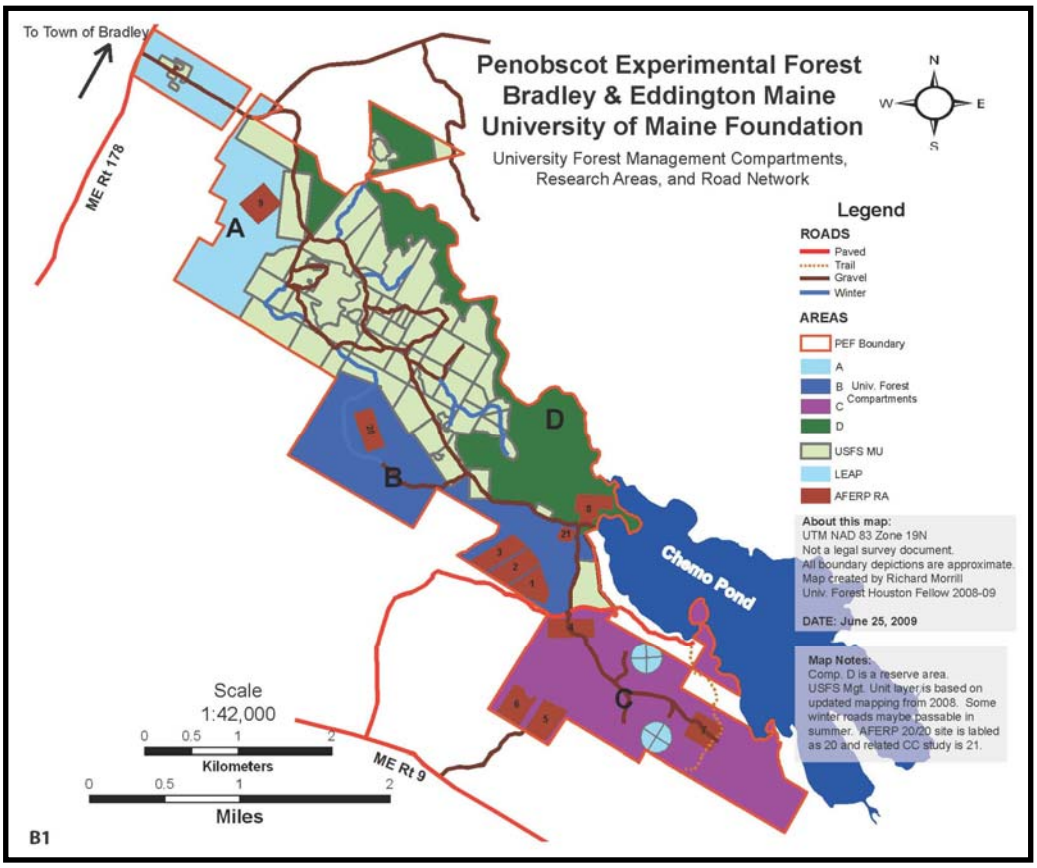
Penobscot Experimental Forest

Forest Management Plan

University of Maine Foundation Ownership

University Forests Management Area



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Plan Authors:

Richard Morrill

University Forests Intern Forester & 2008 Houston Fellow

&

Alan Kimball

University Forests Woodlands Manager

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Foreword & Acknowledgments

This written plan represents the culmination of many months of labor both in the field and the office. The document has been formatted for "hardcopy printing" but the authors feel that it will prove most useful in electronic form, so the reader can take full advantage of built in links to supporting documents, websites, and maps. Hyperlinks embedded throughout the text allow one to, with just a button click, "flip" to supporting material and then back to the plan, creating a reading experience akin to having all the appendix information neatly organized on a giant desk immediately available to the reader. This plan is also meant, like the forest ecosystems it describes, to be dynamic and constantly developing with advances in scientific knowledge, management understanding, and forest change. While the next official update to the plan will come in 2019, this electronic format will enable intermediate updates and revisions, thus elevating the document to a working manual for the management of the PEF that will be consulted routinely.

This management plan is the result of contributions from a diverse group of faculty, staff, and students from within the School of Forest Resources (SFR) as well as professionals from outside the halls of Nutting. The Research Operations Team (ROT) members: John Brissette(USFS), Laura Kenefic(USFS), Robert Seymour(SFR), and Jeremy Wilson(SFR) reviewed drafts of this document, and contributed significant direction to the planning process. Jeremy Wilson and Robert Seymour deserve special recognition for their key contributions to the development of management simulations and analysis using modern techniques and technology. Spencer Meyer assisted in building essential database tools and Aaron Weiskittel gave generously of his time and technical expertise in multiple aspects of biometry and modeling. M.S. student Elizabeth Bryce edited multiple sections on invasive vegetation based on her related research in the USFS portion of the PEF. Numerous student workers, too many to list here, assisted in the collection of field data, which made the planning process possible. Several professional foresters provided valuable ideas and feed back relating to FSC principles and forest classification systems, including Robert Byran of Harpswell, Maine and Ross Morgan of Craftsbury, Vermont.

We would like to acknowledge the University of Maine Foundation for accepting ownership of the PEF in 1995 on behalf of the University of Maine, for creating and managing the stumpage account, the research account, and the PEF Endowment. The Foundation, through the Green Endowment Program, was instrumental in securing both the Houston Forest Management Fund that helps support undergraduate interns working on the PEF and the George L. Houston Scholarship Fund that supported Richard Morrill, the first Houston Graduate Fellow, as he worked tirelessly to bring this plan to fruition.

Executive Summary

This document is the comprehensive forest management plan for the Penobscot Experimental Forest located in Bradley and Eddington, Maine, owned in fee by the University of Maine Foundation. This plan pertains to the portion of the forest that is managed by the University Forests and does not govern the management of the USFS research area which resides within the overall forest ownership. The area descriptions in section 3 of this document make clear the parts of the forest to which the plan applies. The planning process and final document have been developed to satisfy American Tree Farm System certification criteria as the PEF is certified under the Tree Farm (ATF) system. In addition, the plan has been crafted to parallel regional Forest Stewardship Council (FSC) certification requirements. While the University Forests Office is not currently pursuing FSC certification it has been determined that FSC guidelines will be incorporated into University Forest management planning activities where possible.

The 2009 planning process has been based on the goal of orchestrating management activities at the landscape level. Individual stand prescriptions and harvest schedules result from planning that seeks to balance current and future stand level forest conditions with the "big picture", the conditions across the entire management area. The first section of the document outlines the management objectives and specific criteria against which achievement of the objectives will be measured. The primary objectives include managing for a sustainable supply of forest products, fostering research and educational opportunities, and protecting unique ecological features and managing to conserve and/or enhance forest biodiversity.

Section 2 describes key elements of the property deed and the memoranda (updated in 2007) which govern the forest and originated with the transfer of the property to the University of Maine Foundation. Part 3 provides a detailed analysis of the current forest conditions as they existed in 2008 on the ownership. The forest can be characterized as generally mature, dominated by sawlog sized overstory trees, often with a developed sapling to small pool strata of shade tolerant species. About 2/3 of the forest is classified as mixed-wood with the other third split between hardwood and softwood types. Invasive species, both vegetation and pest/disease are uncommon, however their presence around the forest boundaries and in the region are cause for concern and necessitate vigilant monitoring. Almost 20% of the forest is subject to shoreland zoning regulation. Roughly 10% of the

upland forest has been designated as ecological reserve or research project controls and will not be subject to harvesting. Of the total ownership area just under 50% (roughly 1260ac) is open to management activities directed by the University Forests.

The 2009 management planning process employed the Landscape Management System, a forest modeling software package capable of manipulating multiple stands simultaneously. Current inventory data was used to build a forest "portfolio" comprising over 150 stands. Harvest treatments were designed and implemented in the model and forest conditions were projected 50 years into the future. Out of the modeling process emerged a single management scenario, developed to balance the planning objectives and achieve a robust and practical harvest schedule. Based on the scenario about 25% of the stands will be managed using an uneven-age system with the remaining 3/4 under an even-age system. Analysis of the forest conditions resulting from the management scenario indicate a gradual draw down of standing volume over 50 years in keeping with an intended area regulation approach to managing the resource. Harvest volumes fluctuate over the period, as does the area regenerated.

Stand classifications based on the Maine Audubon Focus Species Forestry manual show an increase in the percent of young forest due to management actions, as well as a slow increase in the area classified as late successional under the 50 year harvest scenario. Habitat types appear to remain constant over the projection period, however the model portrays a gradual disappearance of the Northern White Cedar type, indicating that this forest type must be monitored closely. Section 7 outlines the attention paid to ecologically unique features and the steps being taken to ensure their integrity over time. The most important element in this regard is the accurate and organized mapping of these critical areas and features. A variety of maps depicting unique habitats as well as numerous other forest attributes are included in Appendix B of this plan.

In Summary, analysis of the model outputs describe a sustainable harvest schedule that satisfies multiple management objectives including a sustainable timber supply, maintenance of a variety of forest conditions available to research and educational activities, and attention to principles of biodiversity. This comprehensive forest management plan provides details, analysis, and recommendations pertaining to the management of the Penobscot Experimental Forest. The authors have designed the documents electronic format to function dynamically, enabling the content to serve as a reference materials that managers can turn to for guidance on all aspects of managing the forest resource.

1. Management Objectives

MAINTAIN AND ENHANCE A HEALTHY, PRODUCTIVE FOREST FOR THE LONG TERM UNDER THE CONDITIONS OF THE DEED AND MEMORANDA THAT GOVERN THE FOREST AND ITS MANAGEMENT.

These management objectives inform both a strategic planning process focused on a long term time horizon (0-50yrs) as well as short term tactical planning (0-10yrs). Objectives are broad goals developed to guide the planning process, while criteria are specific measures against which model outputs and future outcomes can be compared.

1.1 Timber Supply

Objectives: As set forth in the deed and Memoranda of Understanding (MOU) to the property, the forest will yield a sustainable supply of timber and associated income to satisfy scholarship, research, and management goals. In addition management actions will achieve reasonable regulation of acreage and volumes harvested over the long term. The forest will be managed for a diversity of structural conditions using a variety of silvicultural systems. A robust timber resource will be protected from diseases, pests, invasive species, wildfire, and unlawful trespass. Appropriate monitoring programs will be maintained and improved to provide essential feed back for management decision making.
Criteria: Modern forest simulation software is used to create multiple management scenarios, the results of which are compared both spatially and temporally. Sustainable harvest estimates, derived from modeling, are integrated into harvest planning in association with practical field-based knowledge. Data from the continuous forest inventory system (CFI) on the PEF is regularly integrated with simulation software to enable localized calibration of model outputs. Additional monitoring in the form of future planning inventories and CFI measurements are compared to model predictions as part of an adaptive management approach.

1.2 Research and Education

Objective: Continue support of current research projects and provide opportunities for new projects in the future. Fulfill obligations, as outlined in the MOU, of annual contributions to research and scholarship funds. Provide venue and support for field demonstration and tours open to students, forestry professionals, and the public.
Criteria: Monitor the number of research cooperators and projects as well as the level of financial support for research and scholarship funds provided by timber harvesting related income. Track the use of the forest by SFR courses and other events.

1.3 Biodiversity/Habitat/Areas of Special Concern

Objective: A diversity of vegetation species, development stages, and structures are present across all management compartments. Diverse and unique habitat types, significant to a broad spectrum of plant and animal species, not just traditional "game" species, are also maintained and enhanced where appropriate. Unique habitats and imperiled species are protected. The preceding qualities and features are protected and/or cultured across all compartments in accordance with a landscape perspective that considers the immediate forest as well as the area beyond the property boundaries. Appropriate monitoring programs are constantly improved.
Criteria: Based on Focus Species Forestry forest development classifications, management will strive to develop and maintain forest areas approximate to the following percentages: 5-

30% regeneration/sapling; ≥20% intermediate; ≥20% mature; ≥15% late successional. An additional goal of maintaining a minimum of 5% of the forest in each of 6 Focus Species Forestry habitat classes: Aspen/Birch; N. Hardwood; Oak/Pine; Hemlock; Spruce/Fir; and N. White Cedar. Simulation software should be utilized to predict and evaluate the implications of management actions on forest biodiversity and habitat. GIS maps are adequately maintained, depicting both areas of interest as well as general forest conditions. Proper State agencies and non-governmental organizations are engaged to evaluate the status of these qualities within the forest.

1.4 Water and Soil Quality

Objective: Water quality, of the highest level, is maintained through appropriately planned and executed road construction, harvest operations, and silvicultural prescriptions. Soil quality is maintained and where possible improved through attention to appropriate silvicultural and operational principles. Under no circumstances should future soil productivity be compromised in the name of short term profit or expedience.
Criteria: All harvest operations follow **State water quality BMPs**. Management planning considers the impact of whole-tree harvesting on soil nutrient cycles.

1.5 Recreation

Objective: Safe recreational experiences are available to a variety of users. A variety of uses are made possible through road and water access routes and points. Where appropriate, the aesthetic implications of management actions such as harvesting are considered. Recreation use does not compromise other landowner objectives.
Criteria: Conflicts with and among users are minimized.

1.6 Historic and Cultural Resources

Objective: These qualities are maintained in the managed forest and especially in the reserve areas. Up to date mapping of, and details about known resources are integrated into the management planning process whenever possible.
Criteria: Work with state agencies and university departments to evaluate status of these features within the property.