly rated areas from the woodlands identification modeling). There was general agreement on the TSC that the approximately 20,000 acres of DCR lands that are actively managed for watershed values should be included in the woodlands. But the overall range in the TSC recommended woodland allocation reflects considerable uncertainty about how much land is really needed to meet the ecosystem service objectives described above.

  While the published literature consistently demonstrates declines in early successional species, the TSC did not reach consensus about the total amount, location and patch size

of habitat necessary to support these species on DCR land. This was the result of uncertainty about how best to configure and maintain such early successional habitat on the ground, as well as recognition of the fact that the 'right' amount of such habitat depends on public values about the kinds of biodiversity worth protecting. The Committee reviewed management approaches suggesting the designation of (1) 4,500 acres that would be re-cleared every 15 years for early successional habitat versus (2) 30,000 acres managed as a shifting mosaic of clearings managed over a 100-year rotation. Based on comments received from a wide array of sources when the draft recommendations were made available for public comment, the TSC has decided that rather than designating a specific acreage target for early successional habitat, it is recommending that DCR establish a formal ongoing planning and adaptive management process for addressing these needs – the details of this recommendation are discussed further in the management recommendations for woodlands (Recommendation 6).

The other substantial uncertainty revolves around the amount of land needed to demonstrate sustainable forestry, including late successional restoration aimed at enhancing biodiversity and increasing carbon sequestration. In general the TSC finds that DCR should build up an estimate of these acreage requirements based on the identification of a set of stands that is representative of the range of forest types, age classes, and logging conditions in the state. An example of such an approach, which suggested the need for 90,000 acres of woodlands for demonstrating sustainable forest management, is included in Annex 5. But this analysis is only intended to be illustrative of the type of detailed, on-the-ground assessment that the TSC recommends be done to finalize the acreage necessary for a system of model forests. As part of this further analysis, TSC recommends that DCR coordinate closely with DFW to identify opportunities for integrating the early successional habitat creation into management of lands identified for forestry demonstrations.

Transitioning to the New System

- To complete the zone mapping, DCR planners will need to make final decisions about allocations to the three zones in collaboration with partners and informed by careful public review. The TSC notes the desirability of a large forest reserve system built on greater redundancy; based on very preliminary analyses there would appear to be adequate land in the DCR system to support a certain amount of redundancy across ecological settings (see Annex 5). For example, if 80,000 acres are designated as parklands and another 120,000 as woodlands, it should be possible to devote approximately 110,000 acres to an extensive proposed reserve system, given the current acreage of the State and Urban Park system. Greater redundancy could be achieved as additional lands outside of current state holdings are added to meet the stated goals (see the discussion below on the role of easements and purchases). It is critical to note, however, that the TSC has not had the data, analytic capabilities or time to fully verify that this more extensive system of reserves can be configured on the ground in a way that meets the goals for each zone. Moreover, the allocation process must address the complexity of certain properties, for example Mount Greylock, where decisions will have to be made about how existing infrastructure will be handled in the context of a property that is largely allocated to a forest reserve. *In light of this, the allocation scenarios, and*

supporting analyses in Annex 5, should be viewed as broad goals and are not intended to define the future status of specific properties. This can only be done through a much more detailed planning exercise that considers the ecosystem service objectives of each zone and applies specific criteria for configuring the system on the ground. This final allocation process should include careful consideration of both forest ecosystem science and public values, while reconciling any on-the-ground conflicts.

- The transition to the new zoning and management system raises a number of questions about DCR land management policies in the period before the management planning is finalized. The TSC recommends that the current suspension of new timber sales be continued until the zoning process, including public review, is complete. This will be followed by a period when DCR develops revised Forest Resource Management plans including guidelines for each of the zones. During this period, timber sales could be reinstated, but until such time as the guidance and management plans are complete, all timber sales should focus on less controversial silvicultural prescriptions (*e.g.*, uneven-aged management for late successional characteristics as discussed in Keeton (2006) and D'Amato & Catanzaro (2007)).

- As noted in the Forest Reserve section, future land protection (acquisition and easements) will play an important role in developing a sufficiently protected land base to provide the full suite of ecosystem services. The TSC recommends an aggressive land acquisition program, in collaboration with EEA and other Massachusetts land protection agencies and organizations. Because the large forest reserve network requires additional acreage to realize reserve design goals and become fully functional, the TSC recommends prioritizing forest reserve acquisition within intact forest blocks, and including buffers and connections. In addition, further acquisitions of parklands and woodlands will likely be needed to ensure that future public ecosystem service demands are met.

Discussion: DCR currently has a three-zone system for mapping its lands. This system, however, has resulted generally in a commingling of parklands and woodlands, and a resulting lack of clarity about differences in management approaches. The TSC has identified two major benefits of adopting the proposed zoning system.

First, the zones align better with ecosystem service priorities and make explicit where different management approaches are appropriate, generally organizing the DCR lands along a continuum that reflects the intensity of human intervention and management. Forest reserves would clearly have the least intervention, although this does not necessarily imply zero management -- approaches for managing human access (trails), invasive species/pests, herbivore damage, or woody fuel loadings are all things that might warrant intervention. The main emphasis on the parklands would be enhancing the recreational experience of visitors -- although generally this will require a greater degree of intervention than in the forest reserves, management would be performed only with the goal of supporting the recreational experience and enhancing the types of ecosystem services also provided by forest reserves. The woodlands would be the locus for the more intensive (primarily vegetation) management practices that, for example, support provision of local wood products, early successional habitat creation, clean water needs requiring active watershed manipulation, and active management to promote the development of late successional characteristics and lifecycle carbon storage.

Second, the recommended zone system could be implemented more quickly than property-specific resource management plans, since it is essentially a refinement of the district planning process currently used by DCR forest planners. Recently, DCR, with guidance from the Stewardship Council, established a priority scheme for the development of property-specific resource management plans. In the future, as funds become available and as is required by M.G.L Ch. 21, Sec. 2F, this prioritization can serve as a starting point for resource management planning focused on areas most likely to benefit from more detailed on-the-ground planning.

The TSC notes that over the longer term, flexibility will be needed in the delineation of zones in order to adapt to changing future ecological conditions and societal preferences. Both factors are subject to change, with the possibility that climate change could result in dramatic alterations. The TSC therefore recommends that DCR periodically reassess the appropriateness of the areas delineated as parklands and woodlands. As noted above, the TSC has recommended that the forest reserve designations become permanent. Finally, it is important to note that the goal of woodlands designation is to maintain sustainable delivery of multiple ecosystem services <u>including</u> wood product production by utilizing management techniques.

Recommendation 4: Management Approaches for Large Forest Reserves

Recommendation: *Management of large forest reserves should allow ecological processes to determine the long-term structure, composition, function, and dynamics of the forest to the maximum extent possible. However, the areas that have been considered for large reserves range widely in their natural and historical disturbance regimes. In this context, flexible yet thoroughly vetted reserve management will support ecological functions in the varied forest ecosystems of the Commonwealth and under the ecological and climatic uncertainties of the future.*

This will accomplish the primary goal of large forest reserves, which is to support the biodiversity that results from natural forest processes, structure and function over long time frames.

- Annex 6 contains the general approach developed for managing forest reserves by EEA and the 'Management Guidelines' developed by DCR that should be followed but augmented as discussed below.

- In addition to these specific recommendations and guidelines, for the reserves to maintain their ecological function over long time frames:

  - There is a need for large forest reserves (>15,000 acres each), minimally fragmented, and representative of varied ecological settings that define Massachusetts forest biodiversity.

  - Because it takes centuries to develop many of the old growth structures, functions and ecosystem services provided by forest reserves, some degree of permanence is needed to ensure these forest reserves are allowed to mature protected from political forces. Forest reserves should therefore be codified in law or made permanent through other vehicles.

  - Reserves should be embedded in, and connected to, a larger forest 'matrix' or woodland. Efforts to protect this forest matrix should proceed in parallel with forest reserve designation.

Implementation Guidance: The TSC provides implementation guidance in two specific areas for the forest reserves: (1) ecosystem management and (2) recreation and infrastructure management.

Ecosystem Management

Despite regional variation and site-specific differences, in general the TSC recommends forest reserve management with the least amount of human intervention. When in doubt, or where there is disagreement among qualified ecologists and foresters, the default management prescription should be to do nothing (*i.e.*, a 'humble and hands off approach' as prescribed by Foster et al. (2005)). Natural processes, such as disturbance, should be allowed to play out unimpeded by human activities or intervention.

Supporting natural processes and the resulting biodiversity are the primary ecosystem service goals for large forest reserves. Wood production is not a utilized ecosystem service in forest reserves, and therefore the majority of the reserves will not be actively managed. However, in the context of this approach, as discussed and detailed below, some situations may call for ecological restoration and vegetation management in reserves. This flexibility, with the safeguards discussed below, is crucial to maintain forest reserve functions in the context of diverse forest types characterized by a tremendous range of land use histories and disturbance regimes across the state. For example, fire adapted forest reserves in southeastern Massachusetts will require active restoration and management to maintain open habitat for rare species and reduce the risk of catastrophic wildfire that can threaten human health and safety.

As a safeguard, no sales of wood should occur on forest reserves beyond the revenue collected **incidentally** from restoration and management activities directly within a restored or managed area. Related to this idea, existing state guidance on reserves management requires that "(e)ach large reserve will have an operational plan established with opportunities for public input to clearly define what activities will and will not occur, and to determine in advance how managers will coordinate with local officials in response to events like wildfires, pest and pathogen outbreaks, extensive blow downs, and other natural disturbance events." The TSC also recommends that a 'Science Advisory Board,' consisting of conservation biologists, be established to inform, review and approve major restoration and management activities within forest reserves.

In developing the existing system of large forest reserves, EEA, DCR and DFW have given significant thought to the question of how forest reserves should be managed. A key point from the most recent EEA guidelines is that "the primary difference in activities between reserves and other state owned forest lands will be the exclusion of commercial timber harvesting" (Annex 6).

The TSC specifically recommends:

- No salvage logging or preemptive logging associated with disturbance, for example after wind or ice storms (Foster & Orwig, 2006).

- The Guidelines listed in DCR's 'Forest Reserve Management Plans' should be followed (Annex 6). Summarized and paraphrased, these guidelines require that:

    - Habitat manipulations and traditional silvicultural treatments and operations are not permitted, with exceptions for rare species habitat management and invasive species control.

    - Management may be permitted to control erosion or stabilize soils.

    - Spread of major significant forests pathogens [and insects] may be controlled if there is a major threat to the identified ecosystem service objectives for a reserve.

    - Prescribed fire and related mechanical management activities may be used when it is compatible with forest reserve values, restoration of native communities and ecological processes, and public safety. Fire-breaks may be maintained.

- As discussed in Recommendation 3, the TSC also suggests that one or two wilderness areas, comprising approximately 5,000 acres in total, be established within the proposed system of forest reserves. In general, the ecosystem management guidelines for these areas would be the same as for the rest of the area dedicated to forest reserves – the primary differences for the wilderness areas are related to human uses (see below).

- Forest reserves should be monitored over long time frames to assess the development and maintenance of key ecological functions, structure, and composition; and to provide baseline data to inform forest management on areas managed for other values.

Recreation and Infrastructure Management

State land in forest reserves should be accessible and useable by humans in keeping with both the original intent of state lands and certain important ecosystem service values associated with them *(i.e*., aesthetic, recreational, historic and spiritual). Human activities, however, should have minimal impact on the other intended values of forest reserves (*i.e*., biodiversity, wildlife, acoustic and visual aesthetics, etc.). Therefore, the amount and nature of human activities within the reserve areas is important to define. Again, Massachusetts state agencies have thought through many of the issues related to reserve management.

The TSC specifically recommends that the guidelines listed in DCR's 'Forest Reserve Management Plans' should be followed (Annex 6). The Guidelines specify:

- Activities that are prohibited include creation of new roads, construction of new wind towers and communications sites, use of off-road vehicles (ORVs), and all forms of intensive, development-dependent recreation. The TSC recognizes, however, that in some cases existing infrastructure supporting human uses will need to be maintained.

- Activities that may be allowed are hiking, hunting, fishing, bird watching, mountain biking, snowmobiling (only on designated trails with snow >4" packed), and horseback riding.

- Other allowable activities are (i) limited trail construction to relocate existing trails to avoid adverse impacts to rare species or late seral habitat, water quality, or archaeological sites; (ii) minimal cutting to maintain public vistas and trails, and to remove hazardous trees directly adjacent to trails that pose an imminent risk to public safety; and (iii) existing roads will be managed and maintained according to DSPR road standards. Roads not needed may be closed and restored.

- The TSC envisions further restrictions on human uses in the wilderness areas, which would be established within the forest reserve areas. To the maximum extent, existing roads would be closed and restored as functioning ecosystems, and new roads would be prohibited. Due to their potential negative impacts on the wilderness experience and wildlife in the areas, snowmobiles, mountain biking, dogs and horses also would be prohibited. Similarly, only bow hunting and catch-and-release fishing would be permitted. Further, no mechanized or power equipment would be allowed for management activities, except in the event of an emergency (*e.g.*, evacuation of an injured person).

Discussion: There are two significant challenges in defining recommended guidelines for large forest reserves. The first is the ongoing debate, even among forest ecologists and conservation biologists, as to the level of intervention, restoration, and management necessary within forest reserves (Soule and Terborgh, 1999). Based on the high levels of anthropogenic alteration to forest composition, structure and function (*i.e.*, past land use and logging history, atmospheric deposition, non-native insects, diseases, and plants, fires suppression, elimination of large predators and subsequent over-abundance of browsing herbivores such as white tailed deer and moose), some ecologists or forest managers may consider the current condition of the forest to be in need of ecological restoration and management. What actions to take to remedy these situations are arguable, and run the gamut from 'do nothing' to 'actively manage' to restore structure, composition, and function.

Secondly, forest reserve management is confounded by the fact that conditions and desired outcomes vary across ecological settings. For instance, in northern hardwood forests, where creation of relatively limited gaps within stands (gap dynamics) is the predominant disturbance regime with occasional large scale, stand-replacing weather events, allowing natural processes to proceed will most likely result in forest composition, structure and processes within their natural range of variation. On the other hand, in the pitch pine-scrub oak systems of southeastern Massachusetts, millennia of anthropogenic burning as well as periodic severe weather-related disturbances have fostered a unique mosaic of important habitats dependent on continued management to retain their full suite of biodiversity. As a result, what works for one forest reserve may not be appropriate for another.

To address these issues, the recommendations and guidelines presented above allow forest reserves to function as ecological 'stages' on which natural processes play out. The 'actors' may change in response to disturbance and other processes (especially in the context of climate change), but the goal is for forest functions to remain resilient. For this to occur:

- Large reserves management should allow natural processes to determine the long-term structure, composition, function and dynamics of the forest to the maximum extent possible. The resulting forest will develop and retain biological legacies (*e.g.*, soil structure, coarse woody debris, seed banks, etc.), ecological function (*e.g.*, water storage and cycling, nitrogen cycling, etc.), complex structure and composition, and old growth or late successional forest characteristics that will support a broad suite of biodiversity and resilience in the face of climate change. While this may not always result in a forest that is as aesthetically pleasing as a managed park -- for example large natural disturbances will not be cleaned up -- the TSC finds there is substantial ecological value in preserving large, unfragmented blocks of forest and letting these evolve largely via natural processes, particularly given the existence of other DCR lands managed more actively for parkland and woodland values. The Massachusetts state agencies support this approach (Annex 6) with certain caveats -- for example "(f)or each natural disturbance that occurs within a given reserve, a decision must be made as to whether or not the disturbance can be allowed to proceed to any degree without threatening human life and property outside the reserve." The agencies state that "(e)ach large reserve will have an operational plan established with opportunities for public input to clearly define what activities will and will not occur, and to determine in advance how managers will coordinate with local officials in response to events like wildfires, pest and pathogen

outbreaks, extensive blow downs, and other natural disturbance events." The TSC supports these exceptions.

- Under certain situations related to forest conditions, desired outcome (e.g., rare species habitat viability), specific threats (e.g., fire suppression) and other factors, ecological restoration and management may be necessary to support functionality of large forest reserves. Reserve management must be based on ecological principles, fully vetted with an interdisciplinary team of experts and scientists (in this case the Science Advisory Board mentioned above). In this context, decisions are based on transparency, collaboration and trust rather than on rigid policies that restrict ecological management principles due to mistrust, ineffective communication or inadequate public process.

- The primary purpose of the new wilderness designation is to create opportunities for recreational experiences that exclude certain other human uses that would generally be permitted across the system of forest reserves. Prohibition of all mechanized vehicles and power equipment, as well as mountain bikes, horseback riding, and certain forms of hunting and fishing will provide a qualitatively different and unique experience for visitors to the areas covered by the wilderness designation.

- The long-term function of state forest reserves will depend not only on the management within the reserve boundaries, but also on the size and configuration of defined forest reserves and on the protection and management in the surrounding forest as well. For these reasons, it is important to designate large forest reserves -- greater than 15,000 acres each where possible -- and to locate these reserves in the least fragmented and most intact areas of the state, with examples in each of varied ecological settings that define Massachusetts forest biodiversity. In addition, a focused effort on keeping the lands surrounding the reserves in forest, and defining and protecting key wildlife corridors among forest reserves, are all crucial aspects of a successful reserve system.

Recommendation 5: Management Approaches for Parklands

Recommendation: *DCR should develop and implement management guidelines for Parklands that focus on enhancing recreation, while continuing to provide additional ecosystem services, including those identified for reserves as well as the aesthetic and cultural values of the property.*

In parklands, the primary ecosystem service is recreation, although these lands will also be managed to provide a wide array of other services. Although some parklands may be managed intensively to accommodate recreational use or address recreational impacts, wood production is not a utilized ecosystem service in the parklands. Any cutting would be limited to what is necessary to support recreational assets and uses, including public safety.

Implementation Guidance: Parklands should be designated according to the process outlined in Recommendation 3. The parkland zones should be managed in a manner that is similar to what currently occurs at DCR's forested Urban Park properties, with any tree work being conducted to support the recreational, aesthetic and cultural uses and values of the property. Designation of a property as parkland is not intended to change current recreational uses or recreational use decisions in the area. All recreational use decisions, including decisions regarding OHV use, should continue to be made on a property-by-property basis, with public input, as they are now.

Since the focus for parklands is recreation, wood production should not be a management objective in this zone. Instead, any tree or forest management activities should be directed primarily at maintaining or improving the recreational experiences of visitors. Tree cutting generally will only be for purposes of hazard tree removal, pest or disease management, trail construction and maintenance, and view maintenance. In some cases, management will also be needed to advance ecological or other values within the park zone, e.g., the maintenance of a cultural landscape. Park managers may find it occasionally necessary to remove downed trees from intensive recreational use areas after major natural disturbances. View maintenance should be approved by the park managers, but only after consultation with or at the request of local trail stewards, 'friends groups,' to ensure that aesthetic values are being managed by those responsible for overseeing the recreational uses of the property. And as a safeguard, no sales of wood should occur on parklands beyond revenue collected **incidentally** from restoration and management activities directly related to maintaining or improving the recreational experience as described above, and as long as this can be done without additional impacts to the site. For example, if a major natural disturbance causes a drive-in campground to be inundated with downed high-value trees, the park manager may be able to generate some revenue from necessary work. To conduct more routine tree work, DCR may wish to consider bringing in an arborist crew to serve its properties because this type of work generally does not yield enough revenue from the timber that is cut. Revenue generation should not be a driving factor for any cutting decision in the parkland zone, but revenue from harvests in DCR's woodland zones should be available for parklands management.

The TSC would like to note, however, that on occasion there may be extenuating circumstances where more intensive cutting than recommended above may make sense. For instance, if a stand of fire-dependent species is degrading as a result of fire suppression, the forest stewardship team, together with park and planning staff, may decide that silvicultural treatment for ecological restoration is desirable to protect habitat as well as future aesthetic values. If a park manager or

forest steward identifies such a need, DCR should be required to pro-actively engage and consult with local citizen stewards and users in both evaluating options and, if silvicultural treatment is determined to be appropriate, the cutting plan. Cutting plans that fall into this 'extenuating circumstance' category in the parklands zone should require the approvals of the Director of State Parks and the Director of Forest Stewardship.

Parklands may also contain areas of 'patch reserves' designed to protect ecologically sensitive or culturally important resources that require management standards more restrictive than would generally be the case for parklands (e.g., archaeological sites). From an ecological perspective, management guidelines for these patch reserves should allow for ecological restoration as needed to support continued provision of a patch reserve's ecosystem services, including control of invasive plants, insects and herbivores as necessary. Hazardous trees along trails and roads could be removed and cutting would be allowed where necessary to promote rare and endangered species. A parallel set of guidelines would need to be developed to protect culturally significant resources.

Finally, DCR should focus substantial educational efforts in the parklands zone. The state parks and forests can play an important role in reconnecting society with the Commonwealth's natural and cultural heritage, while also serving a potentially significant role in encouraging more people to participate in the care of these areas.

Discussion: As the forests of Massachusetts continue to be permanently lost with the spread of development, many State and Urban Park properties have become increasingly important as an outlet for people to connect with nature and the state's cultural history. Properties in the vicinity of relatively dense population and development are true assets for the state, serving as refuges where people can experience a quiet setting and natural elements without having to travel long distances. Massachusetts also boasts some areas that are truly remarkable for their scenic and relatively remote backcountry qualities.

Across this spectrum of properties that have high recreational and aesthetic qualities, which the TSC recommends be designated as parklands, visitors value and expect to find a relatively natural or natural-seeming setting free from timber harvesting activities. Nevertheless, these areas would still need to be actively managed, although the range of management intensities would vary both within and between properties. The limited areas with campgrounds and other areas of recreational infrastructure would be managed very intensively, while other areas would be managed using approaches more akin to those for the forest reserves.

The benefits of the management approaches recommended above for parklands include the following:

- By prioritizing the management goals for the parklands clearly on recreation, while still supporting the sustained provision of many other ecosystem services, and making DCR park staff and planners the primary decision-makers for land management activities in this zone, DCR will add clarity to the planning and decision-making processes for these lands. This should improve communication with key stakeholders and generally provide a higher quality recreational experience for parkland users. While advice from DCR foresters can certainly help inform necessary forest management decisions, timber

harvesting should not be an objective on the parklands, thereby allowing DCR to avoid any confusion resulting from potentially conflicting recreation and timber values.

- More specifically, implementation of the suggested management guidance will clarify expectations for tree work, which will be focused principally on management objectives that improve the recreational experience, such as maintaining scenic vistas and removing hazard trees.

- Under the TSC's proposed management approaches, DCR will still have the option of conducting more intensive forest management on parklands should a situation truly call for it, but only in conjunction with a more integrated planning and public participation process.

- An intentional education effort that seeks to engage more people in conservation should produce a cadre of volunteers to help with stewardship efforts as well as a broad-based and diverse segment of the public that understands and supports the conservation of the Commonwealth's natural and cultural heritage.

Recommendation 6: Management Approaches for Woodlands

Recommendation: *DCR should develop and implement management guidelines for Woodlands that demonstrate excellent forest management practices for sustainable production of wood, restoration of late successional habitat, active management of drinking water quantity and quality, creation of early successional habitat, and promotion of carbon sequestration and any other ecosystem services that benefit from relatively active manipulation of the forest. Over time, these guidelines should promote a greater emphasis on uneven-aged forests across the DCR system. At the same time, woodlands management should include guidelines to protect rare species habitat and other natural resources, as well as the integrity and scenic quality of trails and scenic roads in the woodlands zone.*

The TSC is recommending that DCR put in place a set of silvicultural guidelines for woodlands that result in the creation of 'model forests' established for the purpose of demonstrating to private landowners and the public at large how excellent silvicultural management can be implemented across the variety of forest types and stands that exist in the Commonwealth. To be useful to private landowners, these demonstrations should consider both the biological and economic benefits and costs of sustainable management across a range of management scales. Although the model forests will be managed primarily for the subset of forest ecosystem services that require relatively active human intervention, these areas should at the same time continue to accommodate high quality recreational experiences for the public.

Management of woodlands poses a wide array of social and scientific challenges, among the most important of which is the difficulty of specifying a 'one size fits all' set of silvicultural prescriptions. Silviculture -- the art and science of tending a forest -- provides the core set of tools for controlling forest establishment, composition, structure and growth. But selection of the appropriate tools is a function of societal values and ecosystem service objectives mediated through our scientific understanding of ecosystem dynamics and site-specific conditions. Furthermore, all these factors change over time – public attitudes shift, ecologists develop new insights, and the ecosystems themselves evolve in response to exogenous factors like climate change and introduction of invasive species, and as a result of specific silvicultural techniques that are applied over time (McDonald, Motzkin, & Foster, 2008). The challenge is to specify guidelines for applying silvicultural techniques that reflect our current 'best' interpretation of public values and ecosystem science, while allowing land managers flexibility over time to adapt to change through experimentation with and implementation of alternative silvicultural practices.

Within that broad context, the TSC's recommendations for DCR woodlands management are designed to increase the emphasis on uneven-aged silviculture. Our current understanding of forest ecology suggests that, for many types of stands, uneven-aged management will deliver the broad set of woodland ecosystem services more effectively than even-aged approaches, although it will be important to carefully monitor ecosystem impacts over time to ensure this is the case (see Recommendation 7). Under the guidelines, even-aged management would be reserved for two primary purposes. First, it would be applied to create larger openings (up to 5 acres) in areas being managed jointly with DFW to create early successional habitat (primarily tertiary stands -- see below). Second, even-aged silviculture may be appropriate in cases where ecological restoration is needed to ensure continued provision of suite of woodlands ecosystem services --

for example to promote regeneration in timber stands extensively damaged by natural disturbance.

The TSC would like to emphasize, however, that the recommendations anticipate that management practices will need to evolve over time in response to changing values, science and ecosystems. Such change should be informed by the adaptive management system described in Recommendation 7 and the public processes outlined in Recommendation 8. Paraphrasing Dr. Mark Ashton in his presentation to the TSC, the intent is not to remove tools from the forest manager's toolbox. Instead, the TSC is proposing a shift in the current emphasis of silviculture, while recognizing that effective provision of woodlands ecosystem services in the future will likely require experimentation with a wide range of silvicultural techniques in DCR's model forests.

Implementation Guidance: To implement this recommendation, DCR needs to create management guidelines specific to the woodlands zone. These guidelines need to address five major elements of woodlands management -- silvicultural practices, creation of early successional habitat, issues related to harvests of wood for biomass energy generation, educational aspects of woodlands management, and recreational use of woodlands.

Silvicultural Practices in Woodland Zones

The goal of the proposed silvicultural practices for woodlands is to put in place guidelines that allow DCR to demonstrate ecologically and economically sustainable forest practices to private landowners and the public. These recommendations represent a shift towards a greater focus on ecosystem-based management.

1. Forest Assessment - Stand and Type Classification

As a first step in defining appropriate silvicultural practices for model forests, DCR will need to assemble additional information on the origin, age and condition of the forest stands. The three classifications proposed are **primary, secondary and tertiary** forest**.** *The classification will be a major factor in determining the appropriate silvicultural prescriptions for a stand*.

- **Primary** forests are those areas that have always been in forest growth and never pastured or cleared for tillable crops. Consequently the original biotic community is present.

- **Secondary** forests are those areas that were in agricultural use at one time but have since grown back to forest, been harvested once, and now have re-grown a second post-agriculture stand.

- **Tertiary** forests are the first stands to grow after agricultural abandonment. Their condition and composition is usually characterized by early successional species (pines, birches, maples) that will be replaced over time by other species; plantations of native and non-native conifer species, which may or may not represent the long term species composition of the site; or stands degraded by partial harvests. These stands developed or were planted on agricultural lands that had been previously tilled or used for pasture.

In the past DCR avoided treating hardwood tertiary stands in favor of other more highly productive stands found in secondary and tertiary (conifer plantations) forest. This recommendation proposes that all stands, both high and low productivity in all classes, be selected for treatment on an equal basis across the forest.

Forest type maps, already prepared by DCR for Green Certification, should be helpful for classifying DCR lands. In addition, Harvard Forest researchers have assembled a collection of 1830 forest history maps showing forested areas at around that time; these also would likely be helpful for further classification of DCR woodlands.

2. Levels of Silvicultural Management

Much of the controversy on DCR lands has centered on the issue of the appropriate size of openings created by harvests, with certain stakeholders arguing that large openings, whether they be clearcuts or shelterwood harvests, are inappropriate. However, as pointed out in a public comment on the TSC draft report, submitted jointly by five prominent New England silviculture professors (Ashton et al., 2010), natural disturbances in Massachusetts forests cause a fairly wide range of opening sizes and the structure and composition of the state's forests result from these processes. In northern hardwood forests, where typical openings may be between one-eighth and one-fourth of an acre, events like micro-bursts result in less frequent but larger openings typically in the 1 to 10 acre range. Other research has linked the development of oak-pine forests to more episodic and larger disturbance regimes related to hurricanes and Native American cultivation and use of fire. In these stands, the recommendation from the silviculturalists is to allow patches of up to 10 acres to be harvested in order to approximate the natural disturbance regime.

Based on our current understanding for forest ecosystems, the TSC finds that over the long-term a silvicultural approach that approximates the pattern of natural disturbance is appropriate for ensuring the regeneration of an age and species diverse forested landscape in Massachusetts. Under such an approach, DCR foresters would implement harvests across the landscape in patterns that are representative of the size and frequency of canopy openings occurring as a result of (non-catastrophic) natural disturbance. But the TSC also recognizes the potential for controversy and public distrust when larger opening are created. To reconcile these issues, the TSC is recommending that DCR adopt silvicultural guidelines, based on three alternative levels of woodlands management, that require a high degree of public consultation and acceptance for harvests that would create larger openings.

- **Level 1** management is designed for protecting ecologically sensitive or culturally significant patch reserves in the woodland zones. Level 1 would allow for ecological restoration as needed to support continued provision of a patch reserve's ecosystem services, including control of invasive plants, insects and herbivores as necessary. Hazardous trees along trails and roads could be removed and cutting would be allowed where necessary to promote rare and endangered species. Timber production would not be a management objective for these areas. A parallel set of guidelines would need to be developed to protect culturally significant resources.

- **Level 2** management is designed for use in high productivity primary and secondary forests where uneven-aged silvicultural prescriptions -- including single tree and group-patch selection methods – would be applied to promote the development of multi-aged

and late successional stands (up to 150 to 200 years of age) with quality timber and high biodiversity, watershed protection and carbon storage values (D'Amato & Catanzaro, 2007; Keeton, 2006; Hagan & Whitman, 2004; Aber, et al., 2000). Harvested patches should not exceed one-third of an acre. This approach is intended to encompass both classic uneven-aged management as well as irregular uneven-aged methods where stands are entered and re-entered at intervals that, while resulting in a diverse forest, may not achieve the perfectly balanced distribution of size and age classes that defines textbook uneven-aged silviculture. Uneven-aged management will allow for the regeneration of both shade tolerant and intermediate tolerant species. The tops and branches of harvested trees (< 4 inches in diameter) would be left in the forest to maintain nutrient and organic matter levels, and to provide wildlife habitat. Level 2 management would permit ecological restoration as needed to promote woodland ecosystem services -- including actions to address stands extensively damaged by natural disturbance, and control of invasive plants, insects, diseases and herbivores.

- **Level 3** management is designed for use in lower productivity and damaged primary, secondary and tertiary stands where a variety of uneven- and even-aged silvicultural prescriptions might be employed, both for intermediate and regeneration cuts. Uneven-aged methods, both those designed to produce balanced distribution of age and size classes and those that result in a more irregular configuration, would be used to harvest single trees, groups of trees and patches up to one-third of an acre in both primary and secondary stands. Irregular shelterwood systems would also be available to restore the structure, composition and function of these lower productivity primary, secondary and tertiary stands (Raymond, Bedard, Roy, Larouch, & Tremblay, 2009). The use of even-aged shelterwood methods (with reserve trees) would be limited to low productivity and damaged tertiary stands with opening sizes not to exceed five acres, unless after consultation with the interested public (see Recommendation 8), DCR concludes that there is a need to expand this limit for ecological reasons at a specific site. All Level 3 harvests would leave tops and branches (< 4 inches in diameter) in the forest in order to maintain nutrient and organic matter levels, and to provide wildlife habitat. Level 3 management allows for ecological restoration – including actions to address stands extensively damaged by natural disturbance, and control of invasive plants, insects, diseases and herbivores -- with the goal of maintaining a site's function, composition and structure.

The silvicultural approach outlined above must be linked to an effective adaptive management system, as described in Recommendation 7. This will allow land managers to evaluate in a rigorous manner whether the ecosystem service objectives for the woodlands are being met, and if not should result in changes to the management approach or objectives.

3. Other Silvicultural Considerations

Silvicultural treatments, both even- and uneven-aged, should be applied to retain forest conditions especially in terms of the aesthetics. This requires a non-uniform approach with mixtures of both the treated and untreated areas. DCR has proposed harvesting only 25 percent of woodland growth, which is not only modest but conducive to the development of structural components such as snags, cavity trees, and down woody debris.

Overall it is essential that DCR's management guidelines for woodlands promote the highest standards for harvests. An important consideration for both Level 2 and 3 management is the siting of permanent harvesting roads. Foresters should lay out a permanent network of harvesting roads before a site is treated, and these roads should comprise no more than 10 percent of the treated area. This is important for maintaining the maximum amount of land in forest growth and to facilitate the use of hand-felling methods that are required in more complex stands. Many DCR logging operations have allowed the logger to determine both the road layout and density of roads, which resulted in more than 10 percent of the treated area in roads, thereby creating problems for future management. Going forward, silvicultural treatments far into the future should be directed and limited by the permanent road layout. Such a permanent system of logging roads, located on land that supports the size and operation of the anticipated harvesting equipment, can be used multiple times without soil and erosion problems. These roads should be used each time the area is treated, even when they grow back to young trees between cutting cycles. In addition, when old town or cart roads pass through the treated area, they need to be maintained in a condition to allow permitted public uses.

DCR silvicultural guidelines should require that every tree designated for removal be marked with paint at breast height and at the root collar. In all managed woodlands, exceptional trees, groups of trees and stands of trees should be identified, mapped, and not treated. These exceptions would include legacy trees, as well as single trees, groups of trees, and stands capable of growing to great size, age, and quality due to exceptional site conditions or genetics. In addition, all wetlands including vernal pools need to be identified on the ground and mapped for all treated areas, including all access roads used in the sale. As a starting point for this identification process, DCR land managers should consider the full range of available vernal pool data sources. This allows for the additional mapping of buffers and special treatment zones associated with these wetland features. Clusters of vernal pools would eliminate woodland management in their vicinity. More generally, DCR's silvicultural guidelines should ensure full compliance with all requirements of the Massachusetts Endangered Species Act (see MGL Ch. 131A, Regulations at 321 CMR 10 for special section on Responsibilities of State Agencies), particularly with regard to promoting habitat for rare and endangered species.

It is also essential that the guidelines for woodlands management ensure that the harvesting equipment is well matched to the silvicultural treatment and that harvests leave enough woody material in the harvested stand to maintain nutrients and habitat. Traditional logging practices employ hand-felling methods in conjunction with forwarders and/or cable skidders to remove the tree from the forest; these methods are appropriate for both even- and uneven-aged stands due to their ability to minimize damage to the residual stand. Advanced cut to length logging machinery that replaces hand-felling is generally more appropriate for use in less complex even-aged stands. Both logging methods leave branches and tree tops that are important to nutrient cycling, wildlife habitat, carbon sequestration, plus shade and physical protection to soils and emerging regeneration.

Conversely, TSC members expressed concern about 'whole tree' logging equipment (feller buncher/grapple skidder combinations). Generally, the Committee finds that the prohibition on removal of tops and branches is likely to make such methods uneconomical on DCR lands. However, if this is not always the case, the TSC urges DCR foresters to carefully consider the potential damage (e.g., compaction and mixing of soils) caused by this type of equipment at a particular site -- in most cases use of such equipment is inconsistent with the types of silviculture

recommended in this report. The one possible exception is whole tree removal for purposes of restoring pitch pine savannah conditions in the Myles Standish State Forest, where whole tree removal reduces the fire hazard and impoverishes the site to help maintain it in pitch pine.

Large landowners, such as DCR, can leverage their requirements for the use of specific logging equipment by requiring widths and weights in the sale contract. In time, if loggers are interested in working on DCR lands they will acquire the appropriate equipment. In addition, DCR should begin requiring that contractors on state lands have a Master Logger certification.

The woodlands management guidelines also need to recognize that the regeneration of trees is an integral component of plant succession. This happens slowly in forests that develop on their own or more quickly where silvicultural treatments have been applied. In either case, regeneration needs to be a continuous process. Herbivores can disrupt this process and where this is a problem it needs to be addressed. For Level 2 and 3 silvicultural treatments, regeneration is expected to be diverse and suited to site conditions. Such diverse advance regeneration appropriate to site conditions needs to be in place before treatments to release this regeneration can go forward. Silvicultural methods that are designed to promote and/or release advance regeneration must include a monitoring system to validate this regeneration and its protection and the data should be made available to the public. Monitoring data should include information on the presence and impact of herbivores.

Managers of DCR's model forests also will need to continuously look for ways to improve and enhance best management practices (BMPs). Forestry on DCR woodlands should be representative of the absolute best practices available. This can be accomplished through rigorous application of the adaptive management process described in Recommendation 8 and through adoption of the recommendations included in the recent Spencer report on harvesting practices on DCR lands (Annex 1).

Third-party certification of public lands management by the Forest Stewardship Council (FSC) has been a major area of concern for some members of the AGS. There is a perception that FSC certification has been used by DCR to justify heavy cutting practices, that the program has not effectively identified problems with the state's management approaches, and that certification is an unnecessary expense for a state agency facing serious budget shortfalls.

While acknowledging these comments from the AGS and the more general concern about certification of public lands (Yale Forest Forum, 2002; Mass Audubon, 2009), the TSC finds that FSC certification is a potentially valuable tool for advancing the ecosystem service goals outlined for DCR woodlands in these recommendations. Third-party verification provides additional impetus for public input, has an overlay of additional standards to be met which aid in protection of ecosystem services, provides impetus for planning, helps educate staff on the broader array of approaches, and makes wood products more marketable/valuable.

But it is also important to recognize that the FSC process takes as a starting point the land management plan and objectives articulated by DCR. Consequently, it is critical that these management objectives reflect the results of a robust and legitimate public process as well as the full suite of ecosystem services essential to these lands. Once the FSC certification team is comfortable that the management objectives reflect such a process, the third-party auditors will be able to provide valuable independent assessments of whether on-going management of the DCR forests is achieving the plan's ecosystem service objectives. For example, the auditors can

determine whether on-the-ground implementation of silvicultural prescriptions is consistent with DCR's integrated resource management plans, and whether such practices are achieving the anticipated ecosystem service results (*e.g.*, carbon sequestration increases in areas managed for late successional forest characteristics). The TSC understands that the FSC process will consider the forest reserves as a requirement for certification, but suggests that DCR request that the parklands be removed from the certification process, thereby focusing FSC's review of land management practices primarily on the woodlands.

4. Early Successional Habitat Creation and Management

As noted in the discussion of land use zoning (Recommendation 3), while the published literature consistently demonstrates declines in early successional species, the TSC did not reach consensus about the total amount, location and patch size of early successional habitat necessary to support these species on DCR land. Determination of these implementation parameters for early successional habitat creation on DCR lands raises complex ecological, economic and social issues. Rather than setting a specific target for acreage devoted to early successional habitat, the TSC recommends instead that DCR work closely with DFW and the academic community to establish a planning process with the following elements.

- Develop integrated resource management plans that include detailed inventories of the location, acreage and size distribution of openings that currently provide early successional habitat across all three land management zones -- this needs to be done at a scale appropriate for identifying the relevant patches of habitat.

- Estimate, to the extent feasible, the likely impacts of future natural disturbances across the three zones and add this to forest harvest plans developed independent of early successional habitat needs in order to estimate total available early successional habitat across the entire DCR forest system (including DWSP lands).

- Work closely with DFW to modify or expand cutting plans to reconcile differences between DFW goals for state lands and the actual occurrence of early successional habitat expected in light of ongoing natural disturbance and harvesting on DCR woodlands.

- Solicit public input on these plans to and make appropriate modifications in order to finalize the area, size distributions and locations of additional vegetation management activities needed to meet early successional habitat goals.

Given AGS concerns about early successional habitat creation, the DCR/DFW plans should configure habitat creation projects to minimize clearing of intact and mature forests while addressing DFW goals for state lands, to the maximum extent compatible with other ecosystem service objectives for DCR woodlands. Cutting in unfragmented forest should be avoided and to the extent possible priority given to management of overgrown fields and expansion of existing open areas. Finally, the plans should address funding issues -- while a shifting mosaic approach results in more land under management, it does have the advantage of paying for itself through the value of the harvested trees, whereas an approach based on frequent re-cutting of immature stands would require that DCR pay contractors to do the cutting.

Essentially, under the TSC's proposal DCR's integrated resource management planning process would be the locus for periodically reviewed decisions about the amount of cutting needed to support early successional species; but this would be informed by better data on current and likely future natural disturbance on DCR lands and should be divorced from decisions relating to timber production in the woodlands zone.

5. Biomass Removals for Energy Production

During the spring of 2009, Secretary of Energy and Environmental Affairs Ian Bowles indicated that he would look to the TSC's opinion on the issue of using state forest lands to produce wood fuel (biomass) to support large-scale biomass plants that have been proposed across the state.

Based on a recent analysis (Kelty, D'Amato, & Barten, 2008) and input from the AGS, the TSC recognizes that the expansion of biomass energy facilities in the state poses a potentially significant risk to many ecosystem services that are critical to maintain on DCR forests. Our woodland zone recommendations reflect a conservative approach for avoiding adverse impacts of biomass removals through a general prohibition on removal of tops and branches, a technique that could diminish nutrient levels and organic matter or degrade wildlife habitat. As discussed above, the TSC wishes to be clear that in light of the many uncertainties about the potential ecosystem impacts of biomass harvesting, a cautious approach -- requiring that 'forestry residues' be left in place to build soil carbon and protect nutrient stocks and habitat -- is called for to ensure the sustainable delivery of ecosystem services from DCR's woodlands. As part of DCR's adaptive management policies, these restrictions should be re-evaluated periodically in the light of new science that may more clearly identify risks. However, DCR would need to be assured through sound scientific evaluation and after public input that permitting or promoting biomass harvesting on state woodlands could be done in a sustainable manner that would not degrade other ecosystem services.

The TSC is also aware of the 'Manomet study' that proposes to look closely the impacts of biomass removals on forest health. We strongly urge that the Manomet team recognize that the ecosystem services prescribed in the TSC's report must not be compromised for biomass production or any other purpose. Indeed, the TSC's ecosystem service priorities provide a framework in which to evaluate the possible costs and benefits of all decisions that are relevant to forest stewardship -- not just decisions about biomass production -- and can make the evaluation and decisions transparent to all stakeholders -- something which we feel is critical going forward.

6. Model Forest Educational Objectives

A key role for DCR woodlands is the creation of model forests that provide public demonstrations of sustainable forestry practices, with the goal of promoting the use of such practices on the state's extensive privately owned forests. To accomplish this, DCR will need to develop a program for engaging landowners in outreach and education programs. To this end, DCR should establish a silvicultural demonstration program based on woodland sites that are widely distributed across the state and representative of the major forest types, site conditions, and sustainable silvicultural and harvesting techniques. Private forest landowners and the forest industry, as well as the general public, will benefit greatly by seeing on-the-ground examples of

the best forest management practices, implementation of the Best Management Practices, and demonstration of sustainable silvicultural practices and harvesting techniques through time. To be effective, this education and outreach program should also include development of careful economic accounting practices to demonstrate the economics of sustainable forest management on private lands. Effective and robust outreach to the public will be necessary to raise awareness of demonstration forests, and to provide effective interpretation and education around demonstration forests.

7. *Management of Recreation in Woodland Zon*es

The TSC anticipates that recreation will continue to be an important public value in DCR forests that are managed as woodlands. Consequently, it is important that management guidelines for the woodland zones be appropriately tailored to protect the recreational experience. The aesthetic qualities of recreational resources can often be substantially preserved simply by identifying which trees are critical to retain -- decisions that occur best through a collaborative discussion and joint site visit of foresters, recreational experts, and local trail stewards. Possible standards or guidelines include:

- For nationally and regionally significant trails, any forest management within 100 feet of the trail should be only for the benefit of the trail or the trail experience itself -- the Appalachian Trail already has a 'primary' zone, where this requirement is in place. Additionally, local trail managers and DCR park staff should be consulted on any harvesting plans.

- For all other trails, any forest management activities within 50 feet of the trail should only be for the benefit of the trail and trail experience itself, unless foresters come to an alternative agreement with local trail stewards and park managers on harvesting plans within the vicinity of abutting trails. Forest managers should consider a joint site visit to collaboratively develop the cutting plan around trails, including a determination of where trees should be retained or where harvesting methods should be relatively light to preserve the quality of the trails as an alternative to a 50' buffer to develop a more flexible and collaborative approach with stakeholders.

- Skidder paths should avoid crossing nationally and regionally significant trails. Where any trail must be crossed, a skidder path should be located at an angle perpendicular to the trail.

- Based on the recommendations of park staff and the public, forest management plans should identify areas of high scenic quality that fall outside the parkland zone, including, for example, views from above, views from below, and views across water. Silvicultural plans should maintain and protect the scenic quality of those areas.

- Slash resulting from forest management adjacent to and within 25 feet of a trail or other recreational use area should take the form of a light and natural appearing forest ground cover (this is similar to language in the existing forest management plans).

Discussion: State forest lands committed to active woodlands management need to be run as 'model forests,' illustrating to private landowners, the forest industry and the public at large how

excellent silvicultural management is undertaken on the full range of forest types and stands that exist within the Commonwealth. To achieve this goal, the TSC suggests that all harvesting on state woodlands should be conducted to showcase sustainable forest practices, with tours provided to the public prior to the start of harvesting but after the stand is marked so private landowners can be provided the opportunity to learn why individual trees are marked, why roads and stream crossings are located where they are, and how and why vernal pools and other features are protected. Post harvest tours should be conducted as well. These tours and activities should offer continuing education credits for forester licensing and be widely advertised. Sponsorship of these tours can be developed with local 'friends groups,' local and regional non-profits, and town government agencies. It is also possible that management of these lands could be contracted out to private consultants under the supervision of DCR staff who have developed the silvicultural prescriptions based on the guidelines and goals established by an approved forest management plan. This potentially might free up personnel to provide greater assistance to private landowners (see Recommendation 9).

Recommendation 7: DCR Organizational Structure, Decision-making, and Planning

Recommendation: *The DCR Commissioner should establish a fully integrated planning and management structure focused on long-term stewardship and adaptive management for the complex and inter-related set of ecosystem service priorities established for DCR parks and forests.*

The goals of this recommendation are three-fold. First is to make clear that long-term stewardship of the forest resource is the fundamental purpose of DCR's land management, since public values rely on a well-functioning forest ecosystem. Second, based on the observation that DCR forest planning is not adequately integrated across the Department's various bureaus, the TSC recommends creation of a single, unified planning and adaptive management system that addresses the full suite of ecosystem service priorities across the forest reserves, parklands and woodlands. Third, DCR needs to expand current efforts and formalize methods for incorporating into its planning and land management activities: (1) information collected from forest resource data; (2) advances in scientific knowledge; (3) alternatives analysis; and (4) a means to gauge the success of its activities and make changes based on results of a formal feedback mechanism.

Implementation Guidance: Our specific guidance under this recommendation falls into three primary areas.

Clarifying the Mission of DCR

The TSC recommends that the DCR Commissioner provide leadership in clarifying and clearly articulating the relative importance and inter-relationships of DCR's multiple missions, with an emphasis on making clear that:

- Resource protection that leads to the sustainable provision of ecosystem services is DCR's fundamental obligation; a high quality visitor experience is derived from successful resource protection; this relationship enables DCR to fulfill an important role in strengthening society's connection to, appreciation for, and support of Massachusetts forests.

- Protection of DCR's forest resources requires integrated planning and monitoring to ensure provision of the broad suite of priority ecosystem services across the state park and forest system.

- Silviculture provides a valuable set of tools that can help DCR to achieve some, but not all, of its ecosystem service objectives.

While the TSC has not conducted extensive analysis of the laws governing management of forest lands, it is clear that many inconsistencies and ambiguities exist in these mandates (see Annex 7 for a more detailed analysis of DCR mandates, prepared by TSC member Kathleen Connolly). To ensure the Commonwealth's legal framework is fully supportive of the vision expressed in the TSC's recommendations, we also suggest that the Commissioner of DCR consider the need for

changes to existing laws in order to clarify the state's legal mandates affecting forest protection and stewardship.

Integration of DCR's Planning Functions

To efficiently accomplish the newly articulated mission, the Commissioner should combine the Department's currently dispersed planning functions into a single unit tasked with the timely development of integrated plans for providing ecosystem services from forest reserves, parklands and woodlands. Over time, the planning unit should be staffed to include individuals with substantive expertise in forest ecology, silviculture, public recreation, watershed management, biodiversity maintenance, and carbon sequestration. At a minimum, this planning unit should include the staff involved in delineating the three new general zones for DCR lands according to Recommendation 3. Once this zoning exercise is complete, the planning unit can begin working to coordinate the development and implementation of the new management guidance described in Recommendations 4 through 6.

Adaptive Management, Science and Data

The TSC recommends that the Commissioner clearly delineate organizational responsibilities and resources for implementation of adaptive planning and management techniques. In this regard, it makes sense to take advantage of the best ideas from any of the divisions/departments and apply them to the management of land in all three zones. It also makes sense to look for opportunities to leverage staff capabilities and to harmonize data collection and analysis. To accomplish these objectives, the TSC has the following suggestions.

- **Forest Resources Inventory and Monitoring:** There is an opportunity to build on a substantial body of existing work and initiatives. The Continuous Forest Inventory (CFI) system is a well-established dataset that has huge value in documenting changes and trends in the forest. The University of Massachusetts proposals and work on Long-Term Ecological Monitoring (LTEM), both within and outside forest reserves, offer the basis for building a minimum common dataset that can be expanded and used on all state lands. DCR planners should also be aware of the NSF's National Ecological Observatory Network (NEON). Some version of the concepts and techniques described in the UMass proposals and existing contracts, and in NEON, need to be incorporated into the normal operations of the Department, rather than operating externally and completely subject to grant and funding vagaries. Opportunities for research cooperation with outside organizations and researchers can be exploited on a case-by-case basis and as funding is available, but cost-effective administration of a 'minimum common dataset' should be a key responsibility of DCR's planning and management staff.

  While CFI, LTEM and NEON data are vital for a number of purposes, they are not sufficient. Land management operates on a number of scales, and a corresponding hierarchy of data collection methods is essential. Current management plans and operations use some of these. It would be worthwhile for DCR, optimally in cooperation with DFW and DWSP and external technical participation as needed, to conduct a formal assessment of the adequacy of existing datasets and sources of inventory information used by DCR in its planning and management (*e.g.*, Ecoregional, CFI, FIA, GIS, District, Stratum, Compartment, Stand, pre- and post-harvest sampling, etc.). Identifying

opportunities to achieve efficiencies across divisions/departments should be part of this evaluation.

Finally, DCR should develop a system for tracking the deed status of its parcels to ensure that all deed restrictions are recognized in the development of management plans.

- **Keeping up with Science:** Evaluating the applicability of new scientific information to short and long-term land management decisions is a daunting task. The chances for successfully analyzing and incorporating advances in scientific knowledge will be greatest if there is a formal mechanism for gathering, synthesizing and analyzing scientific data, concepts and thinking.

  There is an existing model, presently dormant, within the DWSP that could be well-applied across the full Secretariat. The Quabbin Science and Technical Advisory Committee (QSTAC) operated for several years in the late 1990s and early part of this decade. QSTAC had no 'public input' purpose, but brought together highly qualified professionals to deliberate and advise on scientific and technical questions. There is every reason to revive this model and use it in DCR, preferably across divisions/ departments.

- **Keeping Up with Social Science to Understand Visitor Uses and Attitudes.** While recreation is an essential service that DCR provides, the Department has little objective information about who its visitors are, what they are doing, and what their attitudes are. Working with academia, DCR should undertake periodic surveys to understand and monitor the changing human dimension of its forests and this information should inform, together with input from stakeholders, management of DCR lands.

- **Alternatives Analysis:** No amount of inventory data or scientific revelation will tell DCR what to do. There are always many 'correct' or 'feasible' alternatives. DCR should develop the internal capacity to evaluate the information it has to compare alternative management paths. This capacity is an essential aspect of using data, making good decisions and fulfilling the public trust. It makes most sense to build this capacity at the Secretariat level and share it across all landholding agencies. GIS is just a starting point; there are a variety of modern analytical tools available. Building the required capacity, however, will involve software purchase and hiring or retraining existing planning staff.

- **Adaptive Management/Feedback Mechanism:** The concept of 'adaptive management' has broad appeal, but cannot be adopted and implemented casually or in every instance. As a full-blown process, adaptive management can be both demanding of staff time and expensive. Adaptive management requires substantial and long-term commitment from the Department. Adaptive management is a good idea only if the results of monitoring/assessment can reduce management uncertainties and actually lead to change in management actions. Adaptive management requires a model or models (sophistication and complexity can vary) for predicting what will happen. Assessment and monitoring should lead to a corroboration of the model or indicate how the model need to be changed. In the case of DCR forests, some of what is called adaptive management may really be more accurately described as increased pre- and post-activity measurement.

Regardless of whether adaptive management is technically desirable or achievable for DCR, some sort of feedback mechanism is essential. As an applied and integrated activity, forest management has always depended on feedback, usually incorporated informally or even unconsciously into field decisions. At this point, it is critical for DCR to design a more formal version of collecting and using feedback – for several audiences and purposes:

- field personnel need to know whether a silvicultural prescription 'worked' and is repeatable elsewhere;
- supervisors, program managers, and department administrators need to be able to tell the public whether the prescription achieved the desired outcome;
- field personnel and program managers need to understand the implications of inventory and monitoring data, as well as current scientific findings; and
- planners need to incorporate results into the ongoing process of alternatives analysis

Tangible steps to institutionalize a feedback process would include: a) fully developing the procedures and protocols listed in the Inventory, Monitoring, and Evaluation section of the District management plans; b) assigning the responsibilities within annual work plans for specific monitoring and evaluation tasks; c) specifying how monitoring and evaluation will proceed to conclusions, and how two-way communications and involvement of all staff levels will be assured; d) specifying how input from any outside technical/advisory committees will be collected, analyzed, and communicated throughout the organization.

Discussion: The TSC conducted extensive interviews with DCR staff, including all the management foresters as well as senior managers in the Department. These interviews provided valuable insights that have guided our recommendations on how to fine-tune the structure and organization of DCR. Through this process, we observed:

- DCR managers and staff do not operate with a common understanding of department's mission and values -- some believe the primary mission is to satisfy public recreational needs while others think natural resource protection and management should be the main focus for the Department.
- Decision-making and planning at DCR are fragmented and slow, often reflecting bureaucratic structures that are a holdover from the time when the current functions of DCR were carried out by separate agencies.
- There is a perception, and likely a reality, that the main planning activities at DCR have been driven by silvicultural considerations. Human dimensions of resource management have not been systematically integrated into the forest planning processes.

- Lack of funding and staffing have been major barriers to successfully organizing and implementing the mission of DCR. Specifically, the Department needs more ecologists and planners if it is to carry out a mission based on providing a broad suite of ecosystem services.

- In recent years, management in the Bureau of Forestry has not provided adequate oversight of silvicultural operations, either at the planning or implementation stages, although there is a perception that, as a result of recent hires, this may no longer be the case.

- DCR's management foresters do not feel their concerns are adequately appreciated by senior management, particularly regarding how the Department responds to public criticisms. Lack of public confidence has resulted in low staff morale.

- Given the large forested area of the state – over 60 percent of the land in Massachusetts -- the Commonwealth needs to elevate the importance of forest protection and sustainable forest management, both on state and private lands.

These observations were critical to our earlier recommendation to elevate the role of forests in the Commonwealth's environmental decision-making processes (Recommendation 2). But the interviews also suggest a variety of other necessary changes at DCR, including the need to clearly define the Department's mission, harmonize its planning functions and focus them on a broader set of ecosystem services, elevate the resource stewardship role in the organization, and greatly increase the emphasis on adaptive management and related data collection and analysis tasks.

Recommendation 8: Improving Public Process

Recommendation: *Create a robust process that gives members of the public an opportunity for their concerns and values to be addressed and incorporated throughout the planning and implementation of management of the publicly owned land under DCR's care.*

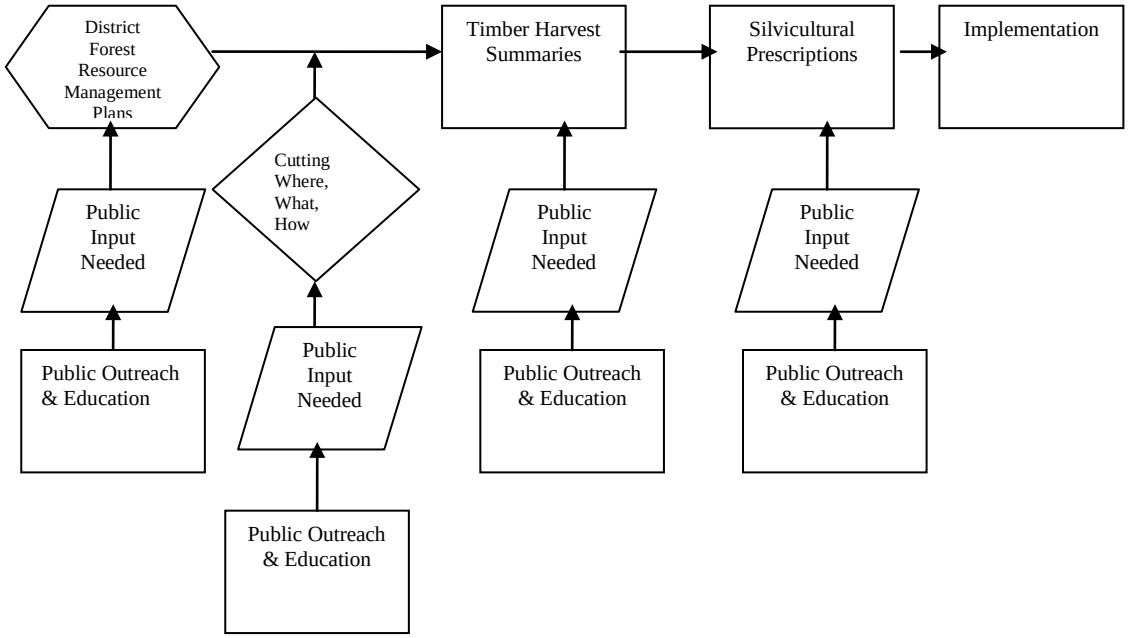
DCR manages a diversity of state forest land on behalf of the general public of Massachusetts. No management decision will be universally accepted by the public, and conflicts of opinion will always be an element of DCR's forest stewardship. Broad public acceptance of DCR's management will therefore need to acknowledge and address the full range of public views, and DCR must enlist a broader cross-section of society in its work to ensure that the full range of views is represented in the decision making process. There is a need for authentic and broad-based public participation in decision making for allocation of land within the three zone landscape zoning mode (Recommendation 3) and at the full range of planning scales for forest management and implementation -- from the broadest, state-wide and district-level forest resource management planning, down to the much finer-scale, stand-level forest cutting plans. There is also a need to address internal processes to improve public participation and better address the concerns of those engaged in the decision making process, as well as ensuring that DCR staff is equipped to effectively respond to the issues raised by the public. Annex 8 includes an outline of more detailed recommendations for a DCR public engagement strategy.

Implementation Guidance:

Allocation of Land in the Landscape Zoning Process: The Forest Futures Visioning Process has developed an approach to the long-term management of DCR forest lands based on ecosystem services (Recommendation 1). The approach relies on classification of land into categories that prescribe management approaches, ranging from extremely limited management in forest reserves, management to maintain recreational and cultural values in parklands, to active silvicultural management in woodlands. The public must be involved in the process for DCR land allocation within the three zone model. The general public is highly invested in the management regimes of its land, and expects to have the opportunity to provide input in decisions about how a valued state property is classified. Opportunities to help identify 'Special Places' and patch reserves will also be highly valued. Also, a well-designed and implemented process for identification of the ecosystem service objectives is a necessary precursor to determining allocations that will be the basis for FSC certification audits.

Management Planning: Each management zone has a different regiment of management prescribed in order to ensure that DCR forests continue to meet ecosystem service objectives. The public expects to be given opportunities to provide input throughout the full range of management planning, and to have the chance to review management decisions prior to implementation. The success of DCR's future forest stewardship activities lies in creating and executing an effective public input process that demonstrably incorporates public concerns and comments, even (and especially) when members of the public are not supportive of intended management actions. DCR needs to increase transparency of management decisions by clearly articulating decisions, including the information that is relied upon in making decisions, and communicating with the public when input is not reflected in final management plans.

As an example, the chart below provides a visual representation of key points within DCR's forest management planning processes that require public participation. Similar models could be developed to identify key points for public input in the development of other management objectives.



Internal Processes: DCR needs to institutionalize 'best practices' for public participation and engagement. Effective public engagement is critical to the development of trust in DCR's management of public resources. The TSC has clearly heard the concerns of some that a more 'robust' public process might have the unintended consequence of causing unnecessary project delays or somehow inhibit DCR staff from carrying out their duties in an efficient manner. The TSC believes that a more proactive approach to engaging the public will improve the substance of policy, reduce conflict while raising trust, take advantage of public knowledge and expertise, cultivate civic capacity and engagement, and lead to successful implementation of management decisions. Some recommendations for improving public process are as follows:

1. *Dedicate management-level staff resources to improving department development and oversight of public participation processes.* Specifically, it is recommended that DCR have at least one senior-level staff person responsible for overseeing 'public involvement' and 'public participation.'

2. *Create clear timelines for projects or policy development/implementation that provide adequate time, opportunity and funding for meaningful public involvement.* In planning a project or policy initiative, it is critical for DCR to consider the time and funding necessary to engage the public on a variety of levels and to ensure that time is available. Too often agencies rush through a public process in favor of meeting a project or policy deadline leaving the public feeling angry, frustrated and unable to support the outcome --

and in the end taking much longer to resolve an issue. Further, when possible, projects should be designed to allow for public input at all stages of the project, rather than involving the public at the very end. In order for citizens to have confidence in public agencies and their commitment to involve them in policy decisions, efforts to engage them must be genuine and not perceived as an 'afterthought.'

3. *Improve tools used to engage the public.* Establish an opt-in list-serve that facilitates e-mail notification of all public hearings, meetings, site visits, review and comment periods, with links to documents, schedules, and other resources posted on DCR web pages. A list-serve that is open to the public but allows moderator-only posting would allow any interested individual to join and receive notifications without DCR taking on the burden of managing a list of individual e-mail contact information. Notifications should be widely distributed to 'friends groups,' e-mail list-serves, conservation commissions, etc. in a timely fashion. Schedules, supporting documents, and hearing notifications should be posted on a prominent area of DCR's website homepage (for instance, in a 'Managing Your Land' section). DCR should continue to explore other methods of reaching out to the public.

4. *Invest in internal capacity building for public engagement.* DCR managers need to equip themselves and their staff with tools and proven approaches to engaging the public through public processes. The very best predictor of innovation within departments and agencies is the level of experience held by managers and more senior staff. The more experience agencies have with effective approaches to public engagement, the better-prepared managers will be to match the appropriate engagement methods to policy and program development.

5. *Engage the public in discussions about effective participation in public processes.* Just as DCR needs to equip themselves with tools for public engagement, members of the public also need guidance about how to be effectively heard at DCR. In seeking public input, DCR should provide clear and consistent guidance on its decision-making processes and categories of input that will be constructive in informing forest and park management decisions. DCR may find an investment in periodic workshops for managers and stakeholders (including 'friends groups') in public process, effective feedback, and conflict resolution to be a worthwhile means of fostering more trusting and collaborative exchanges. DCR could partner with private/public organizations that specialize in direct democracy and/or civic engagement and draw upon existing resources. Overall greater engagement and support for 'friends groups' is also recommended.

6. *Measure benefits beyond cost.* DCR leadership should evaluate successful public engagement processes beyond the layout of public involvement expenditures. While successful public involvement can reduce costly litigation and project delays, other benefits, such as increased trust in the Department and its personnel, public education, and increased civic capacity should be accounted for as well.

7. *Incorporate public engagement practices into project and performance management review for all three land management zones.* Performance management reviews for programs and specific projects should incorporate standards for successful public engagement practice. Furthermore, once public participation standards are in place, it

may be appropriate in some instances to develop, along with them, participatory performance appraisal techniques that engage the public in the performance feedback cycle.

These changes in public process will allow DCR to engage the general public on a wide array of topics that must be addressed if the Department is to move beyond the current environment of mistrust, miscommunication and conflict. These topics include gaining broad public understanding and acceptance for the forest ecosystem services model and for the ecosystem management approaches in the three land use zones. The following recommendations should drive the development of DCR's outreach and education programs:

- *Engage a diverse cross section of the public in a dialog on forest ecology and ecosystem processes, as well as the many ecosystem services and values that DCR forest management is designed to promote*. Education around these functions and values is needed to help the public understand the ways in which management can support and promote the ecosystem functions and values that are seen as important.

- *Promote public discussion around the challenges of balancing the wide variety of uses typical of DCR forest land.* DCR is charged with maintaining land for a wide variety of purposes and uses, which are often in conflict with one another. Outreach focused on promoting an understanding of the balancing act that active management strives to achieve will help the public understand and more fairly debate the underlying goals of forest management.

- *Increase public understanding of sustainable forestry practices and silviculture as implemented on DCR woodlands.* The demonstration program for private landowners discussed under Recommendation 6 should be adapted to help develop a broad-based public understanding of DCR's woodlands management objectives, silvicultural practices, and their ecosystem impacts, including on-the-ground examples of the best forest management practices, physical implementation of the Best Management Practices, and demonstration of the results of silvicultural through time. Effective and robust outreach to the public will be necessary to raise awareness of DCR's sustainable forestry demonstration program, and provide effective interpretation and education around demonstration projects.

- *Engage the public in discussion of their role in forest stewardship and in the public process that directs management of the land held in the public trust.*

Discussion: A very wide range of views exists on the appropriate management of state forests and on the relative importance of the myriad ecosystem functions and values provided by our forests. Management decisions, therefore, will always engender some level of conflict between points of view representing competing, and essentially incompatible values.

A robust public process that strives to reach common ground and gives members of the public an opportunity for their concerns and values to be heard and addressed, will result in a significant improvement in forest management on state lands managed by DCR. Without a robust public process that invites and incorporates the values and concerns expressed by members of the public, the Department will continue to encounter significant resistance to its management decisions and public trust in the DCR's management of public lands will not improve.

Public engagement in the DCR decision-making process needs to be open, transparent, and must occur throughout the lands management program of the Department, from allocation of land to the three zones to on-the-ground practices. Further, and possibly most importantly, the public needs to be confident that its concerns are not only heard, but are given serious consideration and weight in management decisions. Public input cannot be a *pro forma* exercise; this leads to the lack of trust that has been evident in recent years, and engenders conflict that undermines DCR's forest and parks management.

Recommendation 9: Policies for Privately Owned Forests in the Commonwealth

Recommendation: *A prominent part of DCR's mandates include oversight of all forests in Massachusetts. Due to the importance of private forests to public forest function and integrity, and the high level of public benefits provided by private forests in Massachusetts, the Commonwealth should adopt measures to prevent further forest fragmentation and conversion to other land uses, and promote better stewardship of private forests, including the implementation of a requirement that all forest harvesting plans be prepared by a licensed forester.*
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Conservation and protection of the public values provided by private forests in Massachusetts requires increased leadership, education, public investment and alignment of incentives to ensure that these forests will continue to exist in the future and that private landowners make informed decisions about the stewardship of their forest lands. As reflected in the majority of the TSC's recommendations for private lands, wherever possible promotion of good forest stewardship should rely heavily on incentive-based rather than regulatory approaches for improving forest land management.

Implementation Guidance: Currently, markets do not exist for many of the important public ecosystem services provided by private forest landowners, and as a result landowners receive no compensation for these services. In general, the TSC finds that added assistance to landowners is desirable to promote the continued provision of these services. The TSC suggests there are three major areas where the Commonwealth can take action to improve the prospects and opportunities for ensuring a continuing supply of public ecosystem services from Massachusetts forests. These are discussed below, with reference to specific examples of actions that merit further study and consideration by the state.

- ***Preventing Forest Conversion and Fragmentation:*** Under the implementation of the Global Warming Solutions Act, the TSC recommends the state study the benefits and costs of legislation to ensure 'no net loss' of forest canopy, acreage or delivery of forest ecosystem services in Massachusetts. Developers would be required to replace forest canopy converted to development with forest canopy and acreage of comparable ecological value – this might include a combination of permanent protection of private forests via conservation restrictions and the planting of new forest canopy on private land previously not forested (principally in cities and suburbs).

  The TSC also recommends the state conduct further analyses to support the development and funding of cost share programs to facilitate private forest conservation. The public comments on the draft TSC report make clear the broad public support for these types of programs. Such programs, focused on partnerships with land conservation trusts and landowners, will provide valuable public benefits by facilitating completion of upfront activities that currently may act as barriers to the forest land conservation process (*e.g.*, group appraisals, estate planning education and technical assistance, group baseline documentation for conservation restrictions, surveys for conservation restriction exclusions, and small forest business planning and implementation grants). These types of cost incentives serve an important function by reducing initial barriers faced by

landowners who, rather than make no decision and see the forest developed as a result of estate taxes or fragmentation across multiple beneficiaries, prefer to conserve their forest lands.

In addition, the TSC suggests that DCR and EEA closely monitor the progress of the ongoing legislative commission on forest conservation finance. Implementation of the recommendations from this commission will likely need to be integrated with the recommendations of the TSC.

- ***Promoting Improved Forest Stewardship on Private Lands.*** DCR should initiate programs to improve stewardship of public values supplied by private forest lands. Approximately 76 percent of Massachusetts 3.1 million acres of forest are privately owned (including 69,000 acres owned by land trusts). Securing a sustainable flow of public values from these forests can only be assured if the Commonwealth makes a serious commitment of financial and human resources focused on promoting good stewardship of these lands. ***To meet these objectives, the TSC recommends further study and consideration of the merits of the following set of initiatives***:

  – *Promulgation of revised Chapter 132 Forest Cutting Practices Act regulations.* EEA has been working for a number of years to issue revisions to state regulations governing timber harvests on private lands. Revised regulations are essential for ensuring a high level of stewardship on private lands. The Secretary of Energy and Environmental Affairs should move quickly to ensure that revised Chapter 132 regulations are issued for public comment and then finalized.

  – *Tabulation and analysis (including GIS overlay analysis) on an annual basis of information obtained from the Chapter 132 cutting plans*. This information on harvesting in the state is critical for examining areas that undergo various degrees of harvesting, changes in species composition, age class distribution, and short and long term harvesting trends. This information should be shared with private forest landowners and public decision-makers to help them make better informed choices about how to manage their lands within the context of surrounding regional forest management.

  – *Access to GIS mapping and training for private forest landowners, licensed foresters, and land conservation trusts* to assist in the identification of significant forest values on their lands and on adjacent or surrounding lands. These values might include vernal pools, rare and endangered habitat, water supply areas, forest types, nearby protected lands, prime forest soils, and historic sites that can be extremely helpful with short and long term planning, and with identifying abutting and nearby landowners who might have shared interests.

  – *Continuance of cost share programs for new forest management plans that include inventories of carbon stocks* with the goal of facilitating establishment of carbon credits, aggregation of carbon credits for third party verification, and sale to qualified carbon markets. This will provide a new source of income for forest landowners, providing real compensation for the public benefits derived from storage of carbon in privately owned forests.

– *Develop public/private partnerships to provide funding for:*

1. Annual support for part-time coordinators of woodland councils across the state to bring together forest landowners, public officials, business leaders, educators, foresters, loggers, sawmill owners, hunters and fishermen to discuss land use issues and learn from their peers about land conservation efforts, stewardship opportunities and provide local education opportunities. The coordinator is the person who arranges the speakers and programs, arranges for a location and sends out the invitations to ensure the community knows of the meetings.

2. Annual support for the Keystone program (formerly Coverts), run by the University of Massachusetts extension, which trains 25 volunteers annually as local ambassadors for private land stewardship and conservation. Recent analysis of the program indicates an $18,000 annual investment returns the equivalent of 12 full-time people in volunteer hours.

– *Initiate legislation to:*

1. Create a state tax credit for 100 percent of landowners' costs for forest management plans and possible carbon inventories, as well as for forest small business planning and implementation costs that would expand outreach to landowners and provide a stable, long-term increase in managed forest land.

2. Under the implementation of the Global Warming Solutions Act, pass legislation to provide a state tax credit to landowners, harvesters, mill owners and other secondary processors for the sale of forest products that are verified by DCR to have been harvested from long-term sustainably managed forest lands that will return to forest following the harvest and that are sold to a processor or end user less than 100 miles from where the wood was harvested (and within the boundaries of Massachusetts). These products would also be exempt for state sales tax.

3. Under the Global Warming Solutions Act, amend state building codes and implement an Executive Order to increase the use of local wood in construction and transportation infrastructure.

4. Under Chapter 61, provide a state tax credit equal to the cost of property taxes for those landowners in good standing in Chapter 61, as verified by DCR.

5. Chapter 61 should expand the state tax credit for approved private land management practices that promote a set of prescribed ecosystem services (e.g., biodiversity, carbon sequestration, water management, soils protection, etc.) in addition to the supply of local wood products.

6. Develop a state tax credit for Massachusetts Licensed Timber Harvesters to cover the costs of training to obtain 'Master Logger' certification or the equivalent.

- **Require Licensed Foresters prepare all Forest Harvesting Plans:** The importance of the Commonwealth's private forests in producing ecosystem services highly valued by the public requires that all harvesting plans and amendments be prepared by a licensed forester. This would eliminate the current exclusion that allows a landowner to prepare a forest harvest plan without the participation of a licensed forester. According to DCR, 80 percent of cutting plans are currently prepared by licensed foresters. Closing the loophole on the remaining 20 percent can reduce the number of so called short term harvests and encourage private landowners to give greater consideration to long term forest management decisions. The TSC heard from many members of the natural resource community that private rights come with responsibilities as well. A major potential benefit of such a requirement is to lessen, but certainly not eliminate, the need for oversight of Chapter 132 compliance by DCR service foresters through the shifting of this responsibility to licensed foresters. The existing exclusion has provided numerous opportunities for sub-standard harvesting that are unlikely to have occurred had a licensed forester developed the plan. The risk of license loss by foresters violating the requirements of state law provides added incentives for higher silvicultural standards in the forest. This recommendation is also intended to confirm that all harvesting plans for public lands be prepared by a licensed forester responsible for their implementation. While the TSC heard considerable opposition to the licensed forester recommendation, the Committee finds that allowing unlicensed landowners to prepare forest harvest plans in place of a licensed forester violates the intent of the forester licensing law and is contrary to the TSC's goal of promoting good stewardship on all the forests of the state.

Discussion: The TSC's vision for Massachusetts forests relies heavily on providing long-term protection for all the state's forest resources and on promoting good stewardship on these lands. Because the vast majority of forests in the Commonwealth are privately owned, protection of the public values provided by these forests requires the state to work actively with private landowners. In the view of the TSC, far too little attention has been paid to this group over the years, and it is now time to reverse this state of affairs. Clearly this will require new resources and a new focus. It is important to note, however, that some of the ideas described above are designed to create better incentives for forest protection and stewardship, and may not therefore require new forestry staff at the state level (*e.g.*, cost share programs). On the other hand, the TSC has also suggested changes that could free up the time of certain existing state personnel who might then be available to assist private landowners. For example, the requirement that a licensed forester prepare all harvesting plans, while promoting better management, might also have the effect of freeing up time for DCR service foresters to spend assisting landowners.

Recommendation 10: Resources Needed to Implement the TSC Recommendations

Recommendation: *The DCR Commissioner should develop and implement strategies for funding the specific recommendations from the Forest Futures Process.*

Implementing the Forest Futures recommendations will require both reprogramming of existing resources and development of new revenue streams. While it would be convenient to assume that all the proposed changes could be put in place through reallocation and re-assignment of existing DCR staff, this is simply not the case. Increases in DCR staff are needed to support creation of the three zone system, development of new management guidelines and plans, implementation of expanded public participation process, and for both short and long-term management and monitoring of forest reserves, parklands and woodlands. The recommendations in this report form an integrated package of changes that are needed to assure effective management of DCR lands. Many of the recommendations address areas that have been severely under-funded or not funded at all in the past (e.g., preparation of integrated resource management plans, collection and analysis of data to support adaptive management). Consequently, it is critical that EEA/DCR seek additional funding from the legislature to support implementation of the recommendations in this report. Absent new funding, major portions of the recommendation package cannot be implemented. This includes not only funding for DCR staff but also funds for acquisition of the additional lands needed to (1) ensure the future build-out ecologically functional system of forest reserves and (2) provide adequate parkland and woodlands to meet the public's future ecosystem service demands.

Implementation Guidance: In making the recommendations in this report, the TSC is keenly aware of the state's current budget crisis and the difficulty this poses for DCR. With that in mind, we have attempted to identify the highest priority funding needs associated with this report's recommendations.

Priorities

- *Zoning* is a key first step towards implementing the TSC's recommendations. This will primarily require DCR staff time, both to develop plans and to run a robust public process to finalize allocations of land to forest reserves, parklands and woodlands.

- *Management Guidelines and Plans* are needed for lands in each of the three zones once the zoning process is complete. Again, this primarily involves DCR staff time for planning and public process activities but also requires additional resources to complete inventories.

- *Management Plan Implementation and Monitoring* will require extensive staff resources if all three zones are to be given adequate attention. Both parklands and forest reserves must be staffed to ensure compliance with limitations on their use, to ensure the quality of recreational experiences and *to monitor long-term ecological*

conditions. In particular, while not generally requiring silvicultural interventions, forest reserves absolutely need staffing to meet these monitoring needs. On woodlands, the TSC also envisions a much more extensive set of monitoring protocols including collection and analysis of economic data to illustrate the financial costs and benefits of the different model forest practices that are implemented.

- *Public Outreach and Education* is a critical element of the TSC's vision. DCR will need to devote greater resources to these activities in the future, both in the planning phases and through implementation of its resource management plans.

- *New Land Acquisitions* to complete the build-out of the forest reserves will require substantial funds over the coming decades. The Commissioner should develop cost estimates for these plans and work with the legislature to put a strategy in place that will ensure annual funding is available to bring additional lands into the reserve, parkland, and woodlands system as they become available.

- *Compensation for Towns* should be considered by the Commissioner to reduce the impact on communities where lands leave the tax rolls as a result of their purchase and incorporation into the DCR public lands system.

Potential Funding Sources

- *Temporary Reallocations of Staff* within DCR offer an opportunity to make quick progress on the zoning and management planning recommendations. In the interests of moving to the new system as quickly as possible, the TSC recommends that the Commissioner consider the utility of reassigning field forestry and recreation staff to planning activities.

- *Carbon Credits* are a potential source of revenues that the state should evaluate. These could potentially provide a one-time infusion of millions of dollars to the state and are potentially consistent with the management objectives for both parklands and reserves.

- *Timber Sale Revenues* provide one source of additional funding. Currently the legislature requires the return of these revenues to the general treasury. The TSC strongly recommends that the legislature revise its current practice so as to allow DCR to retain timber sale revenues for planning, management and monitoring purposes. These funds should be available for use in the forest reserves and parklands, as well as for infrastructure and management needs in the woodlands.

- *Increases In and Greater Retention of User Fees* are another potential source of revenues to support implementation of DCR's management plans. To the maximum extent possible, it is desirable that ongoing management in the three zones be self-supporting while still being affordable for users. A careful analysis of ongoing management and monitoring costs is needed to determine the potential future role of user fees in supporting the forest reserves and woodlands.

In this regard, the Commissioner will need to work with the legislature to increase the percentage of user fee revenues retained in the future by DCR.

- The ongoing activities of the *Legislative Commission on Forest Conservation Finance* should be carefully monitored by DCR to take advantage of opportunities to develop funding to support the build-out of the forest reserves.

- *DCR Partnering with Non-Profits* is also a potential source of resources, particularly in the areas related to public participation and monitoring. Volunteers from 'friends' and other groups could potentially be of great assistance to DCR in devising and organizing the public input to both the planning processes, the implementation of the plans, and the monitoring of ecosystem conditions. DCR should develop a plan to take advantage of these valuable citizen resources.

- *Additional Allocations of State Budget Resources to Forest Stewardship.* The Commissioner, stakeholders, and general public must make a strong case that too little of the state budget is allocated to the care and protection of public forests in Massachusetts. Given the breadth of ecosystem services that they provide -- all of which are critical to a healthy and vibrant society -- the Governor and the Legislature must allocate additional public funds to the care of these lands.

Discussion: Locating funds for change is always difficult and this is especially the case now in Massachusetts. But new funding (or reallocation of existing monies and resources) is critical if the recommendations in this report are to be implemented. Moreover, the TSC has noted that partial implementation also poses risks -- for example creation of forest reserves without the necessary long-term ecological monitoring and use management is from the TSC's perspective highly undesirable, and could result in reserves being degraded by unauthorized uses.

The DCR Commissioner will need to play a key leadership role in developing an integrated funding plan for supporting the recommendations in this report. The Commissioner can make decisions about reprogramming existing DCR funds and staff, and also will have a lead role in working with the Secretary of Energy and Environmental Affairs on needed changes to legislation and budgets. Development of funding must go hand in hand with the management recommendations outlined in this report and should itself be one of the highest priorities of the Commissioner.

IV. Alternative Viewpoints on Recommendations

Bruce Spencer

My position on codification of forest reserves:

I am opposed to the codification of reserves primarily because it establishes a strong barrier against forestry actions that may be needed to address non-extractive anthropogenic degradation of these forested reserves. During the previous century the Massachusetts forest lost key tree species (American chestnut and American elm), and other key species were seriously weakened (American beech) or threatened (Eastern hemlock and White ash). In addition, invasive plants, insects, and disease have been introduced. This century has seen the continued expansion of invasive plants, insects and diseases plus the enhancement of native insects due to climate change. Trees have started to die on a landscape level. A state law that discontinued moose hunting a century ago is now a difficult barrier to overcome to reduce the severe impact of these herbivores on hardwood regeneration. The interest groups that will fight strongly to prevent a moose hunt are no less ardent than those opposed to any tree cutting that would address anthropogenic degradation of forested reserves.

Charles Thompson

Basis for Comments. Recognizing that all members of the TSC have a variety of disagreements with the final document, I believe that it is important for members to limit written dissent to only those issues believed to compromise the value of the document in particularly serious ways.

Issue 1 -- Overall Value of 'Woodlands'

I am concerned that the general approach we have taken with 'woodlands' effectively understates their total contribution to the social fabric. A primary emphasis on the concept of demonstration and model forests relegates many of the benefits of land stewardship to second-class status. It is precisely the integrated character of thoughtful stewardship at a landscape scale that can be a powerful social good. In an integrated approach, sustainable production of local wood products is part and parcel of the production and protection of water, the protection of biodiversity, and the provision of diverse recreational and educational opportunities. I am concerned that a primary emphasis on "demonstration" amounts to a ghetto-ization of activities, confining them to limited areas.

I also don't believe that any government agency can be cavalier about rejecting perpetual and sustainable sources of revenue that accomplish core objectives, have economic multiplier effects, and result in employment, even if direct revenues may only amount to a few million dollars a year.

Issue 2 – Silviculture and Silvicultural Approaches

I think that the recommendation to increase the emphasis on uneven-aged management is unnecessary, and has the potential to create a good deal of confusion. The inevitable danger is

that readers of the document will equate “uneven-aged management” and “uneven-aged forest”; they are different.

Throughout this process, we have spoken about the “toolbox”; the idea of keeping all tools in the toolbox is a good one, as is the idea of adding new tools as they become available. Going forward, DCR will have to navigate its way through the minefields associated with public perceptions and aesthetic impacts of forest operations. Starting with an emptier toolbox is not the way to start down that road.

Similarly, specification of opening size limit is neither desirable, nor necessary, from a forestry standpoint. Finally, the “levels of silvicultural management” are unnecessarily prescriptive in their specificity and do not allow the degree of flexibility needed in land stewardship.

Issue 3 – Biomass Removals

A categorical or ‘general’ prohibition against whole tree harvesting or removal of tops is neither necessary, nor desirable. This recommendation, while obviously intended to achieve a political objective, is undesirable from a land stewardship standpoint. Concerns about nutrient depletion can be handled by the adoption of a conservative approach in which maintenance of site capability is the overriding principle. There are certain stand situations on certain soils where the ability to remove tops may be part of a completely reasonable silvicultural prescription. A blanket prohibition is unnecessary.

Issue 4 – Private Lands

I acknowledge the importance of the private forests of the Commonwealth, but believe that Recommendation 9 should not be included in the main report. By exceeding our very clear charge, I believe that the TSC is undermining its own credibility.

Many of the ideas detailed in Recommendation 9 are worthy of serious study, as is the overall question of how best to maintain the economic viability of private land ownership in Massachusetts. This effort is worthy of a separate process, by a group fully representative of the interests appropriate for tackling private forest issues. That is not the TSC.

Finally, I do not support the proposed requirement that a licensed forester prepare all cutting plans, except on Ch. 61 and 61A lands. I believe that there are public interests in private lands (water quality, erosion control, endangered species, wetlands protection), and that these are well-covered in current law and regulation. I believe that almost all landowners would be well-advised to use a forester to represent their interest, but I don’t believe that this should be required. The public interest in private lands does not extend to the fine points of silviculture or decisions on when to sell or what to cut.

Respectfully submitted,

Charles Thompson

Joseph Zorzin

According to the FSC web site, "Being FSC certified shows that you comply with the highest social and environmental standards on the market."

The management of the Massachusetts state forests at best could be described as mediocre and therefore does not deserve to be FSC certified. But the fact that it was certified by FSC and will probably regain its certification shows that the public has not gotten what it has paid for, an honest appraisal.

Instead of FSC certification, the public's interest in their state forests would be improved by new laws and regulations with higher standards and by hiring the best possible leadership of the agencies.

That same web site also says, "This gives you credibility with customers and business partners as well as financial institutions and watchdog organizations. FSC certification helps to protect your brand and reputation and it allows you to access highly environmentally sensitive markets."

Such considerations of "brand and reputation" are inappropriate for government agencies. Only the public should be judging the brand and reputation of their government agencies.

Annex 1

SUMMARY OF HARVESTING ASSESSMENT

PREPARED BY BRUCE SPENCER FOR
DEPARTMENT OF CONSERVATION AND RECREATION
BUREAU OF FORESTRY

TIMBER SALE ADMINISTRATION

Timber sale administration was not an assessment topic in the individual reports, but it does suffer from a lack of oversight. In Berkshire County one logger had managed to purchase far too many timber sales then he could properly operate. Consequently this logger had many sales started but none completed and often times in desperation he operated sales under less then desirable conditions. These timber sales were in two districts which indicated a lack of coordination.

Another problem concerned less then desirable loggers who were able to secure timber sales when the forester had no other options. In neighboring districts one forester wouldn't consider allowing a certain logger, whereas the forester in the adjacent district would reluctantly allow the logger because he didn't have a choice. Considering the importance of state forest timber sales to the industry, the program supervisor could use this leverage to improve the work of the slack logger.

LOT DESCRIPTIONS

This is crucial information, because it allows the forester to impart his knowledge on the area proposed to be managed. It is a collection of historical facts, data collection and ecological understanding that is useful not only for the silvicultural prescription but for the reader (public and professional) to feel confident that the proposed work is well thought out and makes sense. The lot descriptions were dramatically different across the districts and many did not provide important information. These need to be standardized across all state forest and parks.

SILVICULTURAL PRESCRIPTIONS

This is similar to the lot descriptions in which generally not enough information was provided. But they also suffered in additional ways. First, sometimes the prescription was not possible because the allowable logging system was not appropriate to the desired conditions. Often this meant that the logging equipment was too large and therefore required the cutting of additional trees that undermined the prescription. This doesn't mean that the logging system couldn't be employed, but that the silvicultural prescription needs to match the equipment. For example, a traditional shelterwood (evenly spaced trees) would need to be a strip shelterwood to accommodate large feller bunchers grapple skidders. Secondly, definitions, for silvicultural methods, need to be the same state wide. A commercial thinning in the southeast needs to have the same results as in the northwest and in both places robust regeneration is not the result. A clear distinction between even-aged and uneven-aged systems need to be clarified, because

oftentimes it seemed that a uneven-aged prescription was likely going to end up an even-aged stand and vise versa.

Another silvicultural concern, is the likely dominance of beech following either a regeneration cut or commercial thinning in mixed northern hardwood stands that have beech as either a mature overstory component or as a dominant understory tree (4-10' tall). Oftentimes the silvicultural prescription predicts a continuation of the current species mix, when in all likely hood beech will dominate the next stand at the expense of the existing species. Although advance regeneration of beech was often the problem, advance regeneration of other hardwood species, such as red maple, will also dominate the next stand under similar situations. To promote or maintain species diversity in future stands when the above conditions exists, some form of control over advance regeneration or sprouting needs to be considered. This was not mentioned in any of the silvicultural prescriptions.

CUTTING PLAN

The greatest variation in cutting plans was the maps. They varied from rough hand drawn to state of the art computer maps. Although there were excellent hand drawn maps, I suspect a move toward the computer driven maps would be an improvement. The proposed changes to Chapter 132 will also bring important improvements especially the information on where the forester is taking the stand/forest.

BOUNDARIES

Boundaries are a success story, as I found the boundaries in good condition across the state. Most of this boundary work was completed in recent years.

TIMBER SALE LAYOUT

The timber sale layout, which addresses the manner in which forest products are removed from the forest, is a critical part of every timber sale. It needs to take into account not only the range of logging equipment allowed; which includes weight, ground pressure, tracks or wheeled, feller buncher, feller processor, width, tri-axle, tractor trailer, and hand felling or machine felling, but the soil and stand conditions to accommodate the logging equipment. The space requirement for the various logging systems vary greatly so much so that some silvicultural methods are not possible with larger logging systems. Whatever the logging system allowed, and many state timber sales allowed the largest available logging systems, the space to accommodate this equipment in the forest and landing has to be provided. For example, if skidders are 10' wide the roads need to be at least 12' and not 8' in width. Some soils can support large heavy logging equipment for much if not most of the year whereas some soils (mesic) have difficulty supporting even light logging equipment at any time of the year. Truck roads for tractor trailers need different standards then truck roads for a tri-axle truck. The timber sale layout needs to be completed prior to the showing of the timber sale to prospective bidders to avoid marking additional trees or allowing unmarked trees to be cut for larger then expected logging machines.

WETLANDS

Most foresters did excellent work in locating, marking, and protecting wetlands. In the few cases where this did not happen, some standard procedures with over site will correct this problem. For example, the boundaries of wetlands are important and it must be decided whether it is flagging or paint which marks the boundaries and how much of each is needed. The mapping of impacted wetlands that occur on truck and logging roads, sometimes far removed from the treated stand, needs attention.

VERNAL POOLS

Vernal pools were identified and protected from logging in the timber sales reviewed. They were not protected from illegal ATV use. ATV use was a problem for vernal pools, wetlands, and general soil erosion in all state forest.

STEEP SLOPES

Only one timber sale contained steep slopes. The steep slope occupied only a small percentage of the timber sale. The service forester was concerned and rightfully so because the soils were easily eroded. It seems prudent that unless the soils on steep slopes can accommodate logging equipment, without risk to soil fertility, then these slopes should not be operated.

HIKING TRAILS

Apparently there is a new policy concerning timber sales and hiking trails. This is important because the treatment of trails varied between districts. All were careful but oftentimes cutting occurred close to the trails to achieve both silvicultural objectives and to remove hazard trees. Trails were restored, but obviously altered. The new policy prevents cutting near the trails but doesn’t allow for salvage of dead trees when the forest dies off from insect defoliation. Trail maintenance is always an expensive task for trail folks and silvicultural operations could lessen this cost with well planned and carried out timber sales.

INVASIVE PLANTS

Invasive plants occur in all districts, but the control of invasive plants varies from active chemical control to no attempt to control. The impact on invasive plants on the future forest varies from slight to serious. On some rich mesic soils it appeared that invasive plants would eventually take over the site and tree growth eventually eliminated. A policy on invasive plant control must be state wide and implemented on all timber sales.

LANDINGS

Most log landings were restored to a clean condition free of logging debris and rubbish, seeded to grass, graded, and ready for the next timber sale. Some landings had old logging debris from previous timber sales and some appeared clean but logging debris had been buried on site. This is usually a problem when the whole tree or the entire stem is skidded to the landing and the unusable parts are not returned to the forest. Supervision seems to be the problem and not a lack of policy.

LOGGING ROADS

The concern with logging roads is from a lack of timber sale layout. Without well planned and marked logging roads the logger determines the road layout which often results in poorly planned roads and too many roads. Logging roads are usually permanently planned roads and reused with each succeeding timber sale. They should not occupy more then 10% of the sale area, be located in areas where soils support logging equipment, and are on gradients that do not promote erosion. As regeneration develops in managed stands, logging equipment is usually confined to these roads to prevent damage to the regeneration. This is a problem for many DCR timber sales because hand felling and winching does not occur and instead all trees are cut and skidded by machines. Most of the stand damage occurs along logging roads in the form of rutted/compacted soils and barked trees. The barked trees were common with grapple skidders removing the whole tree and rutted roads were the result of operating on soils that did not support the logging equipment. This latter problem has been a problem with the recent wet summers and corresponding soft soils. Restoration is successful if underground drainage is not destroyed from deep ruts or heavy equipment. Well planned timber sales and supervision eliminate most problems.

RUBBISH

Rubbish was not a problem on the reviewed timber sales. All foresters are doing a good job controlling logging trash.

FUEL/OIL SPILLS

An oil spill was observed on one timber sale and may have occurred on others. Fuel/oil spills can be easily covered up and therefore easily missed. Loggers with old poorly maintained equipment that frequently requires work at the landing are usually the problem. On the timber sale with the spill, the loggers were working on an old broken machine quite close to the spill. Spill pads were not observed. All loggers should have a full compliment of pads and booms to contain or catch oil and fuel leaks. There was no clause in the timber sale contract, requiring oil and fuel containment pads.

SLASH

There was no slash law violations for boundaries observed in any of the timber sales reviewed. On one timber sale slash piles in the forest were excessive from poor utilization. This was a visual problem but not a silvicultural problem. Another timber sale had some large debris piles that were both unsightly and a problem for regeneration. Supervision should have required returning the debris to the forest. In the vast majority of timber sales slash was not a problem.

VISUALS

In all districts there were visually attractive timber sales from both an aesthetic and silvicultural perspective. Some stands due to their maturity, quality, and natural diversity were easy to maintain in an attractive condition, whereas other stands required an eye for the aesthetics to

maintain or create attractive forest. Sometime timber sales were attractive form a visual point of view but unattractive from a silvicultural point of view.

The landing is usually the most heavily used area of a timber sale and restoring the landing to a neat and debris free area is important. This is where the public often gains access and is often the only opening visible to the public. Sometimes there isn't a choice for the landing location, but when there is, it is best to be off the road, out of site, and not an attention getter. This is important, especially when the logging is active, to not draw attention to the site, for safety reasons.

Sometimes the visuals are destroyed when ice or snow storms bend over saplings or break their tops. Unless these trees are cut down the site will remain unattractive for many years. Storm damaged forest in small amounts often provide needed stand diversity, but it is often prudent to clean up and restore damaged areas visible from roads and trails.

The most attractive timber sale was the result of the following factors: a multiple age stand with two silvicultural entries, excellent timber sale layout, a skilled logger, little or no damage to the soils or residual trees, excellent restoration of landings and logging roads, and supervision that paid attention to the details. Beyond this it may be helpful for DCR Foresters to receive training in landscape design.

SUPERVISION

As mentioned above, under the visuals, paying attention to the details and effectively conveying this to the logger is important to a successful timber sale. The logger can make or break just about every aspect of a timber sale. Consequently the effectiveness of forester supervision is paramount. It is always important to focus on the work and not the person. It is in the best interest of everyone to do good work on public lands. The forester's most important day is day one, when the logger needs to understand what the forester hopes to accomplish with this timber sales and what the forester's standards are to accomplish this task. There are loggers working on DCR lands that need better supervision as already mentioned in this report. I am confident Bill Hill will correct this.

Annex 2

Background on the Forest Futures Visioning Process

The Key Issues that Led to the Forest Futures Visioning Process

The Massachusetts Department of Conservation and Recreation (DCR), a department of the Executive Office of Energy and Environmental Affairs, oversees 450,000 acres of parks and forests, beaches, bike trails, watersheds, and dams, in addition to hundreds of bridges and miles of roadways. Led by Commissioner Richard K. Sullivan Jr., the department's mission is to protect, promote, and enhance our common wealth of natural, cultural, and recreational resources.

At the February 2009 monthly meeting of the Stewardship Council, the legislatively established advisory board to DCR, Commissioner Sullivan presented a plan for a public involvement process to be undertaken by the department to develop a renewed vision for stewardship and management of DCR forest lands. The proposed plan was prepared in response to a recommendation from the Stewardship Council in the fall of 2008 for a larger conversation with stakeholders and the public to address a number of issues that were being raised at their monthly meetings, including forestry practices in parks and ***forests***, green certification, and biofuels.

Citizen stewards, friends groups associated with a number of DCR parks, and several environmental organizations raised a variety of issues with the Stewardship Council and directly with DCR and other state agencies. In raising the issues they expressed serious concern and disappointment with management practices on DCR lands and in the manner DCR interacted with and responded to the interested public. The complaints and concerns were rooted not only in silvicultural practices, but in the perceived culture of the organization which did not value public participation and collaborative efforts and in differing interpretations of mandates and responsibilities. Most of these disaffected individuals and organizations felt that a mindset of land management for timber production was the lens through which responsibilities and mandates were interpreted and decisions were made. They also recognized that limited resources were hampering planning at a site-based level that might have addressed the potential controversies in advance. At the same time private forest landowners felt that the negative public image associated with some DCR actions was impacting the way the management of their lands was perceived. As the controversies continued, some planned timber harvesting was suspended causing timber sale contractors to become frustrated with DCR actions.

The concerns arose around a number of issues including the justifications for timber harvesting; the size of openings created by harvesting; the location of harvests; the choice of silvicultural methods and aesthetic impacts (including cutting of plantations); lack of enforcement, or insufficiently strong, best management practices resulting in negative impacts on vernal pools, and other sensitive environmental and cultural resources; the limited manner in which cutting plans and information was available; insufficient public participation; the potential availability of significant portions of DCR lands for harvesting for biomass energy production; and Forest Stewardship Council certification as having timber extraction as an underlying goal. These concerned stakeholders felt that DCR was not acknowledging or correcting errors in its management practices and that there was no accountability within the department when errors were made. As a result, very low levels of trust and feelings of disrespect arose of the department

and of DCR with some members of the public. Strenuous objection to what were seen as commercial levels of timber harvests or inappropriate decisions at parks and forests including, among others: Beartown State Forest, Boxford State Forest, Chester Blandford State Forest, Chicopee Memorial State Park, Georgetown Rowley State Forest, Mount Holyoke Range State Park, Mt. Grace, October Mountain, Robinson State Park, Savoy State Forest Rutland State Park, and Windsor Jambs State Park.

The Forest Futures Visioning Process which began in the spring of 2009 has involved an open, interactive dialog with forestry and ecosystem service experts, stakeholders, and the general public to consider the public benefits and values of forest lands, resulting in the recommendations contained in this report on forest stewardship practices and strategies for continuing public involvement on those issues. In May 2009, Commissioner Sullivan formally announced the formation of a Technical Steering Committee whose members are respected experts in their fields and charged them with providing recommendations for the future of DCR forests and parks, including how best to manage the myriad public benefits and values of forest land, including recreation, tourism, aesthetics, renewable forest products, habitat diversity, and landscape ecology, and how to strike the appropriate balance among them.

Recognizing that such public processes can be significantly enhanced through professional support and expertise, in December 2008, DCR contracted with the Massachusetts Office of Dispute Resolution and Public Collaboration (MODR) at the University of Massachusetts Boston to act as a neutral forum. MODR brings more than 20 years of experience in leading public collaborations. A team of MODR facilitators developed a design for the public process and have acted as facilitators throughout its implementation to conduct meetings impartially according to jointly agreed-upon ground rules.

As the sponsor and convener of the Forest Futures Visioning Process, DCR determined the goals and objectives of this process and how the outcomes will be used. The department was also responsible for securing the endorsement of leadership and engaging participants; planning and organizing the process with MODR, and allocating sufficient resources to the process. DCR contracted with consultant and policy analyst Tom Walker to provide technical support to a key component of the process, the Technical Steering Committee.

The Formation of the Technical Steering Committee and the Advisory Group of Stakeholders

To inform the planning and design of the Forest Futures Vision Process, the MODR facilitation team conducted 20 interviews with a cross-section of the stakeholder community to gain their insight on the issues, concerns about current and future policies and practices, and suggestions for how to effectively engage in a productive participation process. Interviewees were also asked to suggest experts they believed would be respected by a broad cross section of stakeholders and over 100 people were suggested as experts.

These interviews surfaced a number of issues, concerns, and hopes for the process, including that it needed to: (i) bring clarity to the mandates and values reflected in DCR forest management (ii) be informed by science from a variety of disciplines to establish criteria for forest management and cutting to address on-the-ground issues for the context and implementation of forest management, including the larger context of the full range of public priorities and values, and (iii) be transparent to the participants and the public.

As a result of this input, MODR's process design included means of incorporating broad public input, creating dialog among organized stakeholder groups, and bringing scientific information into any recommendations for a DCR vision going forward. The interconnected components included: (i) the Technical Steering Committee, (ii) an Advisory Group of Stakeholders, and (iii) Public Forums and Walks in the Woods, as well as other opportunities for public input.

Technical Steering Committee: The Technical Steering Committee (TSC) is composed of individuals having a range of expertise related to the public benefits and values of forest lands. This Committee, with input from an advisory group of stakeholders and the general public, was charged by Commissioner Sullivan with formulating recommendations on forest stewardship practices and strategies to be presented to DCR. The members of the TSC are:

Lisa Vernegaard, Chair
Mathew R. Burne
Heather Clish
Kathleen E. Connolly, Esq.
Andy Finton
Dr. William Moomaw
Keith Ross
Bruce Spencer
Thomas Stevens
Charles Thompson
Joseph Zorzin

The Commissioner named Lisa Vernegaard, Director of Planning and Stewardship at The Trustees of Reservations, as chair of the Committee. MODR coordinated the selection process for the remaining 10 members of the TSC with input from a small group representing environmental, citizen steward, professional forester, and forest landowner stakeholder groups as well as a well-respected academic, David Foster of the Harvard Forest. Short biographies for each TSC member are included in Annex 3.

This group of representative stakeholders confirmed the types and balance of expertise desired on the Technical Steering Committee and reviewed the qualifications of the individuals who had expressed interest to MODR in serving on it. The group reached full consensus on the membership of the Committee and Commissioner Sullivan then approved the selections and formally appointed each member. Many of those who were either not chosen or had indicated

they would only be available as a Technical Advisor were consulted by the TSC during the process on particular topics where there expertise could inform the discussions.

Advisory Group of Stakeholders: The Advisory Group of Stakeholders is composed of a representative group of stakeholders who reflect the various interest categories related to the public benefits and values of forests. It includes 23 members drawn from the citizen stewardship, economic development, environmental, forestry, government/municipal, landowner, recreational, and wildlife/habitat stakeholder interest group communities. MODR worked with the various stakeholder communities to identify appropriate representatives who could represent geographic areas and groups, rather than individual interests, and be able to communicate effectively for their constituencies.

This group has engaged in a dialog to surface and discuss issues, developed ideas and suggestions for the Technical Steering Committee, and provided feedback to the TSC on the draft recommendations. The TSC and the AGS met both separately and jointly throughout the process to accomplish these objectives.

The members of the AGS are:

Whit Beals
Jay Belanger
Bill Boles
Mary S. Booth
Ted Cady
Dicken Crane
Alexandra Dawson
Nan Finkenaur
Timothy Fohl
David J. Gafney
Fred Heyes
Claudia Hurley
Becky Kalagher
Michael J. Kellett
Cathy Kristofferson
James McCaffrey
E. Heidi Ricci
Mike Ryan
Carrie Saldo*
Jim Sherman
Peggy Sloan
William R. Van Doren
Jane Winn

* stepped down during the process due to a change in employment

Other opportunities for public input: There have been a number of opportunities for general public input throughout the process through site visits at several representative forests and/or parks, involving technical experts familiar with the on-the-ground issues, MODR-facilitated open public forums to elicit feedback about public values, goals, and concerns, and a series of forums to review the proposed recommendations. A ‘Walk in the Woods’ with an associated Public Forum was conducted in Leominster State Forest in June and in Savoy Mountain State Forest in July.

Public input concerning the values and priorities that should be promoted and protected in DCR state forests has been encouraged throughout the process. Information has been made available on the DCR website, including a description of the process, the formation of the TSC, agenda and meeting summaries for all meetings, and DCR answers to questions raised by both the TSC and

the AGS. The public has also been encouraged to submit comments or suggestions for consideration by email to MODRDCRFFVP@umb.edu.

A Brief History of Massachusetts Forests and Public Lands Managed by DCR

The forests of Massachusetts, covering over 60 percent of the state, are an enormously valuable public resource, providing a wide array of benefits to the state's citizens. These include a range of ecosystem services, such as supporting biodiversity, providing clean water, soil formation, flood control, nutrient cycling and carbon sequestration; wood products including timber and fuelwood; and opportunities for outdoor recreation, spiritual and aesthetic experiences.

Our forests and woodlands define the character of Massachusetts. Yet we have entered a time when the capacity of the state's forests to continue providing these public benefits faces some significant threats – poor management practices such as high grading forestry, loss of forest land to urban and suburban development, impacts of invasive species on biodiversity, changes in forest habitat and function due to climate change, and potential increases in harvesting of biomass for renewable energy production.

Of the total land area in Massachusetts, over 3 million acres or approximately 60% of the state is forested according to the statewide MassGIS 2005 database. 2.2 million acres are unprotected private forest land and 900,000 are protected forest land - including lands in government and land trust ownership and forested lands with conservation or agricultural preservation restrictions. DCR manages 290,000 acres of land in state forests and an additional 18,000 acres of DCR urban parks. DCR's Division of Water Supply has responsibility for an additional 105,000 acres of water supply lands that are managed in collaboration with the Massachusetts Water Resources Authority. The Commissioner of DCR, in his/her role as State Forester, also regulates forest management practices on private lands.

In May 2009, the Harvard Forest in Petersham hosted a one-day Forum on the Forests of Massachusetts, designed to inform the launching of the Forest Futures Visioning Process by providing background information on the history, present conditions and possible future scenarios for the state's forests. The presentations addressed the historical and present day context on the role of Massachusetts as a leader in land conservation, stressing the long string of conservation innovations.

An overview of the history of DCR forests was provided highlighting that a portion of our publicly owned forest land was acquired with the goal of rehabilitating areas that had been poorly managed or abused. This legacy of past management continues to have an impact on the condition and management of these forests today. Also described were the long-term changes that have occurred in the state's forests. Change has been a constant in the state forests, due both to natural and human disturbances, however, recent development activities are different from past activities in that they have resulted in major losses of forests through a process of 'hard' (*i.e.*, relatively permanent) deforestation that is very difficult to reverse. During later meetings in the process the TSC heard presentations or hosted panel discussions where information was provided on carbon sequestration/carbon management/climate change, silviculture, biodiversity, habitat, forests and water, old growth forests, and recreation. (Annex 4).

Technical Steering Committee Framing Questions

As a major steward of Massachusetts forests, DCR launched the Forest Futures initiative to create a renewed vision for Massachusetts forests; describe the role of DCR in advancing that vision; and recommend a set of strategies and guidelines for carrying out DCR's role, with an emphasis on DCR's State Parks and Forests. Development of such a stewardship vision raises a wide array of scientific, economic and public policy issues that are best addressed through a process that first articulates a long-term vision for the forests of Massachusetts and then defines the role of DCR lands within this vision. Only in that context will it be possible to understand whether DCR's planning and implementation approaches are designed to effectively promote the vision.

With this in mind, early on in the process, the Technical Steering Committee proposed to frame its deliberations and recommendations around the following six issues.

1. **Vision for Massachusetts Forests:** What is the desired long-term condition and areal extent of Massachusetts forests? What types of ecosystem services should these forests provide and what are the desired levels of these services?

2. **Role of DCR Parks and Forests in Advancing the Vision**: Do DCR forests possess certain attributes that suggest a greater management emphasis on some ecosystem services rather than others? If so, which ones should be emphasized?

3. **Strategies, Policies, and Guidelines for DCR Forest Management at its Forests and Parks**: Do current DCR land management and stewardship policies strongly advance the vision? If not, what changes does DCR need to make to successfully implement the vision?

4. **DCR Policies for Private Forest Lands and Other DCR Lands:** What actions should the DCR Commissioner, either in his/her role as Commissioner or as State Forester, be taking to promote a fully-integrated vision across DCR forested land under his jurisdiction and private lands in the state?

5. **DCR Public Process:** As DCR implements the vision, are changes needed in how it manages consultations with and outreach to the public?

6. **Legislative Mandates:** Is the vision for managing DCR lands consistent with the department's legislative mandates? If not, what kinds of legislative, organizational, or regulatory changes will be required for implementation of the vision?

7. **Resources and Timing:** Broadly speaking, does DCR have the resources needed to implement the vision? If not, what new resources will be required? What is a reasonable time frame for DCR to make substantial progress in implementing the vision?

The Technical Steering Committee's final report and recommendations address each of these questions, providing a vision, principles and guidance designed to inform DCR's future land management policies for forest lands.

Annex 3

Forest Futures Technical Steering Committee

Committee Chair - Lisa Vernegaard is the Conservation Group Chief of Staff and Director of Planning and Stewardship at The Trustees of Reservations. She has been with the Trustees since 1992. In her current role she oversees the preparation and coordinated implementation of strategic plans, regional work plans, and property management plans; facilitates collaboration, coordination, and communication across the organization's mission-based divisions; directs The Trustees' resource protection team; leverages resource protection efforts to advance a wide array of strategic initiatives, including engagement, volunteerism, diversity, fundraising, and advocacy; and serves as a representative and leader for The Trustees in developing and advancing innovative approaches to a variety of stewardship challenges. Previously she was director of Planning and Stewardship and Director of Planning and Ecology. In those positions she led planning efforts, develop policies and guidelines and led the effort to develop a strategic plan for The Trustees working with the Board, staff and community to develop a compelling vision for the future of the organization. She has experience with a wide variety of ecological issues including rare and endangered species management, habitat restoration, ecosystem dynamics and fire ecology. She holds a Masters in Forest Science from the Yale School of Forestry, has worked for the City of Baltimore and, in the 1980's, the Metropolitan District Commission.

Members

Matthew R. Burne is a wildlife conservation expert, with a particular focus on vernal pool habitats and the diversity of wildlife that depend upon these small forest pools. He holds a Bachelor of Science from the University of Massachusetts Amherst in Environmental Science, for which he focused on wetland ecology. He received a Master of Science, also from UMass Amherst, in Fish and Wildlife Conservation with thesis research focused on the biodiversity of vernal pools. He spent ten years with the Massachusetts Natural Heritage & Endangered Species Program as their Vernal Pool Ecologist and as an assistant environmental reviewer, evaluating impacts to rare wetlands wildlife habitat for Wetlands Protection Act, MEPA, and MESA permits. He also co-founded the Vernal Pool Association, a non-profit educational organization focused on promoting the study, appreciation, and protection of vernal pools conducting workshops throughout Massachusetts and the New England region, and the materials developed are used widely in the region and have reached a national audience. In addition, he manages a social network of vernal pool enthusiasts with over 500 members from throughout the United States and Canada.

Heather Clish has worked at the Appalachian Mountain Club (AMC) for eight years, the first six as the Director of Trails and Riverways Stewardship and now with responsibility for AMC's Conservation Policy program and Trails and Recreation Management Program. In addition to trail building and maintenance, the programs she oversees include trail corridor monitoring, user education, trail protection, on-site management of user impacts, and the promotion of policies that ensure high-quality recreational experiences. She led the development of AMC's Recreation Management Plan for the Katahdin Ironworks property, a 37,000-acre tract in the Maine Woods. She collaborated with foresters on the

Forest Management Plan as it relates to recreation goals. She continues to lead the work to develop and manage recreation opportunities, including hiking, mountain biking, skiing, snowmobiling, pond and river access, as well as camping opportunities. This work includes working closely with AMC's foresters to protect recreational aesthetics when forestry operations are in the vicinity trails and other recreational focal points. She is familiar with tools and concepts such as the Recreational Opportunity Spectrum and Limits of Acceptable Change.

Kathleen E. Connolly, Esq. is counsel at the firm of Murtha Cullina, LLP**.** Her practice is in the areas of land use and environmental law, with an emphasis on conservation, land trusts, farming and forestry, in addition to general zoning permitting. She represents the Farm Bureau, the Department of Agricultural Resources, and many farmers and foresters throughout the Commonwealth. Prior to joining Murtha Cullina, she was a principal with the firm of Kopelman and Paige, practicing municipal law for almost 16 years. In that capacity, she represented conservation commissions throughout the Commonwealth. She currently serves as special counsel to conservation commissions, and continues to serve on the Board of Directors of the Massachusetts Association of Conservation Commissions. She was recently elected an Officer of MACC. She is a coauthor and co-editor of the MACC revised Handbook for conservation commissions. In 2007-2008 she served on the Massachusetts Easement Defense Subcommittee of the Massachusetts Land Trust Coalition, together with Irene Del Bono of EEA, and several other attorneys who worked on revising the EEA Model Conservation Restriction. She has conducted seminars and workshops of legal issues related to conservation. Prior to becoming an attorney, she was Director of Education and Outreach for the New England Office of the U.S. Environmental Protection Agency in the Public Affairs Division.

Andy Finton, for the past 9 years, has served as the Director of Conservation Science for the Massachusetts Chapter of The Nature Conservancy (TNC). His responsibilities include overseeing the application of current scientific information to define and assess conservation goals and threats, and implement conservation strategies to preserve globally significant species and ecosystems. In this role, he has worked extensively with state agency staff on a variety of forest protection and management issues and projects. He also has significant experience in assessing and prioritizing forest land protection and management strategies across the northeast and Massachusetts, and in collaborating with academic partners to inform planning and implementation, including among others: serving as Project Manager for the Massachusetts 'Biomap: Guiding Land Conservation for Biodiversity in Massachusetts'; collaborating with the University of Massachusetts, Amherst to conduct a statewide connectivity assessment to inform land protection and restoration priorities; developing a network of 70 forest practitioners from across The Nature Conservancy's Eastern Region to share best practices. Throughout his career, he has applied The Nature Conservancy's objective, science-based approach to identify priorities that serve as a basis for decision making and seeking common ground among diverse stakeholders. He brings TNC's global, national, and regional perspectives to the assessment of DCR forest values and uses.

William R. Moomaw, Professor of International Environmental Policy at The Fletcher School, Tufts University. In addition to his work 'on- the-ground' at Tufts, Professor Moomaw traveled to Nanjing, China in October to present *Cascading Costs: An Economic Nitrogen Cycle* to academics, government officials and scientists participating in the 3rd International Nitrogen Initiative (INI) Conference. Professor Moomaw also continues to serve as an author for the Intergovernmental Panel on Climate Change (IPCC) and is currently writing on the topic of

‘Renewable Energy and Climate Change’ for next IPCC report. Along with his climate change work in the international arena, Moomaw comes full circle and returns to local action through his work as founder of Tufts Climate Initiative (TCI) to become perhaps the first university to have a climate mitigation policy. Through TCI, Tufts became ‘the first university to join the Chicago Climate Exchange (CCX)®, a greenhouse gas emission reduction and trading pilot program for emission sources and offset projects. Tufts joins other members who are making voluntary, but binding commitment to reduce their emissions of greenhouse gases by four percent below the average of their 1998-2001 baseline by 2006, the last year of the pilot program’.

Keith Ross, for the past three years, part of Keith’s work has been with the authors of the Harvard Forest publication *Wildlands and Woodlands, A Vision for the Forests of Massachusetts* working on pilot projects to advance that vision's goal of protecting 1.5 mil acres in Massachusetts. Since 2003 he has been *Senior Advisor* in the Real Estate Consulting Group of LandVest, providing conservation advisory services for non-profits, land trusts, foundations, and private families in the US. From 1994 through 2003 he was *Director of Land Protection, Vice President* – New England Forestry Foundation, where he built and directed Land Conservation program in New England protecting over 1.2 million acres of working forest lands through gifts and purchase. Pioneered landscape conservation through Hull/Peck project in southern New England (50 parcels, 8,400 acres) and the Pingree Forest Partnership in northern Maine (762,192 acres). Responsible for fundraising over $45 million in 9 years to protect land and fund staff. He was *Founder, Executive Director* – Mount Grace Land Conservation Trust from 1986 to 1994. Wrote & published booklet Conservation and Land Use Planning with Massachusetts' Chapter 61 Laws. His prior work includes *Land Protection Specialist* – Massachusetts Audubon Society Lincoln, Massachusetts 1987-94 (Halftime position); *President, Chief Forester* – Atlantic Forestry,1979 to 1990; and as Assistant County Forester for DEM 1978, and as a logger, sawmill worker, surveyor.

Bruce Spencer was born, raised, and educated in Massachusetts. His family owned forest which I started to manage at an early age for firewood and timber. The forests, especially those surrounding the city of New Bedford’s water supply, were his favorite places. He attended UMass in Amherst and received a BS and MS in Forest Management and Watershed Management, respectively. In 1965 while completing master’s work at UMass, he was offered a job, as watershed forester, for the MDC at Quabbin Reservation. Initially he was the only forester, but over time the forestry staff was increased to 8 for all four watersheds under the care and control of MDC. This became his life’s work for the next 41 years, until his retirement in 2006. The main emphasis of his work was the development of a watershed protection forest through the commercial application of silviculture. Over a 1000 timber sales were completed during his tenure. Through conferences and travel with the Society of American Foresters and the Forest Guild he has studied forest issues in New England and across the northern United States. He has traveled extensively in Europe studying forest management. He has been a member of the Massachusetts Forestry Committee and participated with the current changes to Chapter 132, specifically a subcommittee to rewrite the silvicultural guide lines. He is an active member with the Massachusetts Association of Professional Foresters and the Massachusetts Wood Producers Association. Since retirement he has continued his interest in forest issues with the Forest Guild, as a consultant, and with volunteer work with various non-profits. He has been managing a jointly owned 150-acre woodlot, on which he recently gifted a conservation restriction to the Franklin Land Trust. Because he does his own logging, he holds a license to harvest forest products as well as a license to practice forestry in the Commonwealth.

Thomas Stevens teaches at the graduate and undergraduate level at the University of Massachusetts Amherst Department of Resource Economics. Over the past five years he has focused primarily on the use and development of non-market valuation techniques such as contingent valuation and conjoint analyses. He uses these methods to estimate the economic value of several wildlife species, ecosystem management of forests, wetlands, and recreation on public lands. He is particularly interested in studying the sensitivity of value estimates to the type of methodology used and implications for decision-making and natural resource damage assessments. His outreach activities include work with several federal and state agencies including the USDA Forest Service, the U.S. Fish and Wildlife Service and the EPA. He is a member of the Science Peer Review Committee for the Massachusetts Executive Office of Environmental Affairs and a member of a regional research project (W-133) 'Benefits and Costs Transfer In Natural Resource Planning'. He has written numerous papers, articles, monographs and book chapters.

Charles Thompson holds an MS in Forestry and has a diverse employment experience in professional forestry, including academia (taught timber harvesting, silviculture, forest management at the university level, conducted research on environmental impacts of logging); field forestry (for both industrial and non-industrial landowners); state agency (evaluation/promotion of forest products economic development opportunities); non-profit organization (Exec. Director, New England Forestry Foundation); timberland investment sector (oversight of operations, inventory, silviculture on 2.3 million acres in 17 states, 5 US forest regions and most forest types; staff specialist on forest policy). He is a co-author of the book *Working with your Woodland* which is used in courses at most northeastern universities offering forestry courses; former president of Massachusetts Forestry Association; initiator of first Massachusetts Forest Forum (early 1990s); board of directors, Center for Northern Woodlands Education (*Northern Woodlands* magazine); experience with FSC, SFI, and AFF forest certification standards and programs; currently serve on Operating Committee, Renewable Energy, and Climate Change work groups of National Alliance of Forest Owners. His areas of expertise include: silviculture, timber harvesting (systems, impacts, economics, best management practices); forest management planning on both small and large forests; third party certification systems; federal and state regulation of forest management; ecosystem/ non-traditional markets for forests (including conservation easements, wind power, wetland mitigation banking, renewable energy).

Joseph Zorzin has been a forester in western Massachusetts for 36 years working in every type of forest in the region. His clients include a Guild Model Forest (the only one in this Massachusetts).

Annex 4

Presentations to the Technical Steering Committee

Date of Presentation	Topic of Presentation	Presenter Name(s)
May 18, 2009	Massachusetts' Role as a Conservation Leader: Some Historical and Present-Day Context	Jim Levitt, Director, Program on Conservation Innovation, Harvard Forest, Harvard University
May 18, 2009	Land Use History and the Potential Futures of Massachusetts Forests	David Foster, Director of Harvard Forest, Harvard University and David Kittredge, State Extension Forester and UMass Forestry Professor Bob O'Connor, EOEEA (moderator)
May 18, 2009	Ensuring the Integrity of Massachusetts Forests	Andy Finton, The Nature Conservancy
May 18, 2009	Ownership and Use of Massachusetts Forests	David Kittredge, UMass Amherst
May 18, 2009	Potential Changes to the Forests of Massachusetts in an Era of Global Warming	Hector Galbraith, Manomet Institute and Robert Perschel, Forest Guild
May 18, 2009	The Ecological Conditions and Management Status of DCR Forests in Massachusetts	Bill Hill and David Goodwin, DCR
June 9, 2009	Silviculture	Matt Kelty, UMass
June 9, 20009	Carbon Sequestration/Storage	John Gunn, Manomet
June 23, 2009	DCR Current Forestry Vision and Implementation	William Hill, DCR State Lands Manager Gary Davis, General Counsel DCR and Bob O'Connor, EOEEA
June 23, 2009	Values of DCR Forest Lands	E. Heidi Ricci, Senior Policy Analyst, Massachusetts Audubon Society
June 23, 2009	Past Practices and Accountability	Claudia Hurley, Friends of Robinson State Park and Jane Winn, Berkshire Environmental Action Team
June 23, 2009	Impact of Forestry and Private Lands	Fred Heyes
June 23, 2009	Biomass Briefing	Mary Booth
June 23, 2009	Importance of Reserves	Mike Ryan, and Michael Kellett
June 23, 2009	Legal Issues	Dave Gafney
September 16, 2009	Early Successional Habitat	Dave King, US Forest Service
September 16, 2009	Drinking Water Supply Protection	Thom Kyker-Snowman, DCR Division of Water Supply Protection

September 16, 2009	Biodiversity	Taber Allison, Massachusetts Audubon Society
September 16, 2009	Carbon Storage/Sequestration	Bill Keeton, University of Vermont
September 16, 2009	Good Silviculture	Mark Ashton, Yale University
October 14, 2009	Balancing Public Values – Biodiversity, Recreation and Silviculture	Dave Loomis, UMass
October 14, 2009	Identifying Exceptional Forest Sites for Patch Reserve Designation	Bob Leverett, Eastern Native Tree Society
October 14, 2009	Selection Process for Existing Reserves and Straw Proposals for Additional Reserves	Andy Finton
October 14, 2009	AGS Reserves Work Group Criteria for Large Reserve Designation and Implications for Forestry on Managed Woodlands	Mike Ryan and Heidi Ricci

Annex 5

Background Analyses of Land Allocations to the Three Zones

This annex presents background information on the various analyses that informed the TSC's recommended allocations to the forest reserve, parkland, and woodland zones. In general, there is no one-to-one mapping from these scenarios to the TSC's allocations. The recommended allocation ranges in Recommendation 4 represent the professional judgments of the TSC members, as informed by the scenarios presented here.

1. Nature Conservancy Forest Reserves Scenarios

Two forest reserve scenarios were assembled by the Massachusetts Nature Conservancy (TNC) at the request of the TSC. In TNC's view, ideal reserve design should be based on the principles of conservation biology that direct us to develop a connected network of large, well-buffered forest reserves with minimal internal fragmentation. Because the current arrangement of public lands does not represent an ideal reserve network, ultimately reserves will need to be designated through a combination of existing protected lands and additional land protection. Therefore, building on the approximately 40,000 acres currently designated as large reserves on DSPR land, DCR can achieve forest reserve goals through a combination of the following: (1) designation of additional DCR lands to the acres of DCR land already in reserves, plus (2) addition of new acquisitions of adjacent lands and incorporation of adjacent already protected lands held by other organizations (see table).

The first TNC scenario represents a minimum set needed to insure the ecological integrity of a reserve system. At a *minimum*, an adequate system of forest reserves requires (1) creating reserves in two additional forest blocks representing ecological settings that were not included in the original selection process; and (2) increasing the size of all reserves to at least 15,000 acres each, a reasonable estimate of the minimum viable size for forest reserves in Massachusetts. The minimum proposal would result in 77,000 acres of large forest reserves on existing DCR lands. The overall goal would be to have a minimum of approximately 166,000 acres of large forest reserves under management by DCR and other agencies and organizations (11 reserves each approximately 15,000 acres or larger).

Table A-1
Minimum Reserve Scenario

	ELU	Rank	Total Reserve	DFW/ *DWSP* reserve	DSPR reserve	DSPR+	Total DSPR	Acq POS**	Total	2 ea
Chalet	8	8	6,798	6,469	329	316	645	6,886	14,000	X
Greylock	9	1	8,328		8,328	3,598	11,926	3,074	15,000	X
Mt. Washington	9	2	7,020	738	6,282	754	7,036	7,226	15,000	X
East Branch (Westhampton)	4a	15	2,103	684	1,419	465	1,884	12,432	15,000	X
Wendell	4b	12	0		0	4,121	4,121	10,879	15,000	X
Cunningham Pond	6a	x	3,029	3,029	0	2,717	2,717	9,254	15,000	X
Otis	6b	13	482		482	653	1,135	12,865	14,000	X
Mohawk	7a	4	7,097		7,097	11,035	18,132	182	18,314	X
Middlefield-Peru	7a	7	3,165		3,165	3,228	6,393	8,607	15,000	X
Freetown-Fall River Matrix	A2a2	5	0		0	10,636	10,636	4,364	15,000	X
Myles Standish Matrix (Plymouth)	B2b2	3	11,140	167	10,973	1,071	12,044	2,789	15,000	X
Total			49,162	11,087	38,075	38,595	76,670	78,557	166,314	

** not including 11,087 acres of DFW and DWSP reserves

The second TNC scenario allocates more land to reserves, thereby providing greater redundancy across ecological settings in the state. The expanded reserve proposal, increasing redundancy of large intact blocks (*i.e.*, the number of large reserves within each ecological setting), and increasing representation (*i.e.*, including relatively smaller forest blocks representing ecological settings in eastern Massachusetts where 15,000 blocks do not occur) would increase the total acres devoted to forest reserves to 116,000. If this reserve network were enhanced through additional land protection and incorporation of existing protected forest lands managed as reserves, the strategy would ultimately result in a reserve system totaling approximately 237,000 acres.

Table A-2
Expanded Reserves Scenario

	ELU	Rank	Total Reserve	DFW/ *DWSP reserve*	DSPR reserve	DSPR+	Total DSPR	Acq POS**	Total	2 ea
Chalet	8	8	6,798	6,469	329	316	645	6,886	14,000	X
October Mountain**	8	10	1,383		1,383	14,300	15,683	0	15,683	X
Greylock	9	1	8,328		8,328	3,598	11,926	3,074	15,000	X
Mt. Washington	9	2	7,020	738	6,282	754	7,036	7,226	15,000	X
New Marlborough**	4a	14	350		350	2,729	3,079	11,921	15,000	X
East Branch (Westhampton)	4a	15	2,103	684	1,419	465	1,884	12,432	15,000	X
Wendell**	4b	12	0		0	4,121	4,121	10,879	15,000	X
Warwick**	4b	19	0		0	10,721	10,721	4,279	15,000	X
Royalston**	6a	22	0		0	14	14	14,986	15,000	X
Cunningham Pond	6a	x	3,029	3,029	0	2,717	2,717	9,254	15,000	X
Otis	6b	13	482		482	653	1,135	12,865	14,000	X
Mohawk	7a	4	7,097		7,097	11,035	18,132	182	18,314	X
Middlefield-Peru	7a	7	3,165		3,165	3,228	6,393	8,607	15,000	X
Freetown-Fall River Matrix**	A2a2	5	0		0	10,636	10,636	4,364	15,000	X
Myles Standish Matrix (Plymouth)	B2b2	3	11,140	167	10,973	1,071	12,044	2,789	15,000	X
3 Easten Reserves**						10,000	10,000		10,000	
Total			50,895	11,087	39,808	76,359	116,166	109,744	236,997	

** = Potential new additions to the original 9

** not including 11,087 acres of DFW and DWSP reserves

The results for the two scenarios are summarized in Table A-3 below.

Table A-3 DCR Division of State Parks and Recreation Land						
Scenario	**# of Reserves**	**Existing Reserves**	**New Designations**	**Total 2010**	**Acquisition + other lands***	**Total 2020-2030**
Minimum	11	38,000	39,000	**77,000**	89,000	**166,000**
Enhanced Redundancy	19	40,000	76,000	**116,000**	121,000	**237,000**

*Other lands include other municipal, state, federal, NGO, and land trust lands that are protected and designated as forest reserves within forest blocks. The MA Division of Fisheries and Wildlife has already designated approximately 8,000 acres as forest reserves, and the DCR Division of Water Supply Protection has designated over 3,000 acres. NGOs such as Mass Audubon, TTOR, and TNC manage thousands of acres as forest reserve. ,Forest reserve land acquisition goals are in keeping with historical land protection rates.

** The AGS workgroup identified 18,000 acres of 'large reserves' in eastern MA. This analysis assumes 10,000 of those designated as large reserves with no additional acquisition.

Additional Background Material
On Large Forest Reserve Selection

A project of the MA Executive Office of Environmental Affairs, Department of Conservation and Recreation, and Division of Fisheries and Wildlife

Draft summary produced by
The Nature Conservancy, February 2006 (revised 8-09)

Summary

In 2004, Massachusetts state agencies obtained green certification on over 500,000 acres of forest lands owned and managed by the Commonwealth. The green certification process requires the identification of ecological reserves on a portion of state forest lands, including areas representative of Massachusetts forest types at scales in accordance with the natural disturbance patterns of the region. Based on The Nature Conservancy's forest conservation experience and success, including planning, protection and management, the state agencies requested The Nature Conservancy's data and analyses to assist in the reserve selection process. See EOEA 2005, Hawthorne et al 2005, and DCR 2005 for more information.

Large forest reserves were selected based on the premise that reserves should be located where there remain large patches of forest interior, providing the best opportunities for implementation of successful and functional forest reserves. Additionally, large forest reserves should represent the variety of forest types still occurring in large blocks in Massachusetts. These forest attributes were mapped by identifying forest blocks, stratifying these by their dominant geophysical features, and within each, defining high integrity forest cores. The resulting potential large forest reserve areas were then ranked based on eleven criteria defined by a working group of forest experts. The resulting analysis defined eight areas within the state, within which state lands form the nucleus of large reserves, pending approval by agency leaders.

This document is intended to outline the process used by The Executive Office of Environmental Affairs and its agencies to locate and designate large forest reserves.

Reserve Selection Process

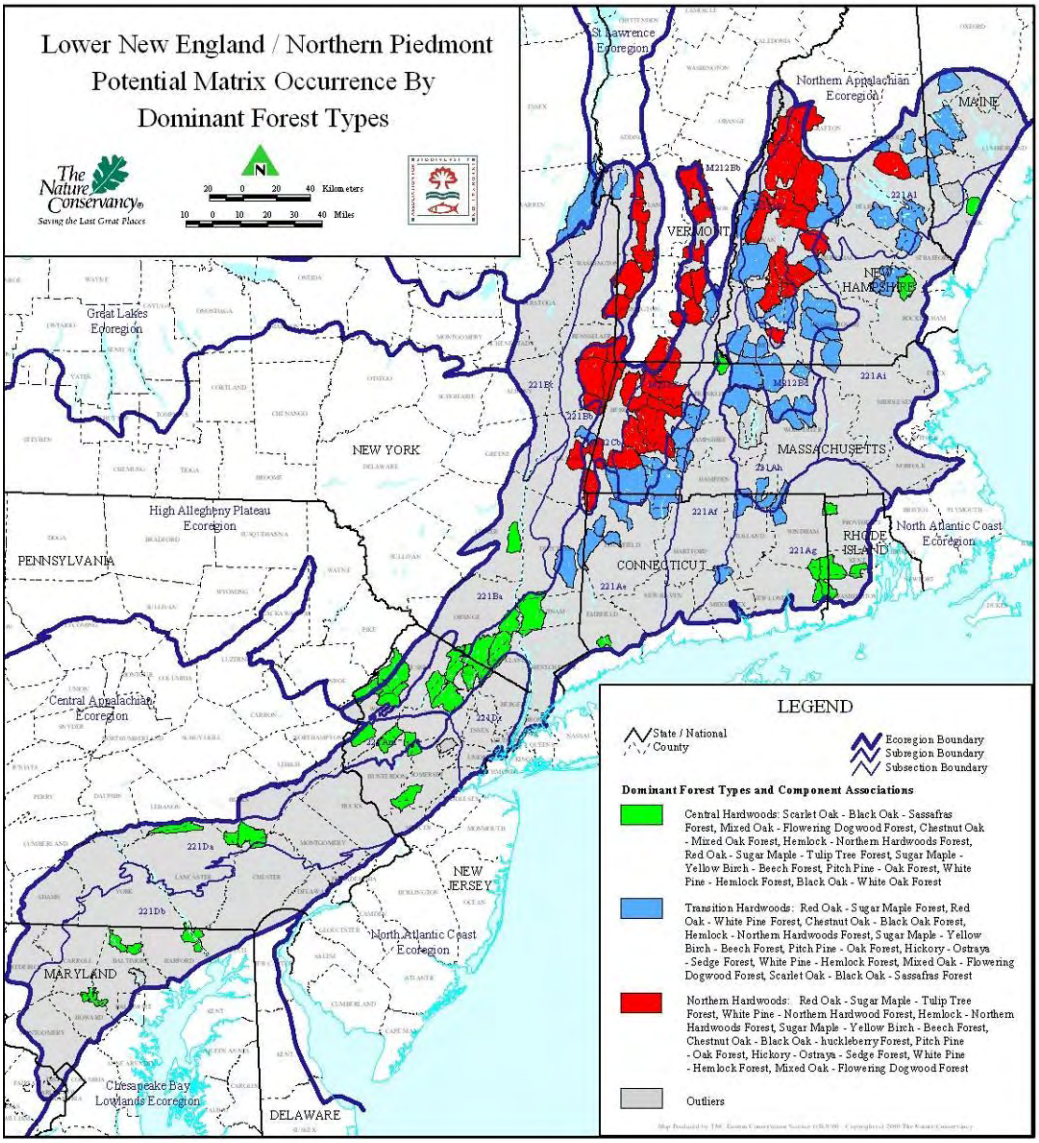
In 2004, Massachusetts state agencies obtained green certification on over 500,000 acres of forest lands owned and managed by the Commonwealth, addressing forest management for social, economic, and ecological values. This approach has been well documented by the agencies (EOEA 2005, Hawthorne et al 2005, DCR 2005).

As a condition of green certification, the state designed a process to select ecological reserves on a portion of these forests, including areas representative of Massachusetts' forest types, at scales appropriate for the natural disturbance patterns of the region. The state agencies requested The Nature Conservancy's data and analyses to assist in the locating and designing this large reserve system.

To facilitate the reserve selection process, The Nature Conservancy (TNC) relied upon a science-based planning system employed for decades by TNC and partner organizations around the world. To accomplish conservation at multiple scales, The Conservancy has completed

ecoregional plans for each of 64 ecoregions in the United States and in numerous ecoregions outside of the US (Anderson 2003). Massachusetts is included in two of these ecoregions, the Lower New England-Northern Piedmont and the North Atlantic Coast, both of which extend from Maine to the mid-Atlantic states. Ecoregional planning identifies critical conservation areas designed to conserve biodiversity targets of global significance including occurrences of rare species, exemplary natural communities, high-integrity forests and exemplary aquatic systems.

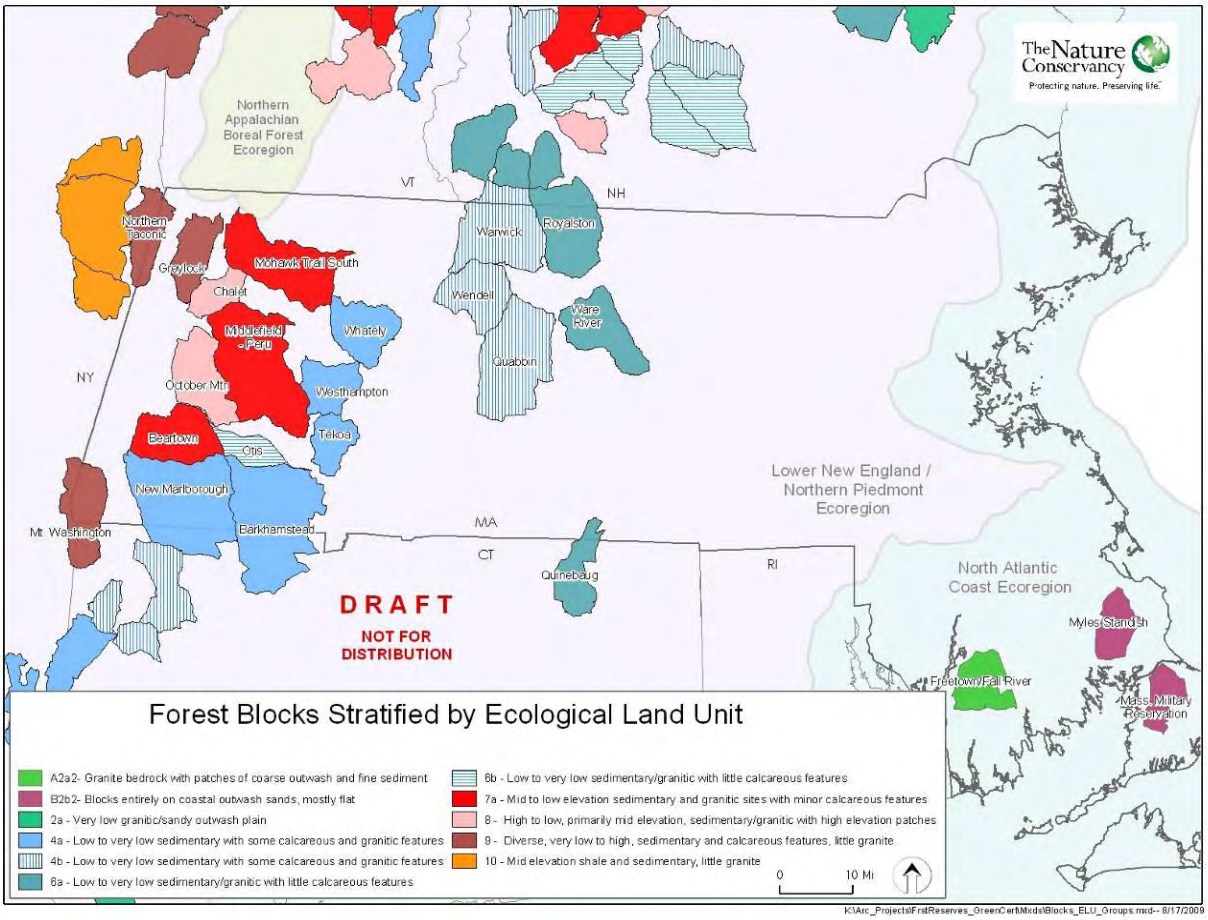
In 2000, The Nature Conservancy analyzed large forest blocks in the Lower New England-Northern Piedmont Ecoregion (Anderson and Bernstein 2003). After a GIS roads analysis, informed by expert review and on-the-ground information, TNC selected 128 blocks as a working set within which to set priorities (Map 1).



Map 1. Forest Blocks in the Lower New England-Northern Piedmont Ecoregion

Important forest sites were initially selected based on viability, defined as blocks of forest at least 15,000 acres, with low road density, few bisecting roads, and large areas of interior habitat. This size threshold is based on Anderson and Bernstein (2003) and Anderson (1999), which defined the minimum dynamic area required to 1) maintain resistance and resilience in the face of severe disturbances, and 2) provide source habitat for interior dependent breeding species.

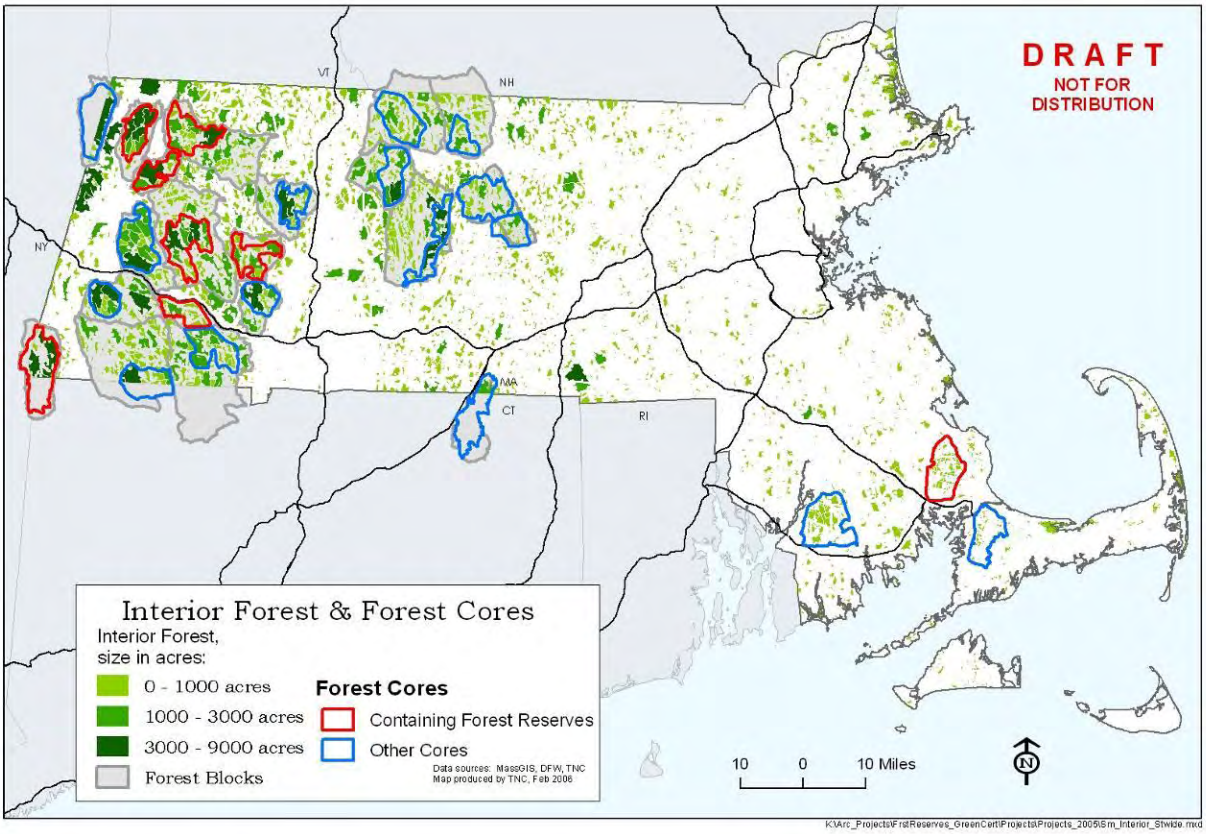
Once potential forest blocks were selected, the blocks were stratified based on their predominant elevation, geology, and topography as represented by 'Ecological Land Unit' (ELU) groups (Anderson and Bernstein 2003). There are 20 such blocks in the Lower New England-Northern Piedmont ecoregion portion of Massachusetts (7 of which straddle the state line) (Map 2). Three additional blocks were subsequently identified in the North Atlantic Coast portion of the state, bringing the total set in Massachusetts to 23. This set of 23 blocks represents eight different ELU types.



Map 2. Forest blocks in Massachusetts, stratified by Ecological Land Unit.

After blocks were identified, forest core areas were delineated to focus reserve designation decisions within each block, based on forest interior habitat. The core analysis was designed by a team including staff from the Division of Fisheries and Wildlife and The Nature Conservancy.

Local roads were buffered 100m, state roads and developed areas were buffered 300m, and interstate highways were buffered 1000m, based on Forman and others (2003). These buffered areas were then overlaid on forest cover data. The result was a data layer representing true forest interior, those areas minimally affected by the impacts of roads and development (Map 3). Forest cores were delineated with coarse outlines around concentrations of large forest interior patches within each of the 23 forest blocks.



Map 3. Forest Interior and forest cores in Massachusetts

Once forest cores were defined, EOEA convened a team of forest experts to evaluate each of the 24 core areas (one of the 23 blocks had two alternative cores within it), based on a suite of 11 criteria (Figure 1). This allowed the selection of a representative subset of cores with the highest biodiversity value. At least one core area was selected within each of the eight Ecological Land Unit block types found in Massachusetts, with the exception that two ELU types had two reserves each, based on high ranking, and one ELU type had no large reserve, based on feasibility. The selection resulted in nine forest cores, representing seven ELU types. State forest lands within these nine cores were then considered a working set of potential large forest reserves.

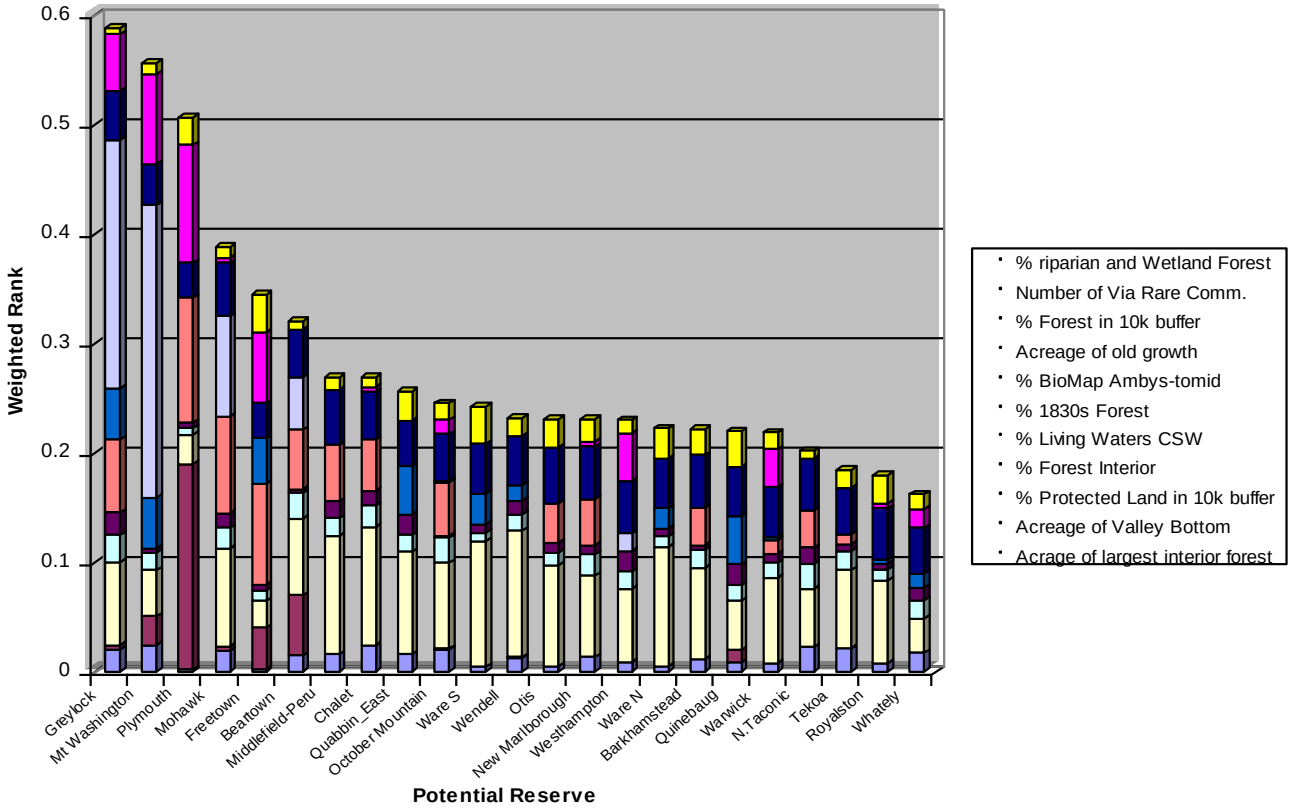
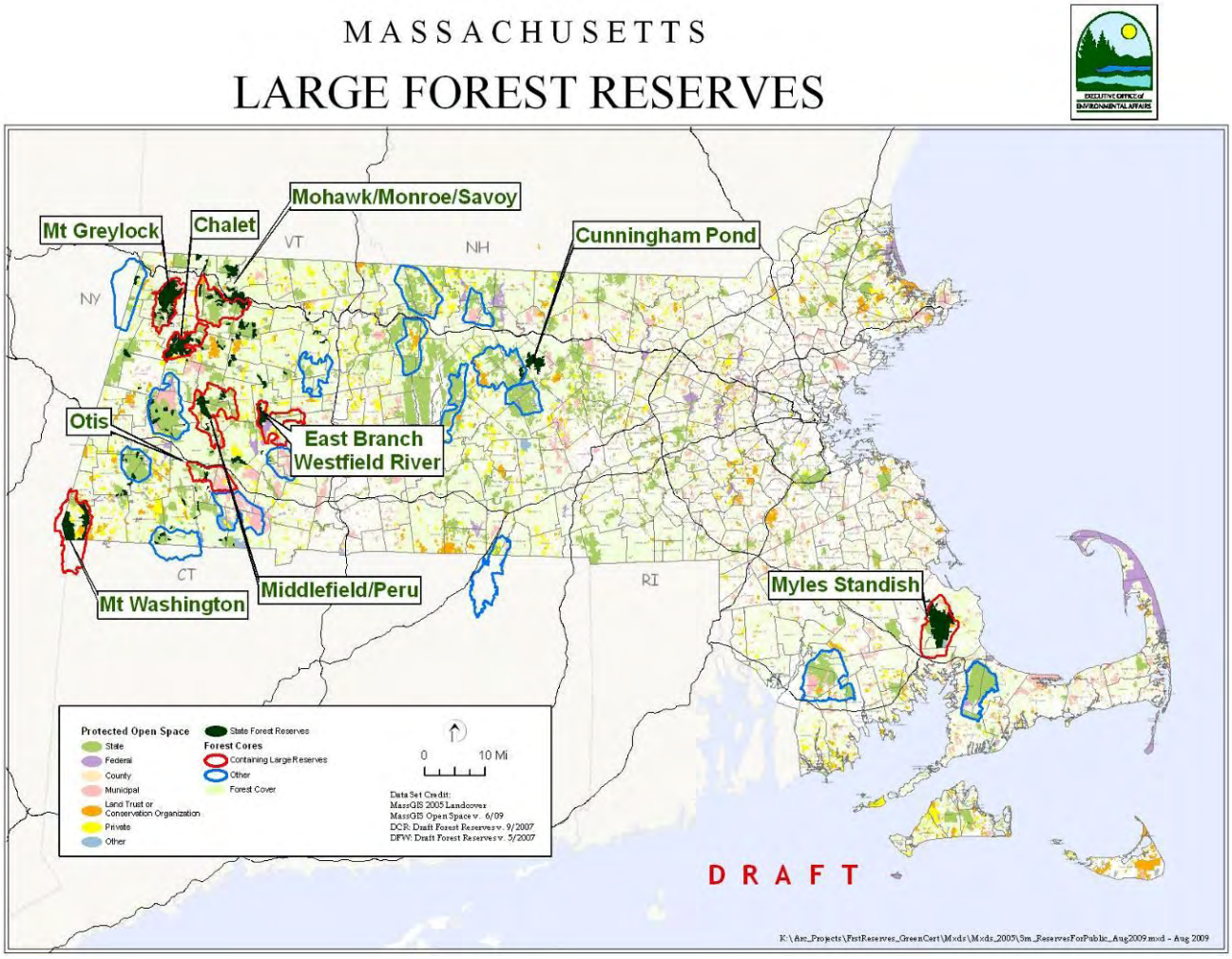


Figure 1. Forest working group large reserve rankings.

The large reserve selection process resulted in a network of nine large forest reserves (Map 4), identified as Greylock, Mohawk/Monroe/Savoy, Mount Washington, Chalet, Middlefield-Peru, Westhampton, Otis, Ware River, and Plymouth. These nine reserves represent approximately 50,000 acres, or 10%, of state forest lands, and less than 2% of Massachusetts' approximately 3,000,000 acres of forest. Of the three forest management agencies, the acres break out approximately:

- DCR, Division of State Parks and Recreation 38,000 acres
- DFG, Division of Fisheries and Wildlife 11,000 acres
- DCR, Division of Water Supply Protection 4,000 acres

These systematically and objectively identified potential large reserves have been reviewed by the public through public meetings and formal comment periods, and approved by agency leadership. The design and implementation of a network of large forest reserves is a key element of certification, and a milestone for Massachusetts state agencies. This network of large reserves will be complemented by small reserves designed around unique features such as rare species habitat, old growth forest remnants, vernal pools, and unique and exemplary natural communities.



Map 4. Potential Large Forest Reserves in Massachusetts.

Literature Cited:

Anderson, M.G. 2003. Ecoregional conservation: A comprehensive approach to conserving biodiversity. Unpublished report, The Nature Conservancy, Northeast & Caribbean Division, Boston, MA. 6p.

Anderson, M.G. 1999. Viability and spatial assessment of ecological communities in the Northern Appalachian Ecoregion. Ph.D. dissertation. University of New Hampshire, Durham. 224p.

Anderson, M.G. and S.L. Bernstein (editors). 2003. Planning methods for ecoregional targets: Matrix-forming ecosystems. Unpublished report, The Nature Conservancy. Conservation Science Support, Northeast & Caribbean Division, Boston, MA. 20p.

Department of Conservation and Recreation. 2005. Central Berkshire District Forest Resource Management Plan. Unpublished report. 112p.

Executive Office of Environmental Affairs. 2005. A landscape assessment and forest management framework for the Berkshire Ecoregions in Massachusetts. Unpublished report.

Forman, R.T.T. and others. 2004. Road Ecology: Science and Solutions. Island Press, Washington, D.C.

Hawthorn, B.H., A.M. Kittredge, J.J. Scanlon, and J. DeNormandie. 2005. Draft Resource Management Plan: Berkshire Highlands Forest Management Zone. Unpublished report, MA Division of Fisheries and Wildlife. Westb

2. AGS Reserves Workgroup Recommended Forest Reserves and Parklands Scenario

PROPOSED MASSACHUSETTS STATE PARKLAND AND RESERVE SYSTEM
Submitted to Forest Futures Visioning Process

SUMMARY

	Total Acres	Parkland Acres in Reserves	Net Parklands & Reserves Acres	% of Total DSPR	% of Total State Lands
DSPR Parks and Reservations Proposed as Parklands	77,762	15,854	61,908	20%	11%
DSPR State Forests Within "Sprawl Frontier" Proposed as Parklands	45,942	36,501	9,441	3%	2%
DSPR Lands Proposed as Large Reserves	176,024		176,024	57%	31%
GRAND TOTAL			*247,373*	*80%*	*43%*

PROPOSED PARKLANDS

Parklands would combine two existing land categories into one consistently managed category.

- **State Parks and Reservations Proposed for Parkland Designation.** All existing DCR state parks, reservations, historic sites, trails, recreation areas, greenways, and other park areas — **77,762 acres (61,908 net acres not in Large Reserves).**
- **State Forests within Massachusetts Audubon Eastern Massachusetts 'Sprawl Frontier.'**[1]Eastern Massachusetts state forests in areas of high population density or projected high population growth — **45,942 acres (9,441 net acres not in Large Reserves).**
- ***TOTAL: 123,704 acres (71,349 net acres not in Large Reserves)***

State Parks and Reservations Proposed for Parkland Designation

			Total Acres
Area	**Municipality**	**Total Acres**	**Minus Reserves**
Abigail Adams SP	Weymouth	9	9
Acushnet Cedar Swamp SR	Dartmouth, New Bedford	*2,100*	
Alewife Brook Parkway	Cambridge	3	3
Alewife Brook Reservation	Arlington, Belmont, Cambridge, Somerville	136	136
Allied Veterans Rink	Everett	3	3
Amelia Earhart Dam	Somerville	2	2
Ames Nowell SP	Abington	610	610
Anthony A. Laconte Rink	Medford	1	1
Appalachian Trail Corridor	Dalton, etc.	1,473	1,473
Ashland SP	Ashland	473	473
Ashmere Lake SP	Hinsdale, Peru	205	205
Ashuwillticook Rail Trail	Adams, Cheshire, Lanesborough	8	8
Baker Chocolate Factory	Boston	0	0
Balance Rock SP	Lanesborough	137	137
Baldpate Pond SP	Boxford, Georgetown	81	81
Bare Hill Pond Public Access	Harvard	2	2
Barefoot Brook Flood Control Site	Marlborough, Northborough	57	57

[1] See *Losing Ground: Beyond the Footprint*, Massachusetts Audubon, 2009, p. 7
http://www.massaudubon.org/PDF/advocacy/losingground/LosingGround_print.pdf

Barnstable Fire Tower	Barnstable	6	6
Bash Bish Falls SP	Mount Washington	424	424
Bates Memorial SP	Hancock	423	423
Bay Circuit Trail	Rowley	84	84
Bay Farm	Kingston	*7*	*7*
Beaver Brook Reservation	Belmont, Waltham	47	47
Beaver Brook North Reservation	Belmont, Lexington, Waltham	243	243
Belle Isle Marsh SR	Boston	188	188
Birmingham Parkway	Boston	3	3
Blackstone River SP	Northbridge	1,066	1,066
Blue Hills Reservation	Braintree, Canton, Milton, Quincy, Randolph	6,387	6,387
Boad Ramp	Hopkinton	1	1
Borderland SP	North Easton	1,776	1,776
Boston Harbor Islands SP	Hingham	335	335
Bradley Palmer SP	Topsfield	740	740
Breakheart Reservation	Saugus, Wakefield	652	652
Bristol Blake SP	Norfolk	141	141
Brook Farm Historic Site	West Roxbury	179	179
Buffumville RA	Oxford	400	400
Buttery Brook Memorial Pool	South Hadley	1	1
C.M. Gardner SP	Huntington	85	85
Callahan SP	Framingham	1,027	1,027
Camp Meigs	Boston	3	3
Campbell's Falls SP	Southfield	138	138
Cape Cod Rail Trail	Eastham	55	55
Carroll Parkway	Lynn	4	4
Carroll Holmes RA	Shutesbury	42	42
Cass Rink and Pool	Boston	3	3
Castle Island SP	Boston	22	22
Cedar Swamp	Hopkinton	9	9
Charles River Reservation	Boston, Cambridge, Dedham, Natick, etc	862	862
Chelsea Creek Beach	Boston	0	0
Chicopee Memorial SP	Chicopee	562	562
Chicopee State Boat Ramp	Chicopee	29	29
Cleaveland Farm	Boxford, Rowley	181	181
Cochituate SP	Cochituate	872	872
Columbia Road Park	Boston	0	0
Commercial Point	Boston	10	10
Conley and Tenean SP	Boston	1	1
Connecticut River Greenway	Deerfield, etc.	1,031	1,031
Connell Rink and Pool	Weymouth	7	7
Connery Rink	Lynn	2	2
Constitution Beach	Boston	82	82
Cushing Memorial SP	Scituate	7	7
Cutler Park SR	Dedham, Needham, Newton	745	745
Daniel S Horigan Memorial Rink	Auburn	5	5
Dealtry Pool	Watertown	1	1
Deer Hill SR	Cummington, Plainfield	350	350
Delaney Flood Control Site	Bolton, Boxborough, Harvard, Stow	656	656
Demarest Lloyd SP	Dartmouth	216	216
Dennis Fire Tower	Dennis	7	7
Dighton Rock SP	Berkley	98	98
Dorothy Quincy House	Quincy	2	2
Dugger Park	Medford	3	3
Dunn Pond SP	Gardner	132	132
Ellisville Harbor SP	Plymouth	97	97

Elm Bank SR	Dover, Wellesley	175	175
Emmons-Horrigan-O'Neill Rink	Boston	2	2
Fall River Heritage SP	Fall River	14	14
Fire Tower-Essex	Essex	7	7
Flynn Rink	Medford	10	10
Forest Grove	Waltham	26	26
Fort Phoenix Beach SR	Fairhaven	28	28
Fort Revere SP	Hull	6	6
Foss Park	Somerville	15	15
Fountain Pond Park	Great Barrington	250	250
Franklin Park Zoo	Boston	83	83
Fresh Pond Parkway	Cambridge	1	1
Furnace Brook Parkway	Quincy	52	52
Gallivan Blvd	Boston	1	1
Gardner Heritage SP	Gardner	0	0
Gardner Veterans Skating Rink	Gardner	5	5
Gore Street (Simoni) Rink	Cambridge, Somerville	1	1
Governor Thomas Dudley Park	Billerica	11	11
Great Brook Farm SP	Carlisle	909	909
Groton Fire Tower	Groton	1	1
Halibut Point SP	Rockport	55	55
Hammond Pond Parkway	Brookline	26	26
Hammond Pond Reservation	Newton	60	60
Hampton Ponds SP	Southampton, Westfield	47	47
Hancock Woods	Boston	48	48
Havey Beach	Boston	17	17
Hawksnest SP	Harwich	236	236
Hemlock Gorge SR	Needham, Newton, Wellesley	16	16
Henry Graf Rink	Newburyport	14	14
High Head	Truro	1	1
Holland Memorial Pool	Malden	1	1
Holyoke Heritage SP	Holyoke	7	7
Holyoke Range SP	Amherst, etc.	3,729	3,729
Hop Brook Flood Control Site	Northborough	161	161
Hopkinton SP	Hopkinton	1,244	1,244
Horse Pond Flood Control Site	North Brookfield	176	176
Horseneck Beach SR	Westport Point	536	536
Hull Shore Reservation	Hull	4	4
J. Elwell Conservation Area	Northampton	2	2
John H. Thomas Memorial Pool	Springfield	2	2
John J. Janas Memorial Rink	Lowell	5	5
John J. Thompson Memorial Pool	Ludlow	1	1
Johnny Appleseed SP	Leominster	206	206
Jordan Marsh Service Center	Quincy	81	81
Joseph Sylvia State Beach	Edgartown, Oak Bluffs	117	117
Jug End SR	Egremont	19	19
Kelly Rink	Boston	5	5
Kennedy Park	Cambridge	5	5
Kings Beach	Swampscott	3	3
Kittredge Flood Control Site	North Brookfield, Spencer	120	120
Krug Sugarbush SP	Chesterfield	88	88
Lake Lorraine SP	Springfield	3	3
Lamberton Brook Flood Control Site	Warren, West Brookfield	13	13
Laurel Lake Boat Ramp	Lee	0	0
Lawrence Heritage SP	Lawrence	0	0
Lawrence Riverfront SP	Lawrence	46	46

Leo Martin Golf Course	Weston	31	31
Linden and Town Line Brook	Revere	11	11
Leominster State Pool	Leominster	6	6
Lowell Heritage SP	Lowell	60	60
Lowell Park	Cambridge	8	8
Lt. Col. E.J. Higgins Mem Pool	Lawrence	3	3
Lynn Fells Parkway	Melrose, Stoneham	3	3
Lynn Fishing Pier	Lynn	0	0
Lynn Heritage SP	Lynn	4	4
Lynn Shore Reservation	Lynn	22	22
Lynn Woods Reservation	Saugus	49	49
Malibu Beach	Boston	27	27
Marine Park	Boston	11	11
Mary O'Malley Waterfront Park	Chelsea	20	20
Massasoit SP	East Taunton	1,181	1,181
Maudslay SP	Newburyport	482	482
McCrehan Pool	Cambridge	2	2
McMorrow Playground	Boston	6	6
Medfield Charles River SR	Dover, Medfield, Millis	476	476
Medford Boat Club	Arlington	1	1
Melrose Pool	Melrose	2	2
Middlesex Fells Reservation	Malden, Medford, Melrose, Stoneham, etc.	2,391	2,391
Moore SP	Paxton	738	738
Moose Hill Food Control Site	Leicester, Spencer	112	112
Morrissey Blvd	Boston	21	21
Morton Street	Boston	32	32
Mother Brook Reservation	Boston, Dedham	45	45
Museum of Science	Boston, Cambridge	81	81
Mount Everett SR	Egremont, Mount Washington, Sheffield	1,653	1,653
Mount Greylock SR	Adams, Cheshire, Lanesborough, etc.	*12,728*	
Mount Sugarloaf SR	Deerfield	533	533
Mount Tom SR	Holyoke	1,967	1,967
Myles Standish Monument Sr	Duxbury	30	30
Mystic Lakes	Medford, Winchester	96	96
Mystic River Reservation	Arlington, Everett, Medford, Somerville	327	327
Mystic Valley Parkway	Arlington, Winchester	24	24
Mystic View Road	Everett	2	2
Nahant Beach/Lynn Shore Res	Nahant	67	67
Nantasket Beach SP	Hull	39	39
Nashua River Rail Trail	Ayer, Dunstable, Groton, Pepperell	57	57
Naskatucket Bay SR	Mattapoisett	211	211
Natural Bridge SP	North Adams	44	44
Neponset River Reservation	Boston, Canton, Dedham, Milton	1,407	1,407
Neponset Valley Parkway	Boston, Milton	20	20
New Charles River Dam	Boston	7	7
Newton Lower Falls Park	Newton, Weston	9	9
Nickerson SP	Brewster	1,953	1,953
North End (Steriti) Rink	Boston	3	3
Norwottuck Rail Trail	Northampton	62	62
Oak Island Boat Ramp	Shrewsbury	6	6
Old Harbor Reservation	Boston	142	142
Pattens Cove	Boston	10	10
Peddocks Island	Hull	193	193
Pemberton Park	Lawrence	5	5
Pilgrim Memorial SP	Plymouth	61	61
Pilgrim Memorial Monument	Plymouth	11	11

Pine Swamp	Ipswich	5	5
Plum Island SR	Newburyport	64	64
Purgatory Chasm SR	Sutton	100	100
Quashnet Woods SR	Mashpee	32	32
Quincy Shore Drive	Quincy	8	8
Quincy Shore Reservation	Quincy	88	88
Quinsigimond SP	Worchester	38	38
Red Bridge SP	Ludlow, Palmer, Wilbraham	101	101
Red Wing Bay	Needham	2	2
Regional Headquarters-Central	Amherst, Hadley	14	14
Regional Headquarters-West	Pittsfield	80	80
Rehoboth Fire Tower	Rehoboth	1	1
Revere Beach Parkway	Everett, Revere	91	91
Revere Beach Reservation	Revere	84	84
River Street	Weston	2	2
Riverdale Park	Dedham	6	6
Riverwalk Park	Waltham	10	10
Robert M. Devine Rink	Boston	4	4
Robinson SP	Agawam, West Springfield, Westfield	*1,025*	
Ross Flood Control Site	Berlin	187	187
Roxbury Heritage SP	Roxbury	3	3
Rumney Marsh Reservation	Revere, Saugus	737	737
Rutland SP	Rutland	286	286
Salisbury Beach SP	Salisbury	355	355
Sandy Point SP	Ipswich	134	134
Saugus River Reservation	Saugus	8	8
Scusset Beach SR	Bourne, Sandwich	79	79
Sen. P. Eugene Casey Mem Pool	Milford	3	3
Sherrin and Dale St. Playground	Boston	8	8
Short Beach	Revere, Winthrop	5	5
Silver Brook N Flood Control	Sandisfield	160	160
Silver Brook S Flood Control	Sandisfield	53	53
Skinner SP	Hadley	843	843
South Beach SP	Edgartown	106	106
South Cape Beach SP	Mashpee	460	460
South New England Trail	Bellingham, Blackstone	33	33
South Watuppa Boat Ramp	Fall River	7	7
Southwest Corridor	Boston	0	0
Spot Pond Brook	Malden, Melrose	13	13
Squantum Point Park	Quincy	46	46
Stodders Neck	Hingham	26	26
Stone Zoo	Stoneham	15	15
Stony Brook Reservation	Boston, Dedham	613	613
Sucker Brook Flood Control	West Brookfield	68	68
Tenean Beach	Boston	10	10
Tisbury Fire Tower	West Tisbury	1	1
Toohig Park	Boston	2	2
Town Brook Flood Control	Braintree	54	54
Town Line Brook	Everett, Malden, Revere	12	12
Triphammer Woods	Hingham	26	26
Tyler Flood Control	Marlborough, Northborough	98	98
Vaughn Square	Melrose	1	1
Veterans Memorial Park	Medford	3	3
Veterans Memorial Rink	Franklin	4	4
Veterans Memorial Rink	Somerville	2	2
Victory Road Park	Boston	7	7

Village Falls Park	Needham	2	2
Wachusett Mountain SR	Princeton, Westminster	2,289	2,289
Wahconah Falls SP	Dalton, Hinsdale, Windsor	48	48
Walden Pond SR	Concord, Lincoln	335	335
Waquoit Bay NERR	Falmouth, Mashpee	110	110
Ware River Rail Trail	Phllipston, Templeton	33	33
Washburn Island SP	Falmouth	286	286
Watson Pond SP	Taunton	11	11
Webb Memorial SP	Weymouth	59	59
Wells SP	Sturbridge	1,238	1,238
West Island SR	Fairhaven	350	350
West Roxbury Parkway	Boston	36	36
Western Gateway Heritage SP	North Adams	8	8
Whitehall SP	Hopkinton	837	837
Willis Fishing Pier	Lynn	0	0
Wilson Mountain Reservation	Dedham	15	15
Wilson Mountain Reservation	Dedham	200	200
Winthrop Beach	Winthrop	18	18
Wompatuck SP	Hingham	3,584	3,584
Other-Parks and Recreation	Granby, Kingston, Royalston, Whately	136	136
Other-Urban Parks	Boston, etc.	22	22
	State Parks and Reservations Total	***77,762***	***61,908***

State Forests within Massachusetts Audubon eastern Massachusetts 'sprawl frontier.'

			Total Acres
Area	**Municipality**	**Total Acres**	**Minus Reserves**
Barnstable	Barnstable	51	51
Billerica	Billerica	168	168
Boxford	Boxford	*1,045*	
Brewster	Brewster	26	26
Carlisle	Carlisle	22	22
Cleaveland Farms	Boxford	*184*	
Manuel F. Correllus	Martha's Vineyard	*5,214*	
Douglas	Douglas	*5,318*	
Franklin	Franklin	777	777
Freetown-Fall River	Fall River, Freetown	*5,470*	
Georgetown-Rowley	Georgetown	*1,041*	
Harold Parker	North Reading	*3,329*	
Kingston	Kingston	167	167
Lowell-Dracut	Dracut, Lowell, Tyngsboro	1,000	1,000
Marlboro-Sudbury	Marlboro, Sudbury	300	300
Myles Standish	South Carver	*12,410*	
Nantucket	Nantucket	137	137
Raynham	Raynham	15	15
Rehoboth	Rehoboth	140	140
J. Harry Rich	Groton	508	508
Shawme-Crowell	Sandwich	700	700
Sutton	Sutton	1,459	1,459
Upton	Upton	2,660	2,660
West Bridgewater	West Bridgewater	246	246
Willowdale	Ipswich	*2,490*	
Wrentham	Wrentham	1,064	1,064
	Eastern State Forests to Parklands-Total	**45,942**	***9,441***

	PROPOSED PARKLANDS-GRAND TOTAL	123,704	***71,349***
	% OF TOTAL DSPR LAND	41%	***23%***

PROPOSED LARGE RESERVES - SUMMARY *[Existing reserves in italics]**

Area	EPA Ecoregion*	DSPR Existing	DFW Existing	DSPR/DFW Total Existing	DSPR Proposed Additions	DSPR TOTAL PROPOSED	TSC DSPR "Expanded" Scenario	TSC DSPR "Expanded" Scenario Gap	Other Potential State Addns	TOTAL POTENTIAL RESERVES
Chalet	58c	*329*	*6,469*	*6,798*	1,495	1,824	645	-1,179	3,971	12,264
October Mountain	58c				16,323	16,323	15,683	-640	2,345	18,668
Mount Greylock	58e	*8,328*	*0*	*8,328*	8,029	16,357	11,926	-4,431	489	16,846
Mount Washington	58a	*6,282*	*738*	*7,020*	371	6,653	7,036	383	2,085	9,476
New Marlborough	58d				10,550	10,550	3,079	-7,471	722	11,272
E Br Westfield (Westhampton)	59a58e	*1,419*	*684*	*2,103*	5,344	6,763	1,884	-4,879	6,766	14,213
Wendell	58g				8,000	8,000	4,121	-3,879	643	8,643
Warwick	58g				13,632	13,632	10,721	-2,911	2,831	16,463
Royalston	58g				868	868	14	-854	6,188	7,056
Cunningham Pond (Ware)	59h	*0*	*3,029*	*3,029*	0	0	2,717	2,717	16,058	19,087
Otis	58d	*482*	*0*	*482*	4,275	4,757	1,135	-3,622	2,215	6,972
Beartown	58d				11,389	11,389	0	-11,389	0	11,389
Mohawk	58c	*7,097*	*0*	*7,097*	22,560	29,657	18,132	-11,525	0	29,657
Middlefield-Peru	58e, 58c	*3,165*	*0*	*3,165*	4,106	7,271	6,393	-878	10,411	17,682
Quinebaug	59c				5,318	5,318	0	-5,318	1,000	6,318
Freetown-Fall River	59e				10,949	10,949	10,636	-313	3,541	14,490
North Shore	59f				8,089	8,089	10,000	1,911	5,761	13,850
Martha's Vineyard	84a				5,214	5,214	0	-5,214	0	5,214
Myles Standish (Plymouth)	84a59e	*10,973*	*167*	*11,140*	1,437	12,410	12,044	-366	2,871	15,448
TOTAL		**38,075**	**11,087**	**49,162**	**137,949**	**176,024**	**116,166**	**-59,858**	**67,897**	**255,008**
% OF TOTAL DSPR LANDS						**57%**	**38%**	**-13%**		**45%**
% OF TOTAL STATE LANDS						**31%**	**20%**	**-11%**		**45%**

* Potential reserves not included: Barkhamsted, Catamount, North Taconic, Pittsfield, Quabbin, Wachusett, Whately.

Ecoregions based on:

Level III and IV Ecoregions of Massachusetts, Rhode Island, and Connecticut, U.S. EPA 1999 ftp://ftp.epa.gov/wed/ecoregions/ma_ct_ri/ma_ct_ri_eco.pdf

LARGE RESERVES SELECTION CRITERIA

DCR's Initial Reserve Criteria

The current Commonwealth of Massachusetts Reserve system is a step in the right direction. However, the system falls far short of what is needed. One of the major problems is that the criteria used by the committee to rank and select potential Reserves were incomplete. The criteria were:

- Acreage of old growth
- Acreage of valley bottom land
- % protected land in surrounding area
- % 1830s forest
- Number of viable rare communities
- % forest cover in surrounding area
- % BioMap ambystomid habitat
- % riparian and wetland forest
- % forest interior
- Acreage of largest interior forest
- % living waters critical supporting watershed

Proposed Additional Reserve Criteria

The Reserves Working Group revisited the process and added the following criteria:

- Large blocks of contiguous forest, which should be ranked highest because the integrity and value of natural areas increases significantly with size;
- Opportunities for connectivity for plant and animal movement between large core Reserve blocks;
- Existing and potential connectivity with protected areas in adjacent states;
- Potential for expansion through private land acquisition or by other conservation partners such as land trusts or municipalities;
- Substantial representation within each ecoregion;
- Redundancy, geographically dispersed Reserves to distribute risk;
- Anticipation of future impacts of climate change on existing ecosystems; and
- Contribution to carbon sequestration and mitigation of climate change.

SELECTION CRITERIA APPLIED TO PROPOSED LARGE RESERVES

CHALET [Expansion of existing Reserve]

- High number of rare or threatened communities.
- Significant riparian and wetland forest.
- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Mount Greylock, Mohawk, and Middlefield-Peru (proposed) Reserves, as part of a corridor between Vermont and Connecticut.
- Opportunity for expansion with lands of other state agencies.
- High elevations to accommodate species movement in response to climate change.
- Significant blocks of mature forest to sequester carbon and mitigate climate change.

OCTOBER MOUNTAIN

- One of the largest blocks of contiguous, relatively unfragmented forest in state.
- Opportunity for connectivity with Middlefield-Peru (proposed) and Beartown (proposed) Reserves, as part of a corridor between Vermont and Connecticut.
- Largest block of public land in ecoregion.
- Significant blocks of mature forest to sequester carbon and mitigate climate change.

MOUNT GREYLOCK [Expansion of existing Reserve]

- High number of rare or threatened communities.
- One of the largest blocks of contiguous, relatively unfragmented forest in state.

- Opportunity for connectivity with Chalet and Mohawk Reserves, as part of a corridor between Vermont and Connecticut.
- Largest block of public land in ecoregion.
- One of only two proposed reserves in ecoregion.
- High elevations to accommodate species movement in response to climate change.
- Significant blocks of mature forest to sequester carbon and mitigate climate change.

MOUNT WASHINGTON [Expansion of existing Reserve]

- Connectivity with adjacent New York, Vermont and Connecticut protected areas, as part of a corridor between Vermont and Connecticut.
- One of only two proposed reserves in ecoregion.
- High elevations to accommodate species movement in response to climate change.

NEW MARLBOROUGH

- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Beartown (proposed) and Otis Reserves, as part of a corridor between Vermont and Connecticut.
- Opportunity for expansion with lands of other state agencies.

EAST BRANCH WESTFIELD RIVER [Expansion of existing Reserve]

- Significant riparian and wetland forest.
- Includes Westfield National Wild and Scenic River corridor.
- Complex of several smaller areas that create one large core area.
- Only Reserve in ecoregion.
- Opportunity for connectivity with Chalet, October Mountain (proposed), and East Branch Westfield River Reserves, as part of a corridor between Vermont and Connecticut.
- Opportunity for major expansion with lands of other state agencies.

WENDELL

- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Royalston (proposed) Reserve and adjacent natural areas in Vermont, as part of Vermont-to-Connecticut corridor.
- Opportunity for expansion with lands of other state agencies.

WARWICK

- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Royalston (proposed) Reserve and adjacent natural areas in Vermont, as part of Vermont-to-Connecticut corridor.
- Opportunity for expansion with lands of other state agencies.

ROYALSTON

- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Wendell-Warwick (proposed) Reserve and adjacent natural areas in Vermont, as part of Vermont-to-Connecticut corridor.
- Opportunity for major expansion with lands of other state agencies.

CUNNINGHAM POND (WARE) [Maintenance of existing Reserve]

- Significant riparian and wetland forest.
- One of only two Reserves in ecoregion
- Opportunity for major expansion with lands of other state agencies.

OTIS [Expansion of existing Reserve]

- High number of rare or threatened communities.
- Significant riparian and wetland forest.
- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Beartown (proposed) and New Marlborough (proposed) Reserves, as part of a corridor between Vermont and Connecticut.
- Opportunity for expansion with lands of other state agencies.
- Diverse habitats to adapt to climate change.

BEARTOWN

- One of the largest blocks of contiguous, relatively unfragmented forest in state.
- Opportunity for connectivity with October Mountain (proposed) and New Marlborough (proposed) Reserves, as part of a corridor between Vermont and Connecticut.
- Significant blocks of mature forest to sequester carbon and mitigate climate change.

MOHAWK [Expansion of existing Reserve]

- Significant old growth forest.
- High number of rare or threatened communities.
- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Mount Greylock and Chalet Reserves, as part of a corridor between Vermont and Connecticut.
- Significant blocks of mature forest to sequester carbon and mitigate climate change.

MIDDLEFIELD-PERU [Expansion of existing Reserve]

- Significant riparian and wetland forest.
- Significant rivers and streams.
- Complex of several smaller areas that create one large core area.
- Opportunity for connectivity with Chalet, October Mountain (proposed), and East Branch Westfield River Reserves, as part of a corridor between Vermont and Connecticut.
- Opportunity for major expansion with lands of other state agencies.

QUINEBAUG

- Opportunity for connectivity with adjacent conservation lands in Connecticut, as part of a corridor between Vermont and Connecticut.
- Largest block of public land in ecoregion.
- Only Reserve in ecoregion
- Opportunity for expansion with lands of other state agencies.

FREETOWN-FALL RIVER

- High number of rare or threatened communities.
- Significant riparian and wetland forest.
- Largest block of public land in ecoregion.
- One of only two Reserves in ecoregion.
- Opportunity for major expansion with lands of other state agencies.

NORTH SHORE

- Significant riparian and wetland forest.
- Complex of several smaller areas that create one large core area.
- Includes largest tracts of public land in ecoregion.
- Only Reserve in ecoregion.
- Opportunity for connectivity between inland protected areas and Atlantic Coast.
- Opportunity for major expansion with lands of other state agencies and private lands.

- Regenerating forest that can absorb and sequester carbon to mitigate climate change

MARTHA'S VINEYARD (CORRELLUS)

- High number of rare or threatened communities.
- One of only two Reserves in ecoregion.
- Largest block of state public land on a Massachusetts island.
- Significant opportunity for restoration of damaged ecosystems.

MYLES STANDISH (PLYMOUTH)

- High number of rare or threatened communities.
- One of the largest blocks of contiguous, relatively unfragmented forest in state.
- Largest block of public land in ecoregion.
- One of only two Reserves in ecoregion, and the only one on the mainland.

3. DCR Analyses of Parklands and Woodlands

DCR Landscape Zoning Preliminary Analysis

At the request of the Technical Steering Committee, DCR undertook a preliminary analysis to estimate the impact of applying the landscape zoning system the TSC has developed to its approximately 308,000 acres of land within the forest and park system (Divisions of Urban and State Parks). For this effort, an initial set of data was compiled and underlying assumptions established to generate an 'order of magnitude' assessment of the acreage that would likely be allocated as Parklands, Reserves and Woodlands. In order to complete a final landscape zoning allocation for these lands, DCR would refine this methodology and factor in some data inputs that were not available for this analysis. In addition, consistent with the TSC's working draft recommendations, DCR would seek public input prior to establishing a finalized landscape zoning allocation for its properties.

The following describes the methodology used to identify each of the three landscape zones and project the allocation of each.

Parklands
Three different factors informed the analysis to project parkland allocation – Trails Density, Proximal Household Density and Intensive Use Areas. Trails density was selected using the assumption that areas with denser trails networks would likely offer the values associated with parklands, particularly human use. The inclusion of proximal household density was based on the assumption that properties surrounded by a greater density of households would also have qualities that are consistent with parkland characteristics.

Trails Density was calculated using a Geographic Information Systems (GIS) moving windows analysis. This type of analysis determined the trail density, using a 30-meter grid, for all DCR properties within the Divisions of State and Urban Parks. Using the grid data, areas of high trails density were added to Parklands if they were greater than 10 acres. Entire properties were placed in the Parklands category if 50% or more of their land area contained high density trails.

For Proximal Household Density, a 2.5 mile buffer was drawn around each property and using census data the number of households within that buffer was estimated. The number of households was divided by the acres of the buffered area to obtain the density of households near the property. The third factor considered in projecting Parklands allocation was identifying areas known to be intensive use areas such as: beaches, campgrounds and visitor centers.

Trails density, proximal household density and intensive use area data were compiled into one data layer. The validity of the analysis was 'ground truthed' by selecting a few sites that were known to meet the criteria for Parklands and confirming that the analysis had successfully identified them for inclusion in that zone. It should be noted that trails and intensive use area data was incomplete for one region of the state, and a projection for that area was made based on partial data and anecdotal information about the uses of properties in that region.

The analysis projected a total of approximately 81,000 acres would be categorized as Parklands. However, this includes some acreage that is also included in the possible acreage for large scale reserves, as noted below.

Reserves

In its discussions about forest reserves, the TSC has examined the Nature Conservancy's (TNC) analysis of large scale forest blocks and used this work as a foundation for its recommendations. At the time the TSC requested that DCR perform this preliminary landscape zoning analysis, its discussions were focusing on a scenario to establish 15,000-acre forest reserves in eleven ecological settings, referred to as 'scenario 2.' For this analysis, DCR assumed that this scenario would be implemented and that a total of approximately 83,000 acres would be designated as forest reserves, which includes the large and small scale reserves designated to date in nine core areas on DCR Division of State Parks property as well as significant areas of new reserves. However, there was some overlap between this acreage and the acreage identified in the parklands analysis – specifically areas of intensive recreational use. For the purposes of this analysis, these approximately 17,000 acres were categorized as parklands. Therefore, the total combined acreage of Reserves and Parklands is approximately 147,000 acres.

Woodlands

Mapping appropriate areas for Reserves and Parklands is actually a simpler process than that for Woodlands. Reserves are based on large, unfragmented forest blocks representing different ecological attributes and more localized sensitive resource areas. Parklands are based on forests (and other lands) close to population areas with intensive usage and existing facilities. Forests appropriate for Woodlands possess a wider range of characteristics to support multiple values mentioned in this report such as providing large scale demonstration forests, restoring late successional habitat, managing water supply forests, providing models for carbon sequestration, supporting locally grown forest products, and raising forestry standards on private forests. Elsewhere in the TSC's recommendations, the appropriate amount of forest to support these values is discussed.

DCR developed the Active Forest Management Model to project the allocation of Woodlands (see Exhibit DCR-1). The purpose of this model is to identify the best DCR Division of State Parks lands for Active Forest Management (AFM) (Division of Urban Parks holdings were assumed to be Parkland and not suitable as Woodlands). The model is summarized here and a full description is attached. DCR utilized several new data layers that have recently been completed such as the prime forest soils, forest type and stocking inventory, past forest management areas, fire risk modeling and distance of all DCR forests to local sawmills. The assumption is that excluding areas that have a high priority for Reserves or Parklands, DCR forests that have the following attributes are appropriate for forest management: productive soils, priority forest types and stocking levels, a consistent history of and access road system for forest management, proximity to public roads and highways, proximity to local sawmills and a history of past defoliation from various insect/disease/disturbance complexes. DCR felt that three criteria (past forest management, proximity to public roads and proximity to local mills) were key criteria and they were weighted more heavily. The Active Forest Management Model maps and rates DCR forests for these attributes and calculates a score based on the combination of attributes each 'pixel' contains.

The AFM output is grouped into three categories, based on DCR's assessment of how appropriate the forests are for active forest management: Limited Forest Management Opportunities (score values 0 to 41 - 71,505 acres), Important Forest Management Opportunities (values >41 to 56 - 71,155 acres) and Optimal Forest Management Opportunities (values >56 to 117 - 68,979 acres). DCR feels that forests within the Important and Optimal categories are very appropriate for forest management. These categories total 140,134 acres or 46% of the Division of State Parks holdings.

We compared the acreage identified by the AFM model with the acreage included in 'scenario 2' for reserves and found that the modeled value of 'scenario 2' was compatible with the AFM output.

Landscape Zone Allocation

This preliminary landscape zone analysis was conducted using Geographic Information Systems and MASSGIS data layers. Parklands, Reserves and Woodlands were analyzed, identified and mapped and determinations made about overlapping acreage. Reserves data was mapped assuming the designation of a total of approximately 83,000 acres of new and existing acres (under 'scenario 2' as noted above). DCR used The Nature Conservancy's data layer to identify the acreage and properties that would be designated as additional reserves under this scenario.

Parklands were identified based on an analysis of the parkland criteria noted above. There were 17,000 acres overlapping between Parklands and Reserves that included intensive use recreation areas and these were categorized as Parklands. The result was approximately 81,000 acres of Parklands. Next, land use data was used to identify non-forested areas (salt marsh. grassland, barren areas, open water, etc.) and remove these acres from the remaining acreage. These non-forested acres were not assigned a zone and will need to be revisited later using a more detailed, facility level analysis. The balance of forested acres were assigned to the Woodlands category, totaling approximately 140,000 acres.

This analysis provides an informative high level sense of how the three landscape zones would likely play out across DCR's Urban and State Parks properties, based on the assumptions outlined in this document. DCR will review the TSC's final recommendations once they are completed and determine the appropriate next steps to take regarding landscape zoning. In addition, DCR includes as Exhibit DCR-2 additional information, collected through a DCR survey of other states, on the percentage of state-owned lands on which commercial timber harvesting is restricted.

Exhibit DCR-1

Active Forest Management Model

The purpose of this model is to identify the best DCR DSPR lands for Active Forest Management (AFM).

Input Shapefiles and Grids for Priority AFM Ranking:

1. Prime Forest Soils
2. Vegetation Suitability Classification
3. Past Management
4. Distance from Roads
5. Fire Risk Areas
6. Distance to Sawmills
7. Defoliation Areas

1. Prime Forest Soils

Assumption – forest soils with higher productivity are more appropriate forAFM

Value:

10 - Prime 1
8 - Prime 2
6 - Prime 3 and 3W
4 - Statewide and SW
2 - Local and LW
0 - Unique

* missing Franklin and Plymouth County data

2. Vegetation Suitability Classification for AFM

Assumption –certain forest types of different size and stocking classes are more appropriate for AFM than others

Value of 10 for:

Major Groups	1 White/Red Pine
	2 Hemlock
	3 Spruce-Fir
	5 Northern Hardwoods
	6 Birch – Red Maple
	7 Oak
or Sub Types	SR Red Spruce
	SF Spruce-Fir
	SN Norway Spruce – White Spruce Plantation

	PP Pitch Pine PO Pitch Pine - Oak PS Pitch Pine – Scrub Oak SO Scrub Oak
and Stocking	1 High (A or > 120 ft^2/ac) 2 Medium (B/A or 60 – 120 ft^2/ac)
and Size	4 Small Sawtimber (10.9 – 15” mmd) 5 Large Sawtimber (> 15” mmd) 9 Uneven Aged (3 or more age classes)

Value of 5 (same except for):

Stocking	3 Low (C/B or 40 - 60 ft^2/ac) 4 Sparse (< 40 ft^2/ac)

Value of 1 (same except for):

Stocking	1 High (A or > 120 ft^2/ac) 2 Medium (B/A or 60 – 120 ft^2/ac) 3 Low (C/B or 40 - 60 ft^2/ac) 4 Sparse (< 40 ft^2/ac)
and Size	1 Seedling (< 1” dbh, < 10’ tall) 2 Sapling (> 1” – 4.6” dbh, < 30’ tall) 3 Pole (> 4.6 – 10.9” mmd)
and SubTypes	RC Red Cedar LA Larch Plantation

Value of 0 for:

Major Groups	8 Swamp Softwoods 9 Swamp Hardwoods
or Sub Types	HE Heath SG Sandplain Grassland
or Stocking	0
or Size	0

3. Past Management

Assumption – if there has been past management, it has a higher value for AFM and the greater the number of past entries, the higher the value

Value = 10 - 5 past management entries
9 – 4 past management entries
8 – 3 past management entries
7 – 2 past management entries
6 – 1 past management entries
0 – no past management entries

4. Distance from Roads

Assumption – those lands that are closer to roads capable of supporting logging vehicles have a higher value for AFM

Value:
10 - Within 250 foot (76 m) buffer
8 - Within 750 foot (229 m) buffer
6 - Within 1,500 foot (457 m) buffer
4 - Within 2,000 foot (610 m) buffer
2 - Within 3,750 foot (1,143 m) buffer
0 – Outside of 3,750 feet

5. Fire Risk Areas

Assumption –lands with the highest fire risk have the highest value for AFM (includes parameters for vegetation rate of spread and fuel load, topography for fuel moisture (aspect) and fire intensity (slope), and wildland urban interface)

Value:
10 - >25 – 45
9 - >24 – 25
8 - >23 – 24
7 - >22 – 23
6 - >21 – 22
5 - >20 – 21
4 - >18 – 20
3 - >14 – 18
2 - >9 – 14
1 - >6 – 9
0 - 0 – 6

6. Sawmills

Assumption –lands within shorter travel distances between sawmill locations and DCR lands have a higher value for AFM

Value:

10 – within 10 kilometers (6.2 miles)
8 – within 20 kilometers (12.4 miles)
6 - within 30 kilometers (18.6 miles)
4 – within 40 kilometers (24.8 miles)
2 - within 50 kilometers (31.0 miles)
0 – greater than 50 kilometers away (31.0 miles)

7. Defoliation Areas (*1934 – 2009)*

Assumption –lands within insect infestation, disease outbreak or natural weather event areas have a higher value for AFM

Value:

10 – 10 and above
9 - 9
8 - 8
7 - 7
6 - 6
5 - 5
4 - 4
3 - 3
2 - 2
1 - 1
0 - 0

Input Grids to be excluded from AFM (masks):

1. Old Growth Sites
2. Slopes > 40%
3. Intensive Use Areas
4. Open Water
5. Reserves (approved and draft statewide)

1. Old Growth Sites

Assumption – these areas are not appropriate for AFM

2. Slopes > 40%

Assumption – slopes greater than 40% are too steep and are not appropriate for AFM

3. Intensive Use Areas

Assumption – intensive use areas are not appropriate for AFM

* missing data from the Southeast District

4. Open Water

Assumption – open water areas are not appropriate for AFM

5. Reserves

Assumption – reserves are not appropriate for AFM

Process:

1. All 7 grids are added together using the Raster Calculator

    a. Prime Forest Soils
    b. Vegetation Suitability Classification
    c. **4 x** Past Management
    d. **3 x** Distance from Roads
    e. Fire Risk Areas
    f. **2 x** Distance to Sawmills
    g. Defoliation Areas

2. 5 grids were used to mask out areas where Active Forest Management will not take place

    a. old growth
    b. steep slopes
    c. open water
    d. intensive use areas
    e. reserves

3. Final output (classified into three quantiles – each category contains as close to 33.3% of the integer values from 0 to 117)

    a. Limited Forest Management Opportunities (values 0 to 41) 33.8%, 71,505 acres
    b. Important Forest Management Opportunities (values >41 to 56) 33.6%, 71,155 acres
    c. Optimal Forest Management Opportunities (values >56 to 117) 32.6%, 68,979 acres

4. Score Analysis: The 'Important' and 'Optimal' Forest Management Opportunities categories require that a location has a combination of criteria that are significant to

consider when assessing whether forestry should occur on a site. For example, the following combinations would result in the minimum score for the 'Important' category:

a. 5 past forestry projects on the site + scores in one other category
b. Site is within 250 feet of a public road capable of supporting logging vehicles + site is prime forest soils + scores in one other category
c. 3 past forestry projects on the site + prime forest soils
d. Site contains priority forest vegetation type + prime forest soils + site is within 750 of a public road capable of supporting logging vehicles
e. 10 previous defoliations on the site + prime forest soils + high fire risk site + priority forest vegetation type + score in one other category

5. Certain state forests rate higher as Woodlands based on the mean score of the whole forest. For example, the Warwick State Forest has a mean Woodland score of 52.7 and the October Mountain State Forest has a mean score of 50.7. Both these scores are near the high end of the 'Important Forest Management Opportunities' category.

Exhibit DCR-2

Percentage of State Lands Set Aside from Harvesting Responses from the 20 Northeastern States

Question Asked: *What % of State owned land in your respective State prohibits Commercial Harvesting (i. e. designated: Forest Reserves, Natural Areas, Wilderness, Wildlands, etc.)?*

Connecticut - Response: Chris Martin, CT State Forester
Mike simple question, not so simple an answer. NO HARVEST AREAS

- State Lands designated as State Forests - approx 10 percent of 170K acres. Includes some research plots and areas not conducive to commercial harvesting; steep slopes, excessive wet…
- Natural Area Preserves, State Parks, Special scenic areas - approx 36K acres

DC - Response: Monica M. Lear, Ph.D. - Deputy Associate Director - Urban Forestry Administration - District Department of Transportation

- DC Government owns about 60% of the land and the federal government (different agencies) control and own 40%. DC Government lacks a natural resources department. We have urban forestry and environment agencies. I am not aware of laws that prevent commercial harvesting so to be on the safe side I would say it is a policy for us to not allow commercial harvesting.

Delaware – Response: Austin Short, DE State Forester

- Commercial timber harvesting is not prohibited on any Delaware State Forest lands. I am not positive about our State Parks and State Wildlife Areas (different department). I do not believe that have any areas where timber harvests are prohibited by law but they may have some areas that are off limits through policy. Let me know if you want me to check.

Indiana - Response: John Seifert, IN DNR

- Indiana's numbers. I included state forests (153,790), preserves (20,475), fish and wildlife (145,580) and parks (69,990) for a total of 389,505 state owned acres. Of that preserves, F&W and parks acres are off limits to harvesting - 262,715. About 67% of state owned lands do not allow timber harvesting.

Iowa - Response: Jeff Goerndt, State Forests Section Chief, Forestry Bureau, Iowa Department of Natural Resources

- By policy only, commercial harvesting is not typically allowed on State Parks and Preserves, with the exception of occasional salvage harvests in the case of

storm damage, disease infestations, etc… These areas make up about 19% of the state owned forest land in Iowa.

Maine - Response: Donald J. Mansius, Director (Forest Policy & Management Maine Forest Service - Dept. of Conservation)

- The number reported below is about 12% of DIFW's land base. Taken together with the BPL figures provided separately, the combination of these two numbers still works out to about 86% of the state's lands being available for management.

- Maine Bureau of Parks and Lands: about 86% of BPL lands are harvestable (14% set aside as state park, ecological reserve, or other sensitive area designation).

  1. Parks & Historic Sites (approximately 95,000 acres)

     a. While cutting can take place to maintain view sheds and wildlife habitat, produce material to be used in the parks, and create demonstration areas, commercial timber harvests for commodity extraction is statutorily prohibited on all these acres.

  2. Public Reserved Lands (approximately 580,000 acres)

     a. Sustainable commercial timber harvesting can take place on the majority of this multiple use forest land ownership, approximately 483,400 acres. Some of this area is non-forested.
     b. Harvesting is prohibited statutorily on 85,000 acres of ecological preserves and by policy allocation on an additional 11,600 acres of sensitive or unique community types.

Response: Ryan B. Robicheau, Lands Management Biologist (ME Dept. Inland Fisheries and Wildlife)

- Maine's Department of Inland Fisheries and Wildlife (MDIFW)

  1. The Department has, working in conjunction with a multi-disciplinary group, identified 12,136 acres under it's management as 'potential' ecological reserves under which no commercial timber harvesting will take place (except in extreme instances in line with Chapter 592, MSRA Section 13076). While these have yet to be formally recognized, the Department's management has reflected such status of these reserves.

Maryland - Response: Ian MacFarlane, Exec. Director NAASF
Steve Koehn (MD State Forester) called me from the road to give me this information to pass along to you.

- In Maryland, about 40-50% of the state forest land is designated for planned silviculture activities (i.e. regular management and harvesting). In much of the remaining areas, they can only go in after a fire, gypsy moth outbreak, hurricane, etc. to do salvage and restoration, but those are obviously unplanned circumstances. Steve tells me about 10-15% of the total acreage is in 'wildland' designation, where there is no harvesting, regardless of the circumstance.

Michigan - Response: Cara Boucher, MI State Forester

- By statute (attached) no more than 10% of state owned land may be 'set aside' Sec 35103 (3). Practically and administratively speaking around 15% of all state owned land isn't commercially harvested as a result of statute, recreational use, riparian or other management strategies/objectives.

Minnesota - Response: Meg Hanisch, DNR Forestry, Government Affairs/Communications Program Supervisor

- Of the 16.3 million forested acres in Minnesota, the state owns, or administers, 4.4 million acres. Commercial timber harvesting is allowed on 4 million acres, or 91 percent, of the state-owned 4.4 million acres of forest land. Thus, approximately 400,000 acres, or 9 percent, of state-owned forest land is off-limits to commercial timber harvesting. Most of the state-owned forest land off limits to commercial timber harvesting is in state parks and scientific and natural areas. This information is based on Forest Inventory Analysis 2005 data.

Missouri - Response: Lynn Barnickol, MO MDC

Forest inventory and Analysis for Missouri Totals 671,725 acres of forest land. There are two ownerships involved:

- Missouri Department of Natural Resources Parks Division restricts or is strongly opposed to commercial harvest: Approximately 70,215 acres or 10.4% of the total forest land acres.

- Missouri Department of Conservation - the four member Conservation Commission holds the deeds totaling approximately 601,510 acres of forest land. The following describes the acreage allocation of the 601,510 acres of forest land:

  1. Deed restriction – No harvest on 1,844 acres or 0.3% of the 601,510 acres.
  2. General forest management 68% of the 601,510 acres is available for commercial harvest
  3. Natural areas – 8% - areas are not set up for regularly scheduled inventories, but commercial harvest can occur on an as needed basis to reach natural areas goals. Any harvest is thought to be a one-time occurrence as prescribed fire will be used to complete management objectives.
  4. Research areas – 2% of the total.
  5. Urban and intense recreation areas – 22% of the total. Commercial harvest can occur such as demonstrations on limited acreage. Additionally, river

accesses, fire tower sites, and shooting ranges are listed. Commercial harvest can occur on these areas, but the limited acres available it is not practical.

New Hampshire - Response: Brad W. Simpkins, Interim Director, New Hampshire Division of Forests and Lands

- In New Hampshire, of the approximately 167,000 acres that our agency manages (does not include Fish and Game lands), 19,432 acres are set aside as 'natural areas' or other zoning where we don't do commercial harvesting, or approximately 11.6% of the land base. However, this zoning is decided by our agency, not by state law or administrative rule. Also, there is actually much more acreage that we don't harvest timber just due to access, steepness, recreational reasons, etc., so in reality the amount of acreage where we don't harvest timber commercially is much larger. However, it seemed like your intent was to find out how much is in 'preserve' or 'natural area', which is 11.6%.

New York - Response: Gloria Van Duyne, NYS Dept. of Environmental Conservation, Division of Lands and Forests

- In NY about 65% is Forest Preserve, which prohibits logging.

- Legally we can log on all State Forests. We have chosen to not log on Unique Areas and State Nature and Historic Preserves which are a subset of State Forests. They make up less than 5% of our State Forests. Again, our 3 million acres of State Forest Preserve in the Adirondacks and Catskills constitutionally prohibits logging.

Ohio - Response: Cotton Randall, Ohio Division of Forestry

- Total DNR acreage is 590,000 with a conservative estimate that commercial harvesting is prohibited on 50 % of those lands. This is a rough estimate, as I have not been able to confirm the actual acreages with this constraint from the Division of Wildlife. I will try to get that information this week and get back to you if the 50% estimate changes significantly.

- I was able to speak to our Div. of Wildlife Land Mgt Administrator about their lands. She said that there are no legal constraints on commercial harvesting on their lands, outside of natural preserves, which are technical owned by another DNR division. However, Div. of Wildlife currently does essentially no commercial harvesting based on policy and mgt decisions. To further complicate these calculations, it would probably be more accurate to look at only forested ODNR lands, or lands with the potential to be harvested. The vast majority of Forestry Division lands are forested; however, only 60% of wildlife lands are classified as forested using 2001 NLCD data. I have not yet done all of the calculations for acres of forest land across all ODNR divisions, so I need to add the disclaimer to the following data that these are ALL ODNR lands, regardless of whether they are forested or not. For our state asst/strategy, I will have the data on % forested of all ODNR lands, but not yet.

    1. 35% of Ohio DNR lands (181,000 of a total of 507,000 acres) prohibit commercial harvesting (legal constraints).

2. 72% of Ohio DNR lands (367,000 of 507,000 acres) currently have no commercial harvesting based on a combination of legal, policy, and management constraints.
3. **Note: I reduced the total DNR lands from 590K to 507K, because the 590K number included leases and use agreements on lands that DNR does not own.

Pennsylvania - Response: Matthew J. Keefer, Div. Chief (Bureau of Forestry/Resource Planning and Inventory) and John Hecker Chief, Silviculture Section (PA-DCNR-Bureau of Forestry)

- Please note that the PA State Game Lands are administered by a separate agency. We don't think they have any specific set-asides but would obviously have areas inaccessible to harvesting due to steep slopes, etc. Let us know if you need a more definitive answer on the Game Lands.

- In response to your November 23 request, about 27% of the 3.8 million acres of the State-owned land in Pennsylvania prohibits commercial timber harvesting:

	All Land (acres)	No Harvesting or Very Limited	Non-Harvest %
State Forest	2,100,000	720,000	34%
State Park	300,000	300,000	100%
State Game	1,400,000	-----	0%
All-State Owned:	3,800,000	1,020,000	27%

No harvesting or extremely limited commercial harvesting includes all State Parks and in State Forests Natural Areas, Wild Areas, and Limited Resource Zones.

Vermont - Response: Steven Sinclair, Director of Forests/State Forester, VT Department of Forests, Parks and Recreation

- Designated natural areas represent 2% of the land base. Through our long range management planning process we go through a 'zoning' exercise that identifies 'emphasis zones'. Protection zones typically have no cutting taking place but it's not legally restricted- these are typically high elevation, sensitive sites, etc and represent 15% of the land area.

West Virginia - Response: Gregory W. Cook, CF, Deputy State Forester, WV Division of Forestry

- 22% of state owned land in WV prohibits commercial harvesting.

Wisconsin - Response: Paul DeLong, WI State Forester

- 143,678 acres of the 925,905 forested acres are passively-managed (15.5%)

4. Ross Analysis of Woodlands Requirements

Model forests provide the opportunity to demonstrate over the lifetime of a forest stand the best forms of silviculture and low impact harvesting techniques that provide the broadest possible suite of ecosystem services from the Massachusetts forests. Forests in private ownership on average are held less than 10 years, which is too short a time period to document the results of different silvicultural techniques and/or harvesting techniques. Determining the amount of acreage that would be required for a comprehensive series of model forests in Massachusetts starts with identifying the number of major forest stands within the Commonwealth. For purposes of this document, 20 of the most common forest types were selected. These include the major species from both hardwoods and softwoods in addition to the variety of species combinations and densities that are found in Massachusetts forests. Then the number of required stands can be estimated, assuming three broad age classes for each forest type, and adding two forms of topography, one easy and one difficult for each type, and an allocation across the three regions of the state (east, central and west, not necessarily evenly distributed). Finally, selecting an average size of 250 acres per stand recognizes that contiguous stands of this size may not be possible, but several smaller stands collectively can meet this goal and provide for multiple silvicultural examples as climate changes modify species composition.

Calculations to determine sufficient acreage for DCR Model Forests
presented by Keith Ross Jan 2010

Number of representative forest types in Mass	20	types
While there are probably many more types, this represents the major ones		
Three broad age classes for each type, young, med, old	60	stands
This allows for each type to be represented by different age structures depending upon when they were first established		
Two examples of logging chance for each, easy and difficult	120	stands
Having examples of terrain that is easy and difficult allows for different harvesting methods to match the challenge		
Locating stands of each in East, Central, West of Mass	360	stands
There may be fewer examples in the east, more in the central and many of the larger examples in the west		
Average acreage of each stand @ 250	90,000	acres
Many of the stands will need to be large enough to accommodate a variety of examples. Stands in the east may be smaller and stands in the west may be larger		
plus 20,000 acres managed as watershed lands		
plus 15,000 acres managed for early successional		
	125,000	Total acres

Annex 6

EEA Management of Forest Reserves

What activities will occur in Reserves?

Each matrix reserve will have an operational plan established with opportunities for public input to clearly define what activities will and will not occur, and to determine in advance how managers will coordinate with local officials in response to events like wildfires, pest and pathogen outbreaks, extensive blowdowns, and other natural disturbance events. Plans should review all known disturbance events that have occurred in the vicinity of the reserve over the past few hundred years, and should also anticipate both natural and human-caused events that may occur in the future. Biological monitoring of species, communities, and processes will be a fundamental component of planning for all reserves.

The primary difference in activities between reserves and other state-owned forest lands will be the exclusion of commercial timber harvesting. Recreational use of rubber-tired motorized vehicles such as dirt bikes, ATV's, and four-wheel drive trucks are already excluded from the great majority of state lands, and will also be excluded from reserves. Recreational use of snowmobiles during the winter season may continue under existing permits and on designated trails depending on Agency policy. However, snowmobile use during the winter season will not be expanded on any reserve site beyond what is currently allowed. Foot-pedaled mountain biking and horseback riding will be determined on a case by case basis for each reserve according to Agency policy. Camping will typically be restricted to existing recreational sites, and will not be expanded in reserve sites. Activities such as hiking, hunting, fishing, trapping, birding, and other forms of wildlife observation are currently allowed on most state-owned forest lands, and will continue in reserves.

Determining the appropriate response to wildfires, outbreaks of pests and pathogens, and occurrence of invasive species will be a critical component of reserve planning. One objective established above for matrix reserves was: 'To the greatest degree possible, allow natural disturbance processes to determine the structure and composition of the forest ecosystem'. Given that humans are part of the natural environment, how do we define a natural disturbance, and how do we constrain a natural disturbance such as a lightning-strike wildfire within a reserve so that it does not threaten human life and property outside the reserve?

For planning purposes, a natural disturbance will be defined as an event that would be expected to occur absent direct human actions on the landscape. Natural disturbances include windstorms, lightning-caused wildfire, and outbreaks of native insect pests such as hemlock looper and forest tent caterpillar that have occurred historically in Massachusetts.

For each natural disturbance that occurs within a given reserve, a decision must be made as to whether or not the disturbance can be allowed to proceed to any degree without threatening human life and property outside the reserve. Disturbances such as natural wildfires which can clearly threaten human life and property must either be immediately extinguished within a reserve, or to whatever degree possible, be allowed to 'let burn' within portions of the reserve if state and local officials feel this can be done without impairing public health and safety. In a fire-adapted forest ecosystem like the pitch pine/scrub oak type found in southeastern Massachusetts, wildfire can be extremely difficult to contain, and prescribed burning may be appropriate to emulate natural processes while insuring public health and safety.

A similar approach should be taken to new, human-caused introductions of insects and pathogens that threaten the economic value of private and public forests outside reserves. For example, exotic insects like the Asian long-horned beetle and emerald ash borer have recently caused substantial loss of standing timber in parts of the United States. In the event that a species like these is discovered within a reserve, actions should be taken to eliminate or at least control the species within the reserve so that it does not spread into adjacent forest lands open to harvesting.

Response to introduction of invasive plant species into a reserve must also be considered. Invasive plants include species that did not continuously expand their range area into Massachusetts, but rather were transported substantial distances by humans and placed into new environments where no natural controls occur to constrain the introduced species. Invasive plant species multiply rapidly and reduce diversity of native plants. Invasive plant species identified in this NHESP publication should be eliminated or controlled within reserves using mechanical procedures whenever possible.

In addition to natural disturbances, which can be allowed in reserves without threatening public health and safety outside reserves, certain human-caused disturbances that have become ubiquitous throughout the landscape will likely be allowed to proceed unabated within reserves. Examples include beech bark disease complex, periodic gypsy moth infestations, and hemlock wooly adelgid.

- The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts PDF, a report with an annotated list by the Massachusetts Invasive Plant Advisory Group

DCR Management Guidelines for Forest Reserves

(3) Management Guidelines for Large-scale Reserves

Recreation, Public Access, and Visual Resources within Forest Reserves

A. Recreational activities that may be allowed are hiking, hunting, fishing, bird watching, mountain biking, snowmobiling and horseback riding.

B. ORV use is prohibited

C. When there is snow cover (4+ packed inches), snowmobile use is allowed on designated trails and unplowed roads

D. Intensive, development-dependent recreation and administrative sites are not permitted

E. New trail construction is permitted only if limited to stable areas and are relocations of exiting trails to avoid adverse impacts to late-successional forest habitat, rare species, water quality, and to known or potential archaeological sites

F. Minimal cutting of vegetation to maintain DSPR identified public vistas and trails is permitted

G. Hazardous trees directly adjacent to the trail, and that pose imminent and substantial risk to public safety may be cut.

Silviculture and Vegetation Management within Forest Reserves

A. Habitat manipulation and traditional sivicultural treatments and operations are not permitted, with the following exceptions:

1. Natural Heritage & Endangered Species Program recommendations used to restore, maintain or enhance habitat for rare and endangered species, and exemplary rare communities

2. Restore native vegetation by removing non-native and off-site plantations

3. Control of non-native invasive species will be permitted

4. Vegetation management will be permitted to control erosion or stabilize soils, close roads, or close unauthorized trails

5. Limited cutting of vegetation is allowed for maintenance of trails and existing roads and to protect historic archeological sites

B. Acreage in the reserve is excluded from the annual sustainable harvest calculation

C. Research that causes no adverse impact to the Forest Reserve will be permitted through a formal written proposal process, approved in advance by the Commissioner or their designee

D. New fields, vistas, and wildlife openings are prohibited

Water and Soil Resources within Forest Reserves

A. Management may be permitted to control erosion or stabilize soils, by closing roads and unauthorized trails, or other means

Forest Health and Protection within Forest Reserves

A. Spread of major significant forest pathogens may be controlled if there is a major threat to forest health or risk to private or public interests as determined by the State Forester

B. Non destructive, low impact research for monitoring forest conditions may be established

C. Wildfires will be contained, controlled, and suppressed unless there is an approved site specific controlled fire plan and conditions are within prescription

D. Fire breaks may be maintained in fire prone types of vegetation

E. Prescribed fire may be used when it is compatible with protection of the Forest Reserve, restoration of native communities and ecological processes, and the protection of life and property in the reserve or the surrounding landscape

Facilities, Transportation, and Boundaries within Forest Reserves

A. No new roads will be constructed

B. Existing roads not needed for recreational or administrative use may be closed and restored to their natural condition

C. Passage through the area is allowed on existing stable roadbeds or trails

D. Existing roads will be managed and maintained according to DSPR road standards to assure continued access

E. Construction of new facilities is prohibited. Exceptions may include small-scale, low impact, natural appearing informational kiosks, universal access structures for trails trailheads and parking, and carefully designed boardwalks

Special Uses within Forest Reserves

A. Special uses such as events and activities will be evaluated on an individual basis and may be allowed.

B. Existing special uses such as transmission lines and communication sites that are not compatible with the intent of Forest Reserves will be evaluated to determine if they can be relocated to another area

C. New communications sites are prohibited

D. Wind towers are prohibited

Annex 7

Analysis of DCR Legal Mandates

Summary of Applicable Laws and Regulations
DCR Forest Futures Vision Process

Prepared by Kathleen Connolly, Esq., Murtha Cullina, LLP

I have been asked by Bill Logue on behalf of the DCR Forest Futures Vision Process to prepare a compilation of applicable laws and regulations related to forests and forestry in Massachusetts. The following is a synopsis of the statutes and regulations governing forestry in Massachusetts, either directly or incidentally. As an attorney on the Technical Steering Committee, I remain policy-neutral and simply provide herein the applicable laws and regulations, and in certain cases, my interpretation of any potential inconsistency within or among them. In preparing this synopsis, I have reviewed the summaries of applicable and related laws and commentary thereon compiled by several members of the AGS. This draft synopsis addresses some of those concerns where possible. I have also included cited excerpts from the Massachusetts Association of Conservation Commissions Handbook, of which I am a co-author/editor (I include the citations so that it is clear that I did not write these write these sections for this memorandum). I also note that a recurring issue in the TSC discussions and from the Stakeholders group, as well, has been the extent of DCR's jurisdiction over public and private lands. The first statute listed below cites DCR's oversight of management guidelines for both private and public forest lands. The implementation of forestry management plans will be conducted by different individuals and entities for public lands versus private lands, but DCR has jurisdiction over both for purposes of this statute. Many of the applicable statutes express whether they apply to public or private lands, either in the statutes themselves, or in the implementing regulations. Where they are silent on that point, the determination must be made based on the particular language of the statute and regulations. For example, 131, §40(16) discusses its application to ‘lands managed by the Division .... ‘ Such limiting language can be read to exclude lands not managed by a state entity.

STATUTES

Chapter 21: Section 2F is entitled ‘Management guidelines for sustainable forestry practices on public and private forest lands’ and provides:

> Section 2F. The directors of the divisions of state parks and recreation and urban parks and recreation shall work in cooperation with the director of the division of fisheries and wildlife within the department of fish and game to establish coordinated management guidelines for sustainable forestry practices on public forest lands within the departments of conservation and recreation and on private forest lands. Said guidelines for public forest lands shall include agreements on equipment, personnel transfers, operational costs, and assignment of specific management responsibilities.
>
> The commissioner of conservation and recreation shall submit management plans to the stewardship council for the council's adoption with respect to all reservations, parks, and forests under the management of the department, regardless of whether such reservations, parks, or forests lie within the urban parks district or outside the urban parks district. Said

> management plans shall include guidelines for the operation and land stewardship of the aforementioned reservations, parks and forests, shall provide for the protection and stewardship of natural and cultural resources and shall ensure consistency between recreation, resource protection, and sustainable forest management. The commissioner shall seek and consider public input in the development of management plans, and shall make draft plans available for a public review and comment period through notice in the Environmental Monitor. Within thirty days of the adoption of such management plans, as amended from time to time, the commissioner shall file a copy of such plans as adopted by the council with the state secretary and the joint committee on natural resources and agriculture of the general court.
>
> The commissioner of conservation and recreation shall be responsible for implementing said management plans, with due regard for the above requirement.

Under the language of this statute, DCR, in cooperation with the Division of Fish & Wildlife (DFW) Director is directed to develop coordinated management guidelines for sustainable forestry practices on public and private forest lands. DCR is to submit management plans for all its units to its stewardship council to 'ensure consistency between recreation, resource protection and sustainable forest management.' Public review is through the Environmental Monitor, although these management plans are not enforceable by the public See *Sierra Club v. Commissioner* of *Env'l. Mgmt.*, 439 Mass. 2003). Some of the commentators identified above have cited examples in which DCR did not comply with this statute in that the Commissioner did not incorporate public input. I am not personally familiar with the examples given and cannot comment on specific examples, but note that as written, the language of the statute requires only that DCR 'seek and consider' public input, but not necessarily incorporate it. One might argue, however, that if reasonable efforts are not made to obtain public input, or if sound suggestions are made and not incorporated for reasons that are arbitrary or capricious, then there has not been compliance with Chapter21, §2F. The Massachusetts Association of Conservation Commissions (MACC) Handbook points out that as of 2006, funding had not been allocated to the public review process required by DCR.

Chapter 48, §§16, 16A

The 'Slash Law', requires that tops and branches from logging be cut close to the ground to minimize unsightliness and reduce fire danger. The law requires that slash be kept certain minimum distances from property boundaries, streams, and public highways, essentially banning disposal of slash in these areas. This statute does not contain language that would limit it to either public or private lands.

Chapter 61, the Forest Land Assessment Act, will typically apply to private lands rather than lands owned by the Commonwealth.

Chapter 61 allows landowners to reduce the property tax burden on their woodlands if they are willing to keep the forested land undeveloped and in wood production.

For years participation under Chapter 61 was very limited because many landowners did not want to subject themselves to the onerous conditions imposed by the previous version of the law for the limited tax break offered.

The statute as revised in 2006, Chapter 394 of the Acts of 2006, was to be less onerous.

To qualify for Chapter 61, a landowner must have 10 or more contiguous acres of private woodland managed for forest production under an approved long-term forest management plan. The plan must be approved by the OCR service forester and then filed with the local board of assessors.

To continue in the program, a new (or revised) plan must be filed every 10 years. As part of the agreement, the town receives an option to purchase the property if the owner decides to sell to someone other than a relative.

Chapter 131

G.L.c. 131, Section 4(16) governs Inland Fisheries and Game, and provides that *Clause* (16) *effective until January* 5, *2009]* provides that the Director may:

(16) enter into such contracts as the director, in consultation with the commissioner, deems necessary or appropriate in order to fulfill the responsibilities and mandates of the agency, including, but not limited to, contracts for the cutting and sale of timber on lands managed by the division, and shall deposit monies received from such contracts into the Inland Fisheries and Game Fund pursuant to section 2; provided, however, that it shall be a condition of each contract for the cutting and sale of timber that clear-cutting timber on lands managed by the division is specifically prohibited.

I concur with the comment made in the group discussions that the language 'is clear and unambiguous, simply stating that clearcutting is prohibited on DFW lands' and that it is indicia that the Legislature had concerns about clearcutting in including this language.

Chapter 131: Section 10A. also governs Inland Fisheries and provides: 'the executive office of environmental affairs, the department or any other division of the department within said executive office may designate as qualifying as a nature preserve any real property owned by the commonwealth and under the care and control of said department, executive office or any of its divisions or departments. Such a parcel of real property shall be deemed to be a nature preserve upon the following:

The division shall after a determination that said parcel qualifies as a nature preserve hold a public hearing thereon in accordance with the provisions of chapter thirty A.

The division shall file with the secretary of the executive office of environmental affairs a statement dedicating said parcel as a nature preserve. Such statement shall include the reasons said parcel qualifies as a nature preserve and a plan for the preservation and protection of said parcel as a nature preserve.

A nature preserve established in accordance with the provisions of this section shall be monitored and maintained as nearly as possible in its natural condition, and shall be used in a manner and under limitations consistent with its status as a nature preserve, without impairment or artificial development for the public purposes of present or future scientific research and education, and of providing a habitat for plant and animal species, communities and other natural objects and for

preservation of areas representative of the significant habitats and ecosystems of the commonwealth.

Chapter 131, §40, the Wetlands and Rivers Protection Acts

Wetlands and streams are protected under these acts from activities which would alter, dredge, fill, or harm them. If you are considering activities which might affect or border a wetland or stream, you should contact the local conservation commission to determine what permits you would need under the regulations.

Both acts include a specific exemption whereby forestry and agricultural activities that are considered routine maintenance of the land are regulated differently. Such activities include timber harvesting in wetlands, and temporary stream or wetland crossings for access to a harvest site. These activities are regulated instead under the Forest Cutting Practices Act (MGL Chapter 132). Permitting for these activities is handled by DCR service foresters.

Activities which don't fall under the Chapter 132 regulations, such as a permanent stream crossing, are subject to the Wetlands Act. For forestry purposes, landowners can get a permanent stream crossing permit under the Limited Notice of Intent regulations.

Chapter 131A, the Massachusetts Endangered Species Act

MESA provides in part: ‘Except as otherwise provided in this chapter, no person may take, possess, transport, export, process, sell or offer for sale, buy or offer to buy, nor shall a common or contract carrier knowingly transport or receive for shipment, any plant or animal species listed as endangered, threatened or of special concern or listed under the Federal Endangered Species Act.

Except as otherwise provided in this chapter, no person may alter significant habitat.’

G.L. c. 131A, §2. This law prohibits anyone from killing, collecting or otherwise ‘taking’ any of the 424 species of plants, mammals, birds, reptiles, or invertebrates that the Mass. Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (NHESP) has determined to be rare in Massachusetts.

When any Forest Cutting Plan is filed, the DCR service forester will check the Natural Heritage Atlas to see if the area to be harvested includes any known rare species habitat. If it does, DCR will consult with NHESP about the planned harvest to ensure protection of rare species habitat or species.

The MESA regulations are found at 321 CMR 10.00, *et seq.*

Chapter 132, §§40-46, Massachusetts Forest Cutting Practices Act

Section 40. Declaration of Policy of Commonwealth - It is hereby declared that the public welfare requires the rehabilitation, maintenance, and protection of forest lands for the purpose of conserving water, preventing floods and soil erosion, improving the conditions for wildlife and recreation, protecting and improving air and water quality, and providing a continuing and

increasing supply of forest products for public consumption, farm use, and for the wood-using industries of the commonwealth.

Therefore, it is hereby declared to be the policy of the commonwealth that all lands devoted to forest growth shall be kept in such condition as shall not jeopardize the public interests, and that the policy of the commonwealth shall further be one of cooperation with the landowners and other agencies interested in forestry practices for the proper and profitable management of all forest lands in the interest of the owner, the public and the users of forest products.

Chapter 132: Section 41. State forestry committee; members; forest cutting practices and guidelines

Section 41. The governor shall appoint a state forestry committee, to consist of eight members representing, respectively: forest land owners; primary wood-using industries; licensed timber harvesters; consulting foresters; environmental organizations; water supply agencies; fisheries and wildlife; and one member representing the public at large. The director of the division of forests and parks, hereinafter referred to as the director, shall be an ex officio member of the committee and shall vote only in case of a tie.

In the initial appointments of said committee members, three shall be appointed for a one year term, three for a two year term, and two for a three year term. Thereafter, as the term of a committee member expires, his successor, with like qualifications as his predecessor, shall be appointed for a term of three years. Said committee shall select its own chairman. The members of said committee shall serve without pay, but shall be reimbursed for actual travelling expenses within the commonwealth, when approved by said director.

The state forestry committee, with recommendations of such other advisory committees as the director in his discretion may appoint, shall prepare tentative minimum forest cutting practices and guidelines. Before recommending any forest practices, said committee shall hold hearings, with due notice being given, in conformance with chapter thirty A, in at least three places conveniently located throughout the commonwealth. Said committee may thereafter recommend such practices or modifications thereof and submit them to the director of forests and parks. Said director shall, subject to the approval by the commissioner of environmental management, thereupon adopt the practices and place them in effect, by posting in all city and town halls in the region affected and by publication in at least one daily newspaper in every county affected. Such approved practices may be amended at any time by said committee in the same manner, on its own motion or upon the petition of not less than twenty-five forest owners or licensed timber harvesters of the commonwealth or upon petition of any person authorized under section four of chapter thirty A.

Chapter 132: Section 42. Notice of proposed cutting of forest products; final work order; report to director; appeals

Section 42. Every owner of land who proposes to cut forest products on land devoted to forest purposes, or to cause such products to be cut, except as provided in section forty-four, shall send by certified mail or hand deliver written notice of his intention to begin any cutting operation to the abutters of record on file with the assessors of the town in which the land lies, and whose closest boundary is within two hundred feet of the edge of the cutting area, at least ten days prior to operations; and shall send by certified mail or hand deliver, written notice of his intention to

begin any cutting operation, and his proposed cutting operation, and his proposed cutting plan, including information as may be necessary to describe such proposed activity, to the director or his agent at the appropriate regional office and to the conservation commission of the town in which the land lies at least ten days prior to operations; and in the case of classified forest land, the owner shall provide a reasonable estimate on the stumpage value of the forest products to be cut and properly paint or blaze any boundaries located within fifty feet of the cutting area.

No work may commence until a final work order, with a designated file number, is issued to the landowner by said director or his agent except as hereinafter provided.

The licensed timber harvester shall have a copy of the final work order on the site whenever work is done, for inspection by the director or his agent, who shall give final approval or disapproval to the operation and report in writing to said director the nature of the operation, its extent, the amount of product cut, and such other information as said director may require.

In the event that the director, or his agent, does not act on the notice of intent within the designated ten days from day of receipt of the notice, work may commence, except in wetland areas as defined in section forty of chapter one hundred and thirty-one, in conformity with the submitted plan, provided the licensed timber harvester shall have a copy of the submitted plan on the site of the operation whenever work is done.

An applicant landowner or licensed timber harvester who is aggrieved by any decision of the director or his agent may appeal said decision within ten days of receipt of the decision to the director or his designee who shall act as hearing officer and will hold an informal hearing within ten days and render his written decision to said aggrieved party within five days of the hearing. An applicant landowner or licensed timber harvester further aggrieved by the decision of the director may appeal said decision within thirty days to the superior court.

Chapter 132: Section 43. Failure to give notice

Section 43. Whoever, not being exempt from section forty-two and forty-three under the provisions of section forty-four, fails to give notice and a written plan, to said director or his agent as provided by said section forty-two, or whoever, either as land or stumpage owner or independent contractor fails to follow the plan of operations approved or not disapproved by said director or his agent shall be punished by a fine of not more than one hundred dollars for each acre of land on which cutting occurred in violation of, or in the absence of, said plan and final work order except as provided by section forty-two. The director or his agent is hereby authorized to issue a stop order to shut down immediately any operation that fails to meet the law or regulations until such deficiency is corrected to the satisfaction of the director's agent, or if not corrected, until the director holds a hearing relative to revocation of the harvester's license as provided in section forty-six.

Chapter 132: Section 44. Exempted cuttings

Section 44. The provisions of sections forty-two and forty-three shall not apply to (1) cutting by an owner or tenant of any forest product for his own noncommercial use; (2) cutting or sale of such products by any owner to an amount not exceeding twenty-five thousand board feet or fifty cords on any parcel of land at any one time; (3) cutting for clearance or maintenance on rights of

way pertaining to public utilities and public highways; (4) clearing land for building or for purposes of cultivation or (5) maintenance cutting in pastures.

Chapter 132: Section 45. Cooperation with other agencies; passage through or over private property

Section 45. For the purpose of sections forty to forty-four, inclusive, said director may cooperate with the University of Massachusetts, the United States Forest Service, and any other appropriate public or private organization and may authorize their employees to perform the duties outlined in section forty-two, subject to the approval of the director. The members of said committee, the director, his agents and other designated persons may in the performance of their duties under said sections pass through or over private property.

Chapter 132: Section 46. License to harvest forest products

Section 46. No person, firm or corporation engaged in the business of harvesting timber or other forest products for hire or profit shall cut such products on land devoted to forest purposes and for purposes not exempted by section forty-four without first obtaining a license to do so from the director who is hereby authorized to issue such licenses, and to withhold or revoke such licenses after hearing for failure to comply with sections forty-two to forty-six, inclusive. Applicants shall demonstrate general familiarity with the laws of the commonwealth that concern timber harvesting and provide the director such reasonable information as he may require concerning the amount and type of forest products cut by him during the previous year. The fee for the issuance of such license, which shall expire on June thirtieth of each year, shall be determined annually by the commissioner of administration under the provision of section three B of chapter seven for the filing thereof. Each licensed timber harvester shall, upon request, be provided with a copy of current laws and regulations concerning timber harvesting in the commonwealth.

Whoever violates any provision of this section shall be punished by a fine of not more than five hundred dollars for each violation. The superior court shall have jurisdiction in equity to enforce the provisions of sections forty-two to forty-six, inclusive, and remedy any violations thereof.'

Chapter 132: Section 47. Definitions

Section 47. As used in sections forty-seven to fifty, inclusive, the following words shall have the following meanings, unless the context clearly requires otherwise:-

'Forestry', the science, the art and the practice of conserving and managing for human benefit the natural resources, including trees, other plants, animals, soil and water, that occur on and in association with forest lands.

'Practice of forestry', any professional services requiring the application of forestry principles and techniques. Such services shall include, but not be limited to, forest inventory, forest management planning, timber appraisal, the responsibility for the direction and supervision of silvicultural activities, use and protection of forested areas, and the evaluation of the economic and biological consequences of forest management activities.

In **summary**, the above cited sections of the statute, the Massachusetts Forest Cutting Practices Act (FCPA) regulates timber harvesting on both public and private land in Massachusetts. It was

designed to protect water quality, prevent erosion, protect wildlife habitat and ensure the ability of the forest to produce future wood products. Cutting relative to changes in land use such as farming or residential development is exempt. The law requires that both loggers and foresters be licensed by the state.

FCPA is administered by DCR, largely through its thirteen service foresters and ten DCR forest managers, located throughout the Commonwealth. Its regulations appear in **304 CMR 11.00** The law has a significant impact on the rights and duties of Conservation Commissions under the Wetlands Protection Act and regulations. The two laws should work together to assure protection of wetlands and good forestry practice.

Relationship Between Chapters 131 and 132

Revisions to both of these statutes were done with the intention or coordination of their requirements, as further discussed in a Memorandum of Understanding between DEM and DEP.

As outlined in the Farming in Wetlands Resource Areas, published in 1996 by DEM, DEP, and DFA, ‘under the Wetlands Protection Regulations, certain forestry activities such as commercial harvesting and cutting for one's own use within thresholds are exempt from review only with an approved Forest Cutting Plan. Commercial harvesting is exempt from the Wetlands Protection Act provided that:

- a Forest Cutting Plan is properly filed with both DEM and the local Conservation Commission;
- wetland resource areas are properly identified on the Plan;
- the Plan is approved by the (DEM) Director or his/her agent;
- the Plan is properly and faithfully executed; and
- certain additional conditions are complied with as specified in the Wetlands Protection Regulations.

Therefore, while an approved Forest Cutting Plan is necessary to meet the agriculture exemption, the additional conditions included in the Wetlands Protection Regulations also must be met. The additional conditions include the general exemption conditions required for all exempt agricultural activities:

- the activity is ‘undertaken in such a manner as to prevent erosion and siltation of adjacent water bodies and wetlands’ (310 CMR 10.04(b));
- the activity is conducted in accordance with federal and state laws;
- the activity results in no dredging or filling of salt marsh; and
- the activity results in no substantial amount of fill in Bordering Land Subject to Flooding.

Other conditions are specific to the exemption for activities that are conducted with a Forest Cutting Plan and include:

- landings shall not be located in a Bordering Vegetated Wetland or on a bank;
- exposed soils shall be stabilized;
- there is no filling, excavation, or other change in topography or hydrology (except where allowed for construction of access ways);

- the cutting and removal of trees within Bordering Vegetated Wetlands shall be limited to 50 percent of the basal area;
- work shall be conducted when the ground is frozen, dry, or otherwise stable to support the equipment; and
- the cutting plan application shall be submitted to the Conservation Commission and DEM not less than 10 days prior to the work.

[Note: the Conservation Commission has the opportunity to comment to DEM on the plan during the 10-day period before it is approved. However, Commissions also are able to comment on Forest Cutting Plans even after that period.]

Cutting of trees for one's own use and construction of access ways for forestry activities have additional conditions that were discussed earlier in this Chapter.

The exemption from permit requirements under the Wetlands Protection Act is based on the overall exemption for normal maintenance and improvement of land in agricultural use. When forest products are harvested, the land is considered to be in agricultural use regardless of whether it is enrolled in the **G.L. Ch. 61** current use program.

As noted in the MACC Handbook, Chapter 18, many forest-cutting activities are not considered commercial timber harvesting and are therefore not subject to the FCPA. These include:

- Clearing land for cultivation, when supported by physical evidence of such changed land use within one year after the cutting stops
- Maintenance cutting in pastures
- Small commercial harvests up to the 25,000 board-foot threshold from any parcel of land 'at any one time.' This phrase is defined in the forestry regulations to mean cutting during the period covered by a cutting plan or continuous cutting not interrupted for longer than 180 days.
- Non-harvest management such as thinning and planting
- Clearing and maintaining rights of way for utilities and roads
- Clearing land for changed land use, such as house lots or subdivisions or mining or for any other activity requiring municipal permits, when supported by issuance of the necessary permits before cutting begins
- Limited cutting for the 'non-commercial' use of the landowner or her/his tenant (see below).

The Director of the DCR Division of Forests and Parks (Boston) may issue a determination as to whether an activity is exempt. The DCR Chief Forester in Boston should first be consulted when disputes arise.

The rule is that <u>activities not covered by a forest cutting plan are subject to Conservation Commission review</u> under the Wetlands Protection Act. There are, however, two complicating factors:

- The landowner may apply to DCR and obtain a forest cutting plan for a harvest not technically subject to the act, in which case the work is exempt.
- Some <u>small-scale activities</u> not covered by the FCPA relating to farming and non-commercial harvest are exempt under the Wetlands Protection Act regulations. <u>They are therefore generally exempt under both laws.</u> It is necessary to check both sets of regulations in such

cases. The Wetlands Protection Act regulations related to exempt forestry work are found in 310 CMR 1 0.04(Agriculture)(b)(14-16). Section 15(c) restricts cutting without a forest cutting plan to areas at least 25 feet from the Bank of the river. This wetlands regulatory ban is in addition to the riverside 'filter strip' discussed below. The filter strip is wider (50 feet), but 50 percent cutting is allowed there. Be aware that both apply.

The application of the FCPA to Riverfront Areas is still in dispute. Section 10.58(2)(c) of the Wetlands Protection Act regulations states that the Riverfront Area's outer boundary is '100 feet for new agriculture.' What is 'new' agriculture? New non-forest agriculture, as defined under the agricultural exemption (310 CMR 10.04(Agriculture)(a) means land not in agricultural use during the last five years. No such beginning point is assigned to forestry work. Therefore, any harvesting not part of an existing cutting plan or a long-term forestry plan such as is required by G.L. Ch. 61 (HB §6.5) is presumably 'new.'

This interpretation is strengthened by reference to the FCPA exemptions detailed in 310 CMR 1 0.04(Agriculture) (b)(15)(c). This section limits cutting without a forest cutting plan to 25 feet from the Bank of the river but it is silent as to boundaries for larger cuts under the forest cutting plan. Commissions should seek clarification from the DEP regional offices and the DCR Chief Forester.

The Wetlands Protection Act regulations generally limit tree removal in the 200-foot Riverfront Area to what is necessary for buildings, access, and footpaths. Ten percent 'vista pruning' is also allowed.

A plan submitted to the service forester may be approved by default if DCR fails to act within ten days. However, no work may commence within resource areas identified on the application until the plan has been approved by the forester (304 CMR 11.04(9)(c)). This provision applies to work in all resource areas protected under the Wetlands Protection Act, including wetlands of all kinds, Banks, floodplains, and certified vernal pools.

The standards for cutting set out in the forestry regulations will apply to work done under a forest cutting plan, as will the Wetlands Protection Act's parallel standards found in 1 0.04(b)(14-16).

One commenter noted that DCR cites Chapter 132, §§40-46 to support clearcutting and industrial scale logging policies and states that this statute omits 'such statutory language as that found within G.L.c. 132A, Section 2B, 'requiring that our state lands be so far as practicable preserved in their natural state and that no commercial activities except those essential to the quiet enjoyment of the facilities by the people shall be permitted. There does appear to be broad discretion in implementing both of these statutes on the Commonwealth's public forest lands. While the attempt by the Legislature to coordinate Chapter 131, §40 and Chapter 132, §§40-46 appears to work in practice, their coordination with Chapter 132, §2B is ambiguous. The former allow cutting on public lands, and the latter states that it should be avoided (in stating that such lands acquired by the commonwealth remain in their natural state).

Chapter 131: Section 10A. Nature preserves; designation

Section 10A. The executive office of environmental affairs, the department or any other division of the department within said executive office may designate as qualifying as a nature preserve any real property owned by the commonwealth and under the care and control of said department,

executive office or any of its divisions or departments. Such a parcel of real property shall be deemed to be a nature preserve upon the following:

The division shall after a determination that said parcel qualifies as a nature preserve hold a public hearing thereon in accordance with the provisions of chapter thirty A.

The division shall file with the secretary of the executive office of environmental affairs a statement dedicating said parcel as a nature preserve. Such statement shall include the reasons said parcel qualifies as a nature preserve and a plan for the preservation and protection of said parcel as a nature preserve.

A nature preserve established in accordance with the provisions of this section shall be monitored and maintained as nearly as possible in its natural condition, and shall be used in a manner and under limitations consistent with its status as a nature preserve, without impairment or artificial development for the public purposes of present or future scientific research and education, and of providing a habitat for plant and animal species, communities and other natural objects and for preservation of areas representative of the significant habitats and ecosystems of the commonwealth.

Chapter 132A

Chapter 132A: Section 28. Nature of use of acquired lands, provides:

'It is hereby declared to be the policy of the commonwealth that all such sites acquired or developed by the commissioner shall in so far as practicable be preserved in their natural state; that they shall be in so far as possible collectively self-supporting; and that no commercial activities except those essential to the quiet enjoyment of the facilities by the people shall be permitted.'

Chapter 132A: Section 20. Development and improvement; powers of commissioner

Section 2D. In the development and improvement of state parks, state forest recreation areas and state reservations, the commissioner is hereby authorized and empowered:-(1) To acquire, plan, construct, maintain and operate public recreational facilities, including roads, areas for parking, picnicking and camping, provisions for swimming, wading, boating, outdoor games, winter sports, horseback riding, bicycling and hiking trails, nature study, rest areas, outlooks, comfort stations, food accommodations and such other facilities as the commissioner deems necessary and desirable and consistent with the policy of the commonwealth, as set forth in section two B.

(2) To impose and collect such charges and fees for the use of the lands, buildings, facilities and equipment enumerated in subdivision (1) as may be necessary to defray in so far as practicable the cost of such developments and improvements, including costs of maintenance and operation and bond amortization and interest and to revise said fees and charges from time to time. A disabled veteran or a handicapped person whose vehicle bears the distinctive type number plate authorized by section two of chapter ninety shall not be required to pay the charges or fees imposed under the provisions of this subdivision.

(3) To designate such areas as may be used in season for hunting and fishing.

(4) To effect improvements at public recreation facilities, including improvements through the commonwealth's shared energy savings program and to expend, without further appropriation, monies received as a result of the improvements from a trust for facilities, the costs associated with said improvements, including contingency costs authorized under section forty-three F of chapter seven. The department shall develop and submit to the secretary of administration and finance and the house and senate committees on ways and means an analysis of all expenditures from said trust on or before each September first for the prior fiscal year.

Chapter 184

Chapter 184: Section 31. Restrictions, defined

Section 31. A conservation restriction means a right, either in perpetuity or for a specified number of years, whether or not stated in the form of a restriction, easement, covenant or condition, in any deed, will or other instrument executed by or on behalf of the owner of the land or in any order of taking, appropriate to retaining land or water areas predominantly in their natural, scenic or open condition or in agricultural, farming or forest use, to permit public recreational use, or to forbid or limit any or all (a) construction or placing of buildings, roads, signs, billboards or other advertising, utilities or other structures on or above the ground, (b) dumping or placing of soil or other substance or material as landfill, or dumping or placing of trash, waste or unsightly or offensive materials, (c) removal or destruction of trees, shrubs or other vegetation, (d) excavation, dredging or removal of loam, peat, gravel, soil, rock or other mineral substance in such manner as to affect the surface, (e) surface use except for agricultural, farming, forest or outdoor recreational purposes or purposes permitting the land or water area to remain predominantly in its natural condition, (f) activities detrimental to drainage, flood control, water conservation, erosion control or soil conservation, or (g) other acts or uses detrimental to such retention of land or water areas. A preservation restriction means a right, whether or not stated in the form of a restriction, easement, covenant or condition, in any deed, will or other instrument executed by or on behalf of the owner of the land or in any order of taking, appropriate to preservation of a structure or site historically significant for its architecture, archeology or associations, to forbid or limit any or all (a) alterations in exterior or interior features of the structure, (b) changes in appearance or condition of the site, (c) uses not historically appropriate, (d) field investigation, as defined in section twenty-six A of chapter nine, without a permit as provided by section twenty-seven C of said chapter, or (e) other acts or uses detrimental to appropriate preservation of the structure or site. An agricultural preservation restriction means a right, whether or not stated in the form of a restriction, easement, covenant or condition, in any deed, will or other instrument executed by or on behalf of the owner of the land appropriate to retaining land or water areas predominately in their agricultural farming or forest use, to forbid or limit any or all (a) construction or placing of buildings except for those used for agricultural purposes or for dwellings used for family living by the land owner, his immediate family or employees; (b) excavation, dredging or removal of loam, peat, gravel, soil, rock or other mineral substance in such a manner as to adversely affect the land's overall future agricultural potential; and (c) other acts or uses detrimental to such retention of the land for agricultural use. Such agricultural preservation restrictions shall be in perpetuity except as released under the provisions of section thirty-two. All other customary rights and privileges of ownership shall be retained by the owner including the right to privacy and to carry out all regular farming practices.

REGULATIONS

304 CMR 7.00, Management Plans and Massachusetts 'Wildlands'

304 CMR 7.01: Authority and Purpose (1) ... pursuant to M.G.L. c. 21, §§ 1 and 2F, M.G.L. c. 21, § 4A; and M.G.L. c. 132A, § 7. (2) The purpose of 304 CMR 7.00 is to establish procedures for the Board of Environmental Management and the Commissioner to prepare, adopt and revise official management plans for state reservations, parks and forests and to designate Massachusetts Wildlands.

304 CMR 7.02: Management Plans: For each state reservation, park, and forest, DEM shall follow a management planning process which shall produce the following components: (a) a description of the land's unique resources; (b) a discussion of the land's potential use; (c) land stewardship zoning analysis; and (d) action recommendations. Each Management Plan shall have public participation in its development.

304 CMR 7.03: Massachusetts Wildlands: (1) Massachusetts Wildlands means portions of DEM properties which are designated as either Representative Natural Areas or Backcountry. (2) Representative Natural Area (RNA) means a natural area defined by noticeable boundaries which exemplify a native or naturalized species or community with a high level of integrity and minimal disturbance. RNA's may be nominated from lands which are under DEM Conservation Restrictions. (3) Backcountry Area means a natural area located in the more remote portions of DEM properties which provide existing opportunities for hiking and canoeing in a wild area ...

304 CMR 7.04: Management of Massachusetts Wildlands: (1) DEM shall prepare an Area Management Summary to manage an R.N.A. or Backcountry. (2) The following activities are not permitted within Massachusetts Wildlands: open fires; motorized trail use; destruction or collection of vegetation; geological materials; or wildlife species; and/or aquatic organisms. Mountain bikes are not permitted in RNA's or in the backcountry areas: the Hooper, Range Ridgetops, Alander Mtn. Such restrictions shall not be interpreted to include prohibition of hunting, fishing and trapping at DEM properties where those activities are lawfully permitted or Division operations necessary to enhance public access and safety.'

304 CMR 11.00

304 CMR 11.05(1)2 governs DCR lands and states: 'clear-cutting, coppice cuts, or any regeneration cut leaving less mature trees than those required for seed tree (excepting the removal cut of shelterwood, seed tree or similar systems where, in the judgment of the director's agent, the advance regeneration is a suitable size in stock and for release) shall meet the following standards: a. the maximum size of the opening created shall be ten acres unless the source of the regeneration is seeding from surrounding stands, in which case the maximum size shall be five acres. Clear-cuts larger than these limits shall require a specific reason to be given and approved in the forest cutting plan showing that environmental impact is less, or that environmental benefits would be enhanced, by a larger cut. In these cases, the forest cutting plan must also state the silvicultural justification for larger area and list the provisions necessary to ensure adequate regeneration and mitigation of environmental impacts.'

There has been a concern expressed in this DCR Forest Vision Process that many clear-cuts have greatly exceeded ten acres in size without the requisite reason that environmental impact is lesser, or that environmental benefits would be Enhanced. The belief expressed is that, in most cases, DCR calls what are obvious clear-cuts 'shelterwood' cuts. There does not appear to be any inconsistency in the language of the regulation, but this may be an example of a regulation with broad discretion in implementation. Again, the stated concern shows at least a perception that the DCR may use its discretion in how it defines cuts and there may be a need for more uniformity in requiring compliance with the cuts amounts or an explanation of the reason for exceeding those amounts.

304 CMR 11.02(4) as noted above, addresses forest cutting practices in connection with the state's Wetlands Protection Act, **G.L.c. 131, Sections 40**. It states that the Act requires that a Notice of Intent be filed with the local town conservation commission-but allows for an exemption if the landowner meets certain 'requirements. These include: (1) wetland resource areas are properly identified in the forest cutting plan; (2) the forest cutting plan is approved by the Director or the Director's agent; (3) the forest cutting plan is filed with the local conservation commission as required under 304 CMR 11.04(2) allowing for an opportunity for comment; (4) the Director or the Director's agent sends the approved forest cutting plan to the appropriate DEP regional office; and (5) the landowner faithfully executes the forest cutting plan.

Concerns were expressed with implementation of this regulation. The examples given were clear-cuts in Chester-Blandford State Forest (a clear-cut to the edge of a beaver pond), and Savoy State Forest, Wendell State Forest. This again appears to be a concern about implementation of the regulations that should be addressed in the Forest Futures Vision Document.

304 CMR 11.05 governs Standards for Forest Cutting Practices. 304 CMR 11.05(1)(a)2c states that: 'clear-cutting cannot occur within filter and buffer strips, on slopes of 60% or more, or within wetlands.'

304 CMR 11.05(1)(d) states: 'filter strips shall be left along the edges of all water bodies and certified vernal pools. No more than 50% of the basal area shall be cut at any one time and a waiting period of five years must elapse before another cut is made. The residual stand shall be composed of healthy grown trees well distributed over the area. Exceptions to this standard may be granted by the Director or the Director's agent if it is shown in the forest cutting plan that a heavier cut is necessary to protect the stream, the bank or water supply. Equipment restrictions within filter strips are listed under 304 CMR 11.05(2). The filter strip shall extend 50 feet back from the bank, except in the following cases (all distances shall be measured along the slope).

304 CMR 11.05(1)(d)1 states: 'where slopes within the filter strip are 30% or greater, the filter strip shall extend 100 feet back from the bank, or to the point between 50 and 100 feet from the bank, where a break in the topography reduces the slope to less than 30%.'

CMR 11.05(1)(a)5 states: 'for any intermediate cut, the residual stand must contain sufficient numbers of healthy, undamaged trees greater than 5 inches D.B.H. to constitute a stock level at or above 'C-Ievel' on the appropriate stocking chart.

304 CMR 11.05(1)(d) states: 'Filter strips shall be left along the edges of all water bodies and Certified Vernal Pools. No more than 50% of the basal area shall be cut at anyone time and a waiting period of five years must elapse before another cut is made.'

304 CMR 11.05(1)(b)(e) No more than 50% of the basal area shall be cut any one time as single trees or in small patches ...

304 CMR 11.05(2)(a), Roads, skid roads and skid trails are to be laid out, constructed, maintained and stabilized according to the principles set forth in the BMP manual. ...

The aforementioned sections are not in themselves vague or ambiguous, however, there have been concerns expressed that OCR is not complying with them on its own lands, or selectively enforcing compliance.

310 CMR 10.04(b)14-16

The regulations at 310 CMR 10.00 et seq., implement the Wetlands Protection Act, Chapter 131, §40. Because the agricultural exemptions are contained in a very lengthy section within the definitions section of Section 10.04, I am not citing them in full. However, by way of background, I note that this amendment to the regulations was an attempt to reconcile certain farming activities with wetlands protection. In 1991, the Massachusetts Legislature established the Farmland Advisory Committee (FAC) and directed the Department of Environmental Protection (DEP) to clarify the definition of 'normal maintenance or improvement of land in agricultural use' as it applies to the exemption under the Wetlands Protection Act. DEP adopted regulatory language related to the agricultural exemption for row crops, cranberries, and other commodities in May 1993. The revised Wetlands Protection Regulations for forestry activities (310 CMR 10.00) were adopted in November 1995. In addition to addressing a legislative mandate, the forestry regulations are part of DEP's continuing effort to streamline permitting and provide a better understanding of the standards while maintaining wetlands protection.

The Wetlands Protection Act provides an exemption for 'work performed for normal maintenance or improvement of land in agricultural use.' In the Wetlands Protection Regulations (310 CMR 10.00), forestry is considered an agricultural activity. Therefore, the forestry provisions of the Wetlands Protection Regulations are included with other agricultural activities under 310 CMR 10.04 Agriculture, in the definitions section. In the forestry provisions of the Wetlands Protection Regulations, only those portions of the forest that are subject to the jurisdiction of the Wetlands Protection Act (i.e. in wetland resource areas and buffer zones) are regulated. Forestry activities outside these areas are not regulated, unless and until such activity causes an impact, such as siltation, to a resource area.

As with other agricultural activities, certain forestry activities are exempt from WPA review if they:
1) meet the definition of 'normal maintenance or improvement of land in agricultural use';
2) meet general conditions for the exemption; and
3) meet specific conditions for individual activities included in the exemption.

It is the activity, or the work, that is exempt, not the land. Even though a parcel of land within jurisdiction is forested, a particular activity on that land may not be exempt from the Wetlands Protection Act. Not all activities that take place in the woods, including on a farm woodlot, are exempt. For example, cutting trees to establish a trail or a scenic view is not exempt.

Exempt activities are those that are performed as ‘normal maintenance’ or ‘normal improvement.’ For forestry, normal maintenance activities involve the management and harvesting of forest products, either for commercial sale or for one's own use within certain thresholds. The activities that are considered to be ‘normal maintenance or normal improvement of land in agricultural use’ are described in the Wetlands Protection Regulations (310 CMR 10.04 Agriculture).

For an activity to qualify for an exemption it must take place on forest land that is ‘land in agricultural use,’ meaning land presently and primarily used to grow forest products such as biomass, sawlogs, and cordwood. Because forest products take a long time to grow, it is sometimes difficult to show active use. Nonetheless, for the forestry activity to qualify for the exemption, the land must be devoted to continued production of forest products. Evidence of such committed use would include, for example, a 10-year Forest Management Plan such as required for Chapter 61 or enrollment in a federal or state program to improve forest resources such as the Stewardship Incentive Program. A Forest Cutting Plan approved by OEM also is evidence of continued forest land use. However, lack of these formal plans does not necessarily mean the land is not devoted to continued production of forest products.

Land undergoing a change from forest to development or to open land for farming, and forests used only for recreation or scenic amenity do not qualify as ‘land maintained in forest use.’ Therefore, such activities occurring in wetland resource areas or buffer zones would not be exempt from the Wetlands Protection Regulations.

A necessary and related forestry activity is the creation and use of landings for forest products. These are areas where wood that is being harvested is collected and stored prior to being removed from the site by logging trucks. However, the exemption for landings specifies that they must not be located in Bordering Vegetated Wetlands or banks.

Forest management may involve an orderly plan for achieving the objectives of the landowner or it may involve a decision to not conduct an active management plan. In either case, the forest may be considered land in agricultural use. However, whether the activity that occurs in this area is exempt from the Wetland Protection Regulations is dependent on how the work is carried out and if it meets the conditions of the exemption as specified in 310 CMR 10.04.

A forest management plan specifies forest conditions, goals, and activities for reaching the goals. A fundamental purpose of forest management is to keep the forest healthy and productive. Goals of forest management may include recreation, wildlife habitat enhancement, protection of water quality, and production of forest products. Managing for a commercial product often involves practices such as thinning, pruning, and seeding, as well as harvesting. Since these activities are considered normal maintenance or improvement, they are exempt.

Commercial harvesting of forest products from a resource area is an exempt activity if it is carried out in accordance with the **Forest Cutting Plan Regulations (304 CMR 11.00)** and complies with other conditions identified in the agricultural provisions of the Wetlands Protection Regulations. Therefore, for consistency with these regulations, an approved Forest Cutting Plan is needed from DEM, as well as compliance with the Wetlands Protection Regulations.

Another exempt maintenance activity is the harvesting of trees by owners for their own use, provided threshold limits and all conditions are observed, and a Forest Cutting Plan is obtained when necessary.

- The harvesting of trees during any 12-month period within a wetland resource area or buffer zone is exempt if it does not exceed 5,000 board feet or 10 cords and the following conditions are met:
- crown cover in the harvested area shall be 50 percent or greater after the harvest;
- work shall occur only when the ground is frozen, dry, or otherwise stable;
- there shall be no cutting, removal, or destruction of trees and understory vegetation within 25 feet of a bank;
- slash cannot be placed within 25 feet of a bank;
- there shall be no filling, excavation, or other change in topography or hydrology: and
- landings cannot be placed in a Bordering Vegetated Wetland or on a bank.

(Note: a Forest Cutting Plan is not required for this category.)

- The harvesting of trees during any 12-month period within a wetland resource area greater than 5,000 board feet or '10 cords, but less than 10,000 board feet or 20 cords, is exempt if an approved Forest Cutting Plan is obtained and the work meets the following conditions:
- crown cover in the harvested area shall be 50 percent or greater after the harvest;
- slash cannot be placed within 25 feet of a bank;
- there shall be no filling, excavation, or other change in topography or hydrology; and
- landings cannot be placed in a Bordering Vegetated Wetland or on a bank.

321 CMR 10.00, are the MESA regulations that implement G.L. c. 132A, discussed above.

Article 97

The people shall have the right to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment; and the protection of the people in their right to the conservation, development and utilization of the agricultural, mineral, forest, water, air and other natural resources is hereby declared to be a public purpose.

Article VII of the Declaration of Rights of the Constitution of the Commonwealth states: ‘Government is instituted for the common good; for the protection, safety, prosperity and happiness of the people; and not for the profit, honor, or private interest of anyone man, family, or class of men: Therefore the people alone have an incontestable, unalienable, and indefeasible right to institute government; and to reform, alter, or totally change the same, when their protection, safety, prosperity and happiness require it.’

These provisions are not inherently inconsistent with the statutes and regulations allowing for forest cutting, but does represent different interests. Compliance with the intent of the statutes and regulations on both ends of the spectrum, i.e. those that provide public protections through maintenance of the natural landscape, and those that allow for clear-cutting in certain circumstances, requires adherence to specific guidelines within the regulations.

Respectfully submitted,

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Additional Comments on Legal Mandates

Prepared by Kathleen E. Connolly

There has been a great deal of discussion throughout the meetings as well as in emails regarding certain issues in the applicable laws. I see a consistent concern amongst the TSC and the Stakeholders from whom I have heard as to the main areas of the applicable laws and regulations that are at issue. As I have noted in my summary, however, the issue isn't that they are necessarily inconsistent in all cases, but rather that they contain language that gives DCR broad discretion in implementation, and if DCR uses such broad discretion that it, for example, interprets definitions (like clear-cutting, among others) differently according to each parcel of land, or otherwise exercises its discretion differently on various lands, that can lead to inconsistency in application. As for how to resolve that, I could suggest clearer, unambiguous language with less discretion, but I don't know that that is always in all parties' best interests. The suggestions in Recommendations 1 through 9 about agency reorganization or shifting of responsibility to another agency might be a possibility, but with the recent announcements from EEA of possible reorganization, that is anyone's guess. It may not be fruitful to spend significant time determining to which other agencies DCR might shift responsibilities given the uncertainty of agency organization at this time.

Chapter 21, §2F: I stated in my summary:

> *Section 2F. The directors of the divisions of state parks and recreation and urban parks and recreation shall work in cooperation with the director of the division of fisheries and wildlife within the department of fish and game to establish coordinated management guidelines for sustainable forestry practices on public forest lands within the departments of conservation and recreation and on private forest lands. Said guidelines for public forest lands shall include agreements on equipment, personnel transfers, operational costs, and assignment of specific management responsibilities.*
>
> *The commissioner of conservation and recreation shall submit management plans to the stewardship council for the council's adoption with respect to all reservations, parks, and forests under the management of the department, regardless of whether such reservations, parks, or forests lie within the urban parks district or outside the urban parks district. Said management plans shall include guidelines for the operation and land stewardship of the aforementioned reservations, parks and forests, shall provide for the protection and stewardship of natural and cultural resources and shall ensure consistency between recreation, resource protection, and sustainable forest management. The commissioner shall seek and consider public input in the development of management plans, and shall make draft plans available for a public review and comment period through notice in the Environmental Monitor. Within thirty days of the adoption of such management plans, as amended from time to time, the commissioner shall file a copy of such plans as adopted by the council with the state secretary and the joint committee on natural resources and agriculture of the general court.*
>
> *The commissioner of conservation and recreation shall be responsible for implementing said management plans, with due regard for the above requirement. [Emphasis added]*

Under the language of this statute, DCR, in cooperation with the Division of Fish &Wildlife (DFW) Director is directed to develop coordinated management guidelines for sustainable forestry practices on public and private forest lands. DCR is to submit management plans for all its units to its stewardship council to 'ensure consistency between recreation, resource protection and sustainable forest management.' Public review is through the Environmental Monitor, although these management plans are not enforceable by the public See *Sierra Club v. Commissioner of Env'l. Mgmt*., 439 Mass. 2003). Some of the commentators identified above have cited examples in which DCR did not comply with this statute in that the Commissioner did not incorporate public input. I am not personally familiar with the examples given and cannot comment on specific examples, but note that as written, the language of the statute requires only that DCR 'seek and consider' public input, but not necessarily incorporate it. One might argue, however, that if reasonable efforts are not made to obtain public input, or if sound suggestions are made and not incorporated for reasons that are arbitrary or capricious, then there has not been compliance with Chapter 21, §2F. The Massachusetts Association of Conservation Commissions (MACC) Handbook points out that as of 2006, funding had not been allocated to the public review process required by DCR.

One AGS member has commented on the reference to *Sierra Club v. Commissioner of Env'l. Mgmt*., 439 Mass. 2003 holding that the management plans are not enforceable by the public and adds 'BUT, the revisions to Ch. 21 S.2F that were adopted when DEM and MDC merged included the requirements that plans be approved by the Stewardship Council and that 'The commissioner of conservation and recreation shall be responsible for implementing said management plans, with due regard for the above requirement.' The Sierra Club worked hard to get this language included in the amended statute specifically because of the concern in the Wachusett Mountain lawsuit where the courts decided that DEM didn't have to follow its own management plan – that was up to the discretion of the Commissioner. This change in statute made sure it is mandatory that the plans be followed.' I agree that the statute, since the amendment which I cited in my original memo, requires state agencies to comply with management plans, and that the incentive for the amendment came from the result in that case, as often happens when a single court holding incites legislative change. In fact, the language does not require 'approval' by the Stewardship Council, but rather submittal by DCR for the Council's adoption, leaving no room for review and comment by the Council. As for the public's enforcement rights, there is certainly the option of a ten-citizens suit in environmental cases, but I read the statute's reference to the public as addressing rights of public input.

Another point made by the same AGS member that I find worth including for discussion amongst the TSC and AGS for recommendations for the final report further relates to this section, because there appears to be a great division of opinions from the TSC discussions that I have heard. She states: ' Under what authority is DCR developing Forest Management Plans for its land, prepared by the Bureau of Forestry? How does this square with the agency's planning responsibilities and the process and content laid out in Ch. 21 S. 2F? Isn't it an inherent conflict with 2F for DCR to develop forestry plans that by definition do not integrate recreation and resource conservation as required by 2F? DCR says that it does address these other provisions in the district level Forest Management Plans, but just not to the same level of detail as forestry, and that those other details will be developed in the future in Resource Management Plans prepared by the agency's planning unit. But if the recreational and resource conservation interests aren't addressed at the same level of detail, how can they be adequately protected in undertaking the forestry activities proposed in the Forest Management Plans?' The interpretation of section 2F needs to be explored further and

should be a focus of the final report, on which I will be happy to provide further analysis after the next group discussion and draft.

The other main statutory provision that appears to contain inconsistencies in language interpretation and/or application is **Chapter 132A: Section 2B.** Nature of use of acquired lands, which provides:

'It is hereby declared to be the policy of the commonwealth that all such sites acquired or developed by the commissioner shall in so far as practicable be preserved in their natural state; that they shall be in so far as possible collectively self-supporting; and that no commercial activities except those essential to the quiet enjoyment of the facilities by the people shall be permitted.'

One commenter noted that DCR cites Chapter 132, §§40-46 to support clear-cutting and industrial scale logging policies and states that this statute omits 'such statutory language as that found within G.L.c. 132A, Section 2B, 'requiring that our state lands be so far as practicable preserved in their natural state and that no commercial activities except those essential to the quiet enjoyment of the facilities by the people shall be permitted. There does appear to be broad discretion in implementing both of these statutes on the Commonwealth's public forest lands.

While the attempt by the Legislature to coordinate Chapter 131, §40 and Chapter 132, §§40-46 appears to work in practice, their coordination with Chapter 132, §2B is ambiguous. The former allow cutting on public lands, and the latter states that it should be avoided (in stating that such lands acquired by the commonwealth remain in their natural state). I see this as the most problematic of the applicable statutes. To quote the recommendation of one AGS representative, 'I hope that the TSC recommendations will include a recommendation that these statutes be clarified and harmonized ....' My sense is that the commercial foresters among the TSC (and AGS), for whom I do not presume to speak, might at least agree that this statute is unclear when read with Chapter 132, even if there is disagree ment as to how it should be revised. Specifically, it is not clear as to precisely what lands are covered, and also, the word 'natural,' as used in both c. 21, §2F and c. 132, §2B, should be clearly defined, or they should reference a definition elsewhere.

Chapter 131A, the Massachusetts Endangered Species Act

MESA provides in part: 'Except as otherwise provided in this chapter, no person may take, possess, transport, export, process, sell or offer for sale, buy or offer to buy, nor shall a common or contract carrier knowingly transport or receive for shipment, any plant or animal species listed as endangered, threatened or of special concern or listed under the Federal Endangered Species Act.

Except as otherwise provided in this chapter, no person may alter significant habitat.'

G.L. c. 131A, §2. This law prohibits anyone from killing, collecting or otherwise 'taking' any of the 424 species of plants, mammals, birds, reptiles, or invertebrates that the Mass. Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (NHESP) has determined to be rare in Massachusetts. The MESA regulations are found at 321 CMR 10.00, *et seq.*

When any Forest Cutting Plan is filed, the DCR service forester will check the Natural Heritage Atlas to see if the area to be harvested includes any known rare species habitat. If it does, DCR will consult with NHESP about the planned harvest to ensure protection of rare species habitat or species.

At least one AGS member has raised the concern that under MESA and its regulations, management and management plans for state lands should be held to a higher standard of managing for the benefit of rare species rather than just managing to minimize impacts to rare species habitat.

Annex 8

Recommendations for Development of DCR Public Engagement Strategy

I. Principles of Public Engagement

- Defining Public Engagement?

Examples of Public Engagement Strategies/Protocols -- the following organizations offer excellent examples of public involvement/public engagement strategies:

- America Speaks – www.americaspeaks.org
- U.S. Environmental Protection Agency – www.epa.gov/publicinvolvement
- International Association for Public Participation (IAP2) – www.iap2.org
- Ohio Library Council – www.olc.org
- Public Agenda – www.publicagenda.org
- National Coalition for Dialogue and Deliberation – www.thataway.org

-Public Engagement vs. Public Information

-Public information 'pushed' out to community
-Public engagement – partnership (two-way)

- Other Basic Principles of Public Engagement

- Identify potential stakeholders
- Identify the need/interests of affected parties
- Develop trust & credibility through transparency
- Solicit information and ideas from affected stakeholders
- Ensure all relevant local, state, federal laws & regs are met or exceeded
- Begin early
- Be flexible
- Improve and adapt plan as necessary

II. Develop Internal Public Engagement Policy

- Examine existing policies/legal mandates

-Are they clear, comprehensive up-to-date?
-Are they effective in meeting challenges faced today and anticipated tomorrow?

- Review examples of other state/federal public engagement policies

- Form policy review/form team to analyze gaps and address vague/unclear issues critical to gaining/maintaining public trust

- Conduct periodic policy review (e.g., annually) – include members of legal staff and representative stakeholders

- Document sensitive questions and inquiries from public and forward all inquiries to designated individual

- Establish process for providing appropriate response in a timely manner to any question, inquiry or request for information

- Remain 'in touch' and engaged on issues affecting forests locally, regionally and nationally and how those might affect the public

III. Educate/Engage DCR Internal Base of Support

- Educate DCR staff about public engagement mission, plan, policies and actions so they understand what DCR is doing and why. (Alignment)

- Ongoing internal communication key to continued alignment and ability for staff to communicate DCR's key messages

- Once internal base of support aligned – easier to ensure external public engagement efforts will be fruitful

- Establish an internal public engagement advisory board?

- Ongoing employee 'public engagement' training should include review of DCR public engagement policies/protocols as well as role play situations for employees to practice responding to public inquiries or criticism

IV: Develop a Public Engagement Plan

- Requires significant investment of time, effort & resources

- Requires thoughtful and strategic direction – be clear from beginning about objectives and goals of public engagement

- Critical questions in developing Public Engagement Plan:

    1) What do you want to happen as a result of your efforts?
    2) To whom or to which audiences should these efforts be directed?
    3) What is the time frame?
    4) Who can we enlist to help with this engagement?
    5) How soon do we want results?

- Determine Capabilities (Number of factors to consider)

    - Length of engagement (short-term vs. long-term)
    - Size of staff/human resources
    - Complexity of goals
    - Experience level (prior public engagement experience)
    - Budget
    - History of stakeholder relationship (positive history vs. negative history)

- Identifying and Engaging Key Stakeholders (People or groups who could affect or be affected by DCR initiatives or changes in policy/procedures)

    - Internal staff
    - Other state agencies/municipalities
    - Friends groups
    - Land trusts
    - Environmental organizations
    - Schools/universities
    - Local elected officials
    - Identified public opinion leaders (beyond elected officials)
    - Media (print, radio, TV, web)
    - Civic groups and citizen action groups

- Ensure comprehensive stakeholder list is created by asking following:

    - Whose support is needed and why?
    - Who are the community leaders that shape public opinion?
    - What groups' involvement could affect the project's success?
    - Is opposition expected?
    - Has every group that could be affected been given the opportunity to participate?
    - Turning stakeholders into Allies/Alliance building – Working with partners has several advantages, including:

        - Third-party credibility
        - Increased resources
        - Audience penetration
        - Education

    - Assistance Allies can provide: (Be clear about what you need)

        -Writing letters/gathering support for project or issue
        - Attend selected meetings with local decision makers, civic groups, media
        - Help build understanding among decision makers with whom they have a good relationship
        - Becoming an active volunteer/advisor

V. Monitor/Evaluate Effectiveness of Public Engagement

Ongoing monitoring and evaluation should be built into DCR's public engagement strategy. Evaluating the engagement process provides an opportunity to learn from what did and what did not work in order to improve the planning and delivery of future public engagement processes.

Monitoring should be built into the public engagement proves from the beginning. This will avoid the process from becoming onerous since data will be collected throughout in a pre-agreed format (samples to be provided). Although monitoring should be sustained throughout the engagement process, any final evaluation should take place at the end of the main phase of the public engagement process.

In addition to looking at specific outcomes from public engagement (specific written/verbal comments and feedback to proposed action), DCR should also measure effectiveness of its public engagement based on assessment of the following measurable results:

- Uptake of DCR messages by members of public, friends groups/partners, media and other government agencies
- Statements of policy
- Number of members of public involved in DCR's public engagement activities
- Feedback solicited specifically from partners and decision-makers
- Number of DCR public engagement workshops, presentations and activities (site visits, etc.)
- Public awareness and opinion
- Number of media hits, type of coverage
- Number of web site hits, user surveys

Annex 9

References

Aber, J., Christensen, N., Fernandez, I., Franklin, J., Hidinger, L., Hunter, M., et al. (2000). Applying Ecological Principles to the Management of U.S. National Forests. *Issues in Ecology , 6*.

Anderson, M. (2008). Conserving Forest Ecosystems: Guidelines for Size, Condition and Landscape Requirements. In R. Askins, *Saving Biological Diversity.* Springer.

Ashton, M, Keeton, W., Ducey, M., Kelty, M., Seymour, R. 2010. Comments on Forest Futures Draft Report. Submitted to MA Dept. of Conservation and Recreation via email.

Beier P, and B Brost. 2010. Use of Land Facets to Plan for Climate Change: Conserving the Arenas, Not the Actors. Cons. Bio.

Chandler, D.S. (1987). Species richness and abundance of Pselaphidae (Coleoptera) in old-growth and 40-year-old forests in New Hampshire. *Canadian Journal of Zoology*, 65, 608–615.

D'Amato, A.W., D.A. Orwig, and D.R. Foster. 2006. New Estimates of Massachusetts Old-growth Forests: Useful Data for Regional Conservation and Forest Reserve Planning. Northeast Naturalist.

D'Amato, D., & Catanzaro, P. (2007). *Restoring Old-Growth Characteristics.* UMass Extension. DCR. (2009). Chapter 132 Cutting Plan Database. Boston, MA: Department of Conservation and Recreation.

DeGraaf, R. M., & Yamasaki, M. (2003). Options for managing early-successional forest and shrubland bird habitats in the northeastern United States. *Forest Ecology and Management , 185*, 179-191.

Foster, D., & Orwig, D. (2006). Preemptive and Salvage Harvesting of New England Forests; When Doing Nothing is a Viable Alternative. *Conservation Biology , 20* (4), 959-970.

Foster, D., Kittredge, D., Donahue, B., Motzkin, G., Orwig, D., Ellison, A., et al. (2005). *Wildlands and Woodlands: A Vision for the Forests of Massachusetts.* Harvard Forest, Harvard University, Petersham, Massachusetts.

Hagan, J., & Whitman, A. (2004). *Late-successional forest: a disappearing age class and implications for biodiversity.* Manomet Center for Conservation Sciences, Brunswick, Maine.

Haney, C.J. and C.P. Schaadt. 1996. Functional Roles of Eastern Old Growth in Promoting Forest Bird Diversity. Pp. 76-88 in M.B. Davis (Ed.). Eastern Old-growth Forests. Island Press. Washington, D.C. 383pp.

Harmon, M. (2009). The Role of Federal Lands in Combating Climate Change. *Testimony before the U.S. House of Representatives Subcommittee on National Parks, Forests, and Public Lands of the Committee of Natural Resources* .

Keeton, W. (2006). Managing for late-successional/old-growth characteristics in northern hardwood-conifer forests. *Forest Ecology and Management , 235*, 129-142.

Kelty, M., D'Amato, A., & Barten, P. (2008). *Silvicultural and Ecological Considerations of Forest Biomass Harvesting in Massachusetts.* Department of Natural Resources Conservation, University of Massachusetts. Massachusetts Division of Energy Resources and MA Department of Conservation and Recreation.

Klyza, C. (2001). *Wilderness Comes Home - Rewilding the Northeast.* Hanover, NH: Middlebury College Press.

Loomis, J. (2005). *Updated Outdoor Recreation Use Values on National Forests and Other Public Lands.* U.S. Department of Agriculture, Washington.

Lorimer C.G. and A.S. White. 2003. Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions. Forest Ecology and Management.

Luyssaert, S., E.D., S., Borner, A., Knohl, A., Hessenmoller, D., Law, B., et al. (2008). Old-growth forests as global carbon sinks. *Nature , 455*.

Mass Audubon. (2009). Comments on FSC Recertification.

Mass Audubon. (2009). *Losing Ground: Beyond the Footprint.*

Massachusetts Department of Environmental Protection. (2009). *Statewide Greenhouse Gas Emissions Level: 1990 Baseline and 2020 Business as Usual Projections.*

Massachusetts Division of Fisheries & Wildlife. (2006). *Comprehensive Wildlife Conservation Strategy.* Boston.

McDonald, R., Motzkin, G., & Foster, D. (2008). The effect of logging on vegetation composition in Western Massachusetts. *Forest Ecology and Management , 255*, 4021-4031.

Millenium Ecosystems Assessment. (2005). *Ecosystems and Human Well-Being: Policy Responses.* Island Press.

Munger, J., Barford, C., & Wofsy, S. (2004). Exchanges between the Forest and the Atmosphere. In D. Foster, & J. Aber, *Forests in Time.* New Haven, CT: Yale University Press.

National Coalition for Dialogue & Deliberation (2009). *Core Principles for Public Engagement*

Norton, D. 1999. Pp. 525-555 in M.L. Hunter (editor). Maintaining biodiversity in forest ecosystems. Cambridge University Press. New York.

Nunery, J.S., Keeton, W.S. (2010), Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products. Forest Ecol. Manage.

O'Donnell, F. C. (2007). Carbon Dynamics of a New England Temperate Forest Five Years After Selective Logging. *Senior Thesis in Organismic and Evolutionary Biology*. Cambridge, MA.

Ohio Library Council (2009). *Community Connection Toolkit.*

Perez-Garcia, J., Lippke, B., Comnick, J., & Manriquez, C. (2005). An Assessment of Carbon Pools, Storage, and Wood Products Market Substition Using Life-Cycle Analysis Results. *Wood and Fiber Science , 37*, 140-148.

Puettmann, K., Coates, K., & Messier, C. (2009). *A Critique of Silviculture: Managing for Complexity.* Washington, DC: Island Press.

Raymond, P., Bedard, S., Roy, V., Larouch, C., & Tremblay, S. (2009). The Irregular Shelterwood System: Review, Classification, and Potential Application to Forests Affected by Partial Disturbances. *Journal of Forestry* .

Ricci, H. (2009). Facts about DCR Lands; Notes for presentation to June 23, 2009 Forest Futures Vision Meeting.

Scientific Certification Systems. (2009). *Forest Management and Stump-to-Forest Gate Chain of Custody Certfication Evaluation Report.* Massachusetts Executive Office of Environmental Affairs.

Selva, S. 1996. Using lichens to assess ecological continuity in northeastern forests. Pp. 35-48 in M.B. Davis (Ed.). Eastern Old-growth Forests. Island Press, Washington, D.C. 383 pp.

Slay, C., & Smith, K. (2008). Nest Success Rates of Four Shrubland Specialists in Conservation-Managed Fields with Comparisons to Other Managed and Unmanaged Shrublands. *Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics*, (pp. 705-712).

Soule, M., & Terborgh, J. (1999). *Continental Conservation: Scientific Foundations of Regional Reserve Networks.* Washington, D.C.: Island Press.

The Insight Group and Dorr Research Corp. (2004). *The Public's Use of Outdoor Resources in Massachusetts.* Massachusetts Department of Conservation and Recreation.

Yale Forest Forum (Hodgton, B. (2002). Public Lands Certification. *Yale Forest Forum , 5* (4).