MANAGEMENT PLAN:

MASSABESIC EXPERIMENTAL FOREST

YORK COUNTY, MAINE

Prepared by: Research Work Unit NRS-4155
Northern Research Station
USDA Forest Service
271 Mast Road
Durham, New Hampshire

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MASSABESIC EXPERIMENTAL FOREST

NORTHERN RESEARCH STATION
NEWTOWN SQUARE, PENNSYLVANIA
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Responsible Agency	USDA Forest Service
Responsible Official	Michael T. Rains, Director Northern Research Station 11 Campus Boulevard, Suite 200 Newtown Square, PA 19073-3200 610-557-4017
For further information contact	John C. Brissette, Project Leader Northern Research Station 271 Mast Road Durham, NH 03824 603-868-7632

This management plan is approved.

Michael T. Rains 11.13.06

Michael T. Rains, Director — Date

INTRODUCTION

The Massabesic Experimental Forest (MEF), 3,676 acres in area, is located in central York County Maine, the state's southernmost county. It was purchased in the 1930s and 1940s, largely from Bates College by the Northeastern Forest Experiment Station (now Northern Research Station) of the USDA Forest Service. Additional surrounding farmland was purchased under the Weeks Act. The Northern Research Station manages the MEF and although it is federal land managed by a unit of the USDA Forest Service, it is not part of the National Forest System and consequently not covered under a national forest plan. This document is the management plan for the MEF.

The MEF is a Northern Research Station asset; however, local responsibility for day-to-day management is with Research Work Unit NRS-4155, "Ecology and Management of Northern Forests", which is located in Durham, NH with staff in Bartlett, NH and Bradley and Orono, ME. The RWU has similar management responsibilities for two other experimental forests, Bartlett Experimental Forest in Bartlett, NH and Penobscot Experimental Forest in Bradley and Eddington, ME. Those responsibilities are defined in a mission problem in the unit's Research Work Unit Description. The mission problem states, "Long-term manipulative research and monitoring will be maintained at Bartlett, Massabesic, and Penobscot Experimental Forests as sources of knowledge discovery and development, and as demonstration and education sites." To carry out the mission problem, the RWU coordinates with users of the experimental forests to minimize conflicts among proposed activities and to protect the integrity of existing long-term studies. Conflicts that cannot be resolved at the RWU level are referred to higher authority within Northern Research Station management.

The MEF consists of two units, the Northern Unit (1,668 acres) located in the towns of Lyman, Hollis, and Dayton; and the Southern Unit (2,008 acres) located in Alfred and Lyman (Maps 1 and 2). As background for this management plan, descriptions of the climate, soils, land use history, previous research, the current network of permanent sample points and vegetation of the MEF are in the publication, "Vegetation of Forested Uplands in the Massabesic Experimental Forest" (Dibble and others 2004).

MISSION

The mission of MEF is to provide a location for conducting long-term ecological and management research, and for demonstrating sustainable forest management in central New England. The primary goal is to provide research that develops a better understanding of the effects of management practices on forest structure, composition, and function. A secondary goal is to offer a setting where ecological principals and management techniques can be presented to professional and educational groups and the public. The MEF is also home to a number of rare plant and animal species and it is an important forest-based recreational resource in southern Maine.

DESCRIPTION AND HISTORY

A distance of about 4 miles separates the Northern and Southern Units of the MEF, and the boundaries are complex with a number of inholdings. For discussion purposes, the ownership was divided into four parcels in the Northern Unit (N1-N4) and six in the Southern Unit (S1-S6) plus the administrative site (S7) (Maps 1and 2). The basic forest composition is eastern white pine – northern red oak, and the four most common species are eastern white pine (*Pinus strobus* L.), eastern hemlock (*Tsuga canadensis* (L.) Carr.), northern red oak (*Quercus rubra* L.), and red maple (*Acer rubrum* L.) (Dibble and others 2004). However, the MEF has a number of additional ecological features including some of the largest Atlantic white-cedar (*Chamaecyparis thyoides* (L.) B.S.P.) wetlands in northern New England, an abundance of seasonal wetlands as well as some uncommon and rare plants and animals. Several areas of open water are within or partially within the boundaries. The largest is the 11-acre Tarwater Pond in Parcel N4. The MEF also borders two larger water bodies, Robert's Pond and Estes Lake.

Almost all of the MEF was logged beginning in the 1600s and later cleared for agriculture. Following farm abandonment in the late 1800s and early 1900s, the area reverted to successional forestland. This long history, coupled with earlier Native American activity, resulted in numerous areas of cultural or heritage significance.

In 1947, about 80 percent of the timber was destroyed by a fire that burned about 150,000 acres in southwestern Maine. Most of the northern unit burned; small portions of the southern unit escaped the fire, and now support large, relatively old (>100 years) stands of white pine. Many of the most severely burned-over acres (about 275) were planted to red and white pine after the fire.

Shortly after acquisition of the MEF, research activities were terminated due to World War II. In 1946, the forest was reopened and a series of cruise plots were established across the forest in a systematic grid. The fire of 1947 destroyed most of the cruise plot vegetation as well as the locations. In 1950, a series of management studies were begun on the MEF to compare the long-term effects of silvicultural treatments on costs, returns, yields, and stand responses. The treatments included diameter-limit cutting, shelterwood silviculture and patch and strip clearcutting. Other studies begun in the 1950s and later included planting and direct seeding; chemical white pine weevil control, some by aerial spraying; woodlot management; white pine provenance plantings; and weevil resistance of western white pine progeny. No commercial harvesting of any extent has been done since the 1960s. The studies mentioned above are all inactive. In 1997-2000, an inventory of vascular plants of the uplands was conducted as a prelude to the re-initiation of an ecological and silvicultural program of research (Dibble and others 2004). Other recent activities include the establishment of the Massabesic Experimental Forest Education Project that features several interpretive trails and a number of research projects that use existing forest conditions for their experimental design and treatment structures.

PURPOSE

The purpose of the Massabesic Experimental Forest Management Plan is to:

- Provide overall requirements (standards) for management and research (Std-1, Std-2, etc.).
- Define non-manipulative and manipulative research.
- Define the areas of the forest open to specific uses: manipulative research, education, and reserve.
- Provide expectations (guidelines) on operational procedures and environmental controls (Gdl-1, Gdl-2, etc.).
- Describe the role of cooperators.
- Specify the public input to be observed in conducting research.

OVERALL STANDARDS AND GUIDELINES

Std-1. All applicable laws, executive orders, regulations, rules, and direction established in the Forest Service Manual must be followed.

Std-2. Both camp fires and camping are prohibited.

Std-3. Firewood cutting and/or collecting is not allowed.

Std-4. Station Director's Orders will be used to restrict or close activities or uses in order to prevent, mitigate, or correct existing or potential resource impacts, trail development, health and safety issues, regulation enforcement issues, research conflicts, or other management concerns.

Gdl-1. Management emphasizes education over law enforcement.

Gdl-2. Public education efforts emphasizing the research and demonstration mission of the MEF, natural resource protection, safety, and personal responsibility are encouraged.

RESEARCH

- Non-manipulative research is observational in nature, not requiring altering vegetation structure or composition, or disturbing the forest floor or soil profile.

- Manipulative research may include any form of silvicultural activity including both uneven-aged and even-aged systems, prescribed fire, mechanical site preparation and mechanical

and/or chemical vegetation control. Manipulative research includes other activities such as digging soil pits, increment coring, and cutting trees for stem analysis.

LAND-USE ASSIGNMENTS

For planning purposes, land in the MEF is divided into four categories with differing management regimes or options: Educational, Reserve (and nonforest), Wetlands, and General Forest Area. None of the parcels (N1-N4 and S1-S6) are exclusively in any single land-use category. A general breakdown of the estimated acreages is in Table 1.

Table 1.—Estimated acreages of educational, reserve, and general forest areas on the Massabesic Experimental Forest.

Land Use Category	*Feature*	*Size (including buffer) -- acres --*
Educational	Cooks Brook Trail	Included in Wetlands
	B.C. Jordan and Littlefield Trails (including white pine reserve)	100
	Charles Swett Trail	5
	Clayton Carl Trail	11
Reserve	Roads	147
	Atlantic white-cedar	348
Total restricted from manipulative research		611
Wetlands	Streams, ponds, and wetlands other than Atlantic white-cedar	342
General Forest Area	Broad range of forest composition and structure suitable for manipulative research	2,723
Total MEF		3,676

EDUCATIONAL

The Massabesic Experimental Forest Education Project was established in 1998 to provide the public self-guided interpretive trails and occasional workshops that explain and demonstrate the principles of forest ecology and sound management. Partners with the Northern Research Station in this effort include the Maine Forest Service, the York County Soil and Water Conservation District, the town of Alfred Conservation Commission, the Small Woodland Owners Association of Maine (SWOAM), the Maine Tree Foundation, and Lavalley Lumber Company. Working together, interpretive trails were established and an outdoor classroom constructed and they are used regularly for conservation education for local schools and organizations. Interpretive trails currently include: Cooks Brook Trail (N2); Charles Swett Trail (S4); and the B.C. Jordan, Littlefield, and Clayton Carl Trails (S3).

Management Standards and Guidelines:

Gdl-3. While educational areas are not reserved from manipulative research, such activities should be at a scale that will enhance demonstration and educational values.

RESERVE

The largest area to be reserved from manipulative research are the Atlantic white-cedar wetlands in the eastern portion of S3 (Map 3), an area of about 153 acres in size – a total of 348 acres including a 100-foot buffer. Another reserve area includes the stand of large, old white pine in S3 adjacent to the Ida Jim Road, through which two of the interpretive trails pass – an area of about 100 acres (Map 4).

Roads on the MEF total 7.6 miles. Presuming that roadside areas will be lightly treated, treated differently, or left intact during any sort of manipulative research, the reserve acres assuming a 50-foot buffer on either side (plus the road itself) will be about 147 acres (Map 5).

There are areas on the MEF with historical significance. Some of these areas are known; for example the "Thirteen Cellar Holes" in N2. Others will remain unknown without intensive cultural survey work. At this point, we do not plan an overall survey of culturally significant acreages. These areas will be found and preserved as needed on a case-by-case basis as manipulative projects are planned and analyzed.

Management Standards and Guidelines:

Gdl-4. Reserve areas may be considered for most kinds of non-manipulative research and some kinds of manipulative research (e.g.; soil pits, increment coring) on a case-by-case basis.

Gdl-5. Areas with rare plants may be subject to manipulative research directed specifically at understanding rare plant dynamics.

WETLANDS

Streams and ponds (about 20 acres of ponds) plus a 100-foot buffer (each side of the streams) account for 342 acres (Map 6). The Cooks Brook Trail is included in this area. In addition, there are numerous wetlands and vernal pools that are too small to map.

Buffers along water courses and wetlands will generally follow BMPs. However, specific research may include the effects of disturbance and buffer width on the biology and hydrology of wetlands and vernal pools. So, for the sake of research, we are not limited by existing BMPs (i.e., they are not standards). Nevertheless, proposed research that would affect wetlands or riparian areas require NEPA documentation.

GENERAL FOREST

The remainder of the MEF will be classified as general forest area, acres that can be considered for both non-manipulative and manipulative research. This classification includes a total of 2,723 acres (Table 1) – about 1,300 and 1,400 acres in the northern and southern units, respectively.

Management Standards and Guidelines:

Std-5. Before beginning any significant manipulative research activity (e.g., timber harvest), the area proposed for treatment will be examined as required by the National Environmental Policy Act (NEPA), analyzing both environmental and cultural values and describing appropriate mitigation actions. In particular, the cultural/heritage values need to be carefully assessed before any management activity.

RESEARCH PROGRAM

The MEF is unique among Forest Service experimental forests because it is dominated by the eastern white pine – northern red oak forest type. Furthermore, it has a significant and apparently increasing component of eastern hemlock. As a result, research will focus on the regeneration, biology, health, and economics of white pine, red oak, and hemlock. Both white pine and red oak are highly valuable, and all three species are biologically complex. The abundance of wetlands provides an ideal opportunity for research on wetland animal and plant species. Cooperation among Forest Service RWUs and university and other colleagues widen the range of potential research further including, for example, pathological and entomological studies and aquatic ecology. Additionally, because land around the MEF is becoming increasingly developed, there is potential to examine questions about the wildland-urban interface (WUI) in cooperation with interested abutting and nearby land owners.

Research will be conducted at a variety of spatial scales. Because of the size of the MEF and its neighboring landscape, most research will likely be at the micro-site, or single tree, and whole-stand levels. Small plot experiments will focus on understanding environmental and management interactions on seedling establishment and development, tree growth, and tree health. Stand level experiments will provide a basis for determining competition, growth, yield, and wildlife habitat responses to interactions between environmental factors and management treatments. Some research, such as certain wildlife habitat studies and remote sensing of forest conditions, will be at multi-stand scales. Studies will also cover a range of temporal scales from short- to long-term; i.e., from diurnal to seasonal to years to decades.

Management Standards and Guidelines:

Std-6. Requests to conduct research will be submitted as proposals to the Project Leader of RWU-NRS-4155 in Durham, NH, for review. Within the constraints of NEPA, the Project Leader has authority to approve non-manipulative and manipulative research at most spatial and

temporal scales; however, large scale and long-term manipulative research may need approval from the Director of the Northern Research Station.

Std-7. Standards for experimental design and quality assurance/quality control (QA/QC) policies for research are established by the strategic plans and priorities of the Northern Research Station, and will be followed for all research on the MEF.

Gdl-7. Research will be designed to maximize discovery, development, and synthesis of knowledge needed for sustainable forest management.

Gdl-8. Principles of experimental design will be followed to encourage appropriate and rigorous statistical analyses. However, due to the heterogeneity of sites and forest structure and composition, some studies will of necessity be case histories.

Gdl-9. The demonstration and education value of any manipulative research will be an important consideration.

Gdl-10. When feasible, research will be replicated on, or coordinated with, studies on other long-term research sites in the pine – oak region (e.g., local sites like the Holt Research Forest, Arrowsic, Maine, and the Caroline A. Fox Research and Demonstration Forest, Hillsborough, New Hampshire, and more distant but similar sites in the Lake States).

RESOURCE CONCERNS

This section of the plan defines concerns and provides guidelines related to specific resources and facilities.

RECREATION:

Because the MEF is one of the largest blocks of public land in southern Maine, recreation is an important use. Beside extensive use of the interpretive trails of the education project, other day-use activities include: hiking, wildlife viewing, hunting and fishing in season, horseback riding, mountain biking, and motorized uses such as snowmobiles and off-highway vehicles (OHVs). Most of these activities are compatible with the research and educational mission of the MEF. However, there is potential for conflicts.

Management Standards and Guidelines:

Std-8. If conflicts occur over land use, research and education take precedence over recreation.

Gdl-11. Our aim is to limit vehicular (motorized and non-motorized) and equestrian travel to existing roads and to work with area clubs to develop a limited, designated multiple-use trail system (not to include the interpretive trails) between Forest Service roads or to connect with established, authorized trails off the MEF.

HERITAGE AND CULTURAL:

Heritage and cultural sites – both from early settlers as well as American Indians are common on the MEF – but poorly documented in most cases. Prior to any manipulative activities, a cultural/heritage exam by a qualified inspector – possibly from a WMNF specialist or university cooperator – will be conducted and mitigation procedures as needed incorporated into NEPA documents.

TIMBER MANAGEMENT:

Most harvesting will result from manipulative research. Other harvesting may be required for safety around structures or along roads and trails, or as part of road maintenance. Timber sale procedures will be under the direction of the WMNF timber staff.

Management Standards and Guidelines:

Gdl-12. Skid trails, truck roads, etc. will generally follow the standards and guidelines in the WMNF plan (USDA Forest Service 2005) and related documents, as well as state and local rules and Best Management Practices (BMPs) when appropriate.

FIRE:

Historically fire has been an important natural disturbance in southern Maine. The wildfire of 1947 had a major influence on species composition, structure, and land use decisions on the MEF (Dibble and others 2004). Some manipulative research may include the use of prescribed fire. As evidenced by past history, wildfire is an ever-present concern on the MEF. In case of forest fire, the Maine Forest Service, located at the administrative site on MEF, is the first contact. They also monitor fire conditions and possible closures of public forests in Maine. We will follow their closure recommendations. Additional details are found the in the fire plan for the MEF.

ROADS AND LANDINGS:

The road system, which includes 7.6 miles of gravel roads, is complete and we envision no additional permanent roads. Additional short, temporary roads to log landings may be required. After usage, these areas will be stabilized as needed. For maintenance of the road system, we will call upon the WMNF for assistance.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES:

The MEF has a long history of large- and small-scale disturbances. Perhaps because of the disturbance history, the MEF and surrounding private lands are home to many rare species of plants and animals. The presence of rare species in the area makes the MEF an ideal location for studying the effects of forest management activities on rare species and communities. Prior to any manipulative research, threatened, endangered plant and animal species will be determined

using on-the-ground surveys as well as available records from U.S. Fish and Wildlife and the Maine Department of Inland Fisheries and Wildlife, and mitigation measures will be taken. It is likely that the effects of disturbance or non-disturbance on the success of certain T&E species will be the target of specific research.

INVASIVE SPECIES:

With exception of the administrative site (S7), invasive plants are not abundant on the MEF (Dibble and others 2004). However, because the towns around the forest are developing rapidly, the potential for invasive plant establishment is increasing. Moreover, in some areas of the forest there is an abundance of highly competitive native shrubs, including beaked hazel and several species of Viburnum. Rather than an impediment to the research program, these plant species provide the opportunity to determine the effects of planned and natural disturbances on the dynamics of understory plant communities. This is a highly desirable area of research not available on the Bartlett and Penobscot Experimental Forests.

COOPERATORS

White Mountain National Forest (WMNF) specialists provide assistance in conducting timber sales, especially bids, contracts and sale administration. They may also assist with sale layout and timber marking. In general, the MEF will follow WMNF procedures with regard to vegetative management procedures. WMNF crews maintain the roads on the MEF, and their law enforcement personnel provide advice and assistance.

SWOAM provides public support for the research program at MEF, including valuable advice on problem definition and research goals. SWOAM is also an important partner in the Massabesic Experimental Forest Education Project.

Maine Forest Service (MFS) provides first-line fire control assistance. The local MFS office also facilitates the educational program through developing and maintaining the interpretive trails and conducting workshops for local schools and other interested groups.

Maine Department of Inland Fisheries and Wildlife conducts frequent wildlife surveys in the forest and its biologists are consulted about manipulative studies, especially when planned in the vicinity of rare and endangered species.

Conservation Commission of the Town of Alfred is another key partner in the education program. They also provide local “eyes and ears”, especially in the Southern Unit, and are invaluable in terms of helping with trash pickup and minimizing vandalism.

York County Soil and Water Conservation District, **The Maine Tree Foundation**, and **Lavalley Lumber Company** are the other partners instrumental in the Massabesic Experimental Forest Education Project.

Maine Natural Areas Program maintains a state-wide listing of rare features, including plants, animals, and natural communities; its staff is consulted about manipulative studies, especially when planned in the vicinity of rare and endangered species or communities.

New England Wildflower Society volunteers monitor rare plants on the MEF, in particular the status of Atlantic white-cedar, and provide periodic reports.

University of Maine, **University of Southern Maine** and **University of New Hampshire** faculty and graduate students conduct research on the MEF in consultation and/or cooperation with scientists from the Northern Research Station.

New Hampshire Division of Forests and Lands staff are consulted to coordinate research on the MEF with ongoing work at the Caroline A. Fox Research and Demonstration Forest.

PUBLIC INPUT

Activities on the MEF are subject to NEPA. Most routine research activities, including some small-scale timber harvests, are categorically excluded from NEPA documentation. However, many proposed research activities (e.g., even-aged regeneration harvests) must be (1) described in a scoping letter sent to interested parties, including abutting land owners, and announced in a public ad; (2) described in greater detail in an Environmental Assessment (EA) that is announced in a public ad and sent to any interested parties; (3) evaluated in a Finding of No Significant Influence (FONSI); and (4) activated by a Decision Notice that evaluates all of the prior information and public suggestions and defines the chosen management alternative. Even for small-scale actions that may be categorically excluded from full NEPA documentation, Forest Service regulations require that the scoping step be completed.

LITERATURE CITED

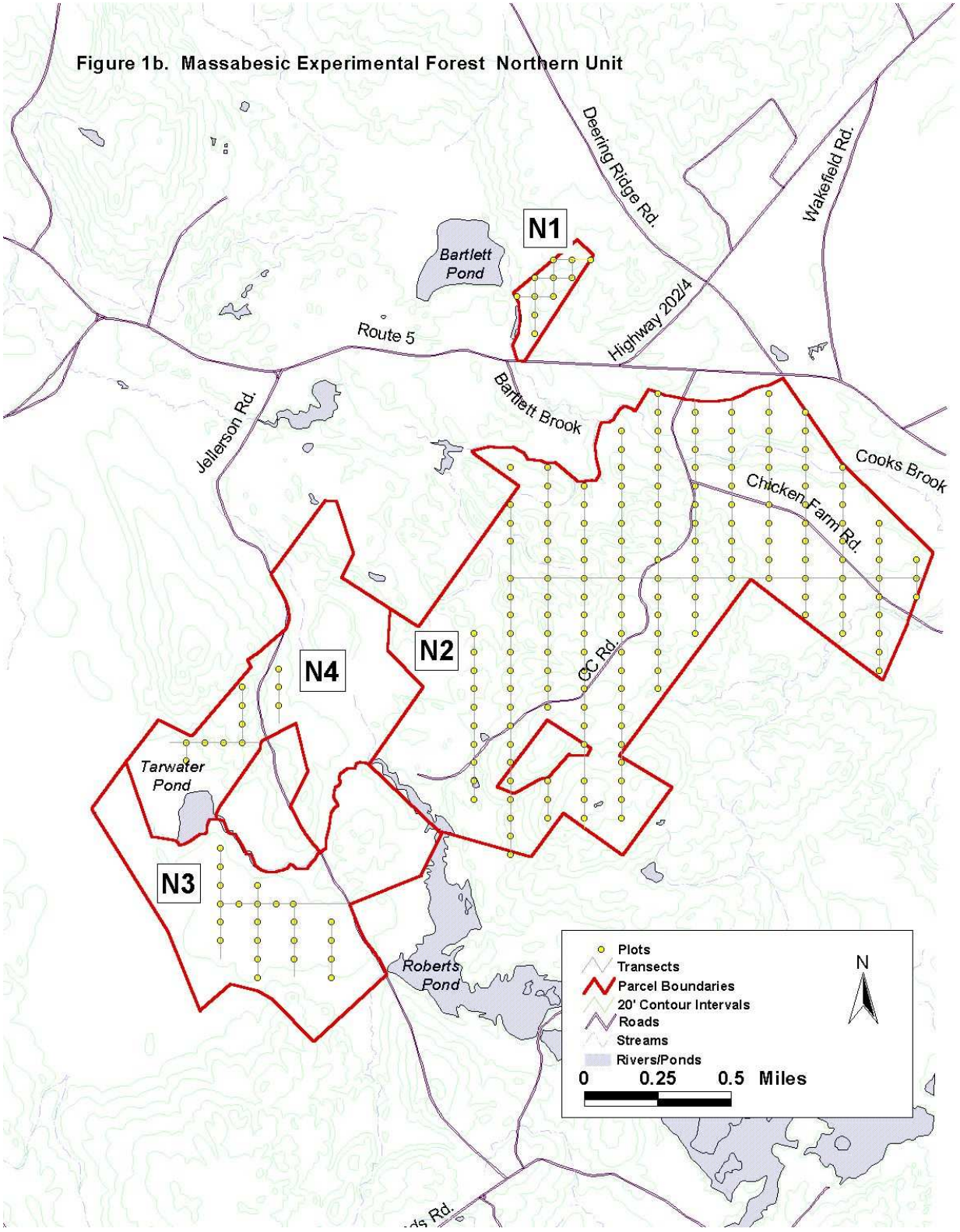
Dibble, Alison C.; Rees, Catherine A.; Sendak, Paul E.; Brissette, John C. 2004. Vegetation of forested uplands in the Massabesic Experimental Forest. Gen. Tech. Rep. NE-320. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 71 p.

USDA Forest Service. 2005. White Mountain National Forest land and resource management plan. Milwaukee, WI: U.S. Department of Agriculture, Forest Service, Eastern Region.

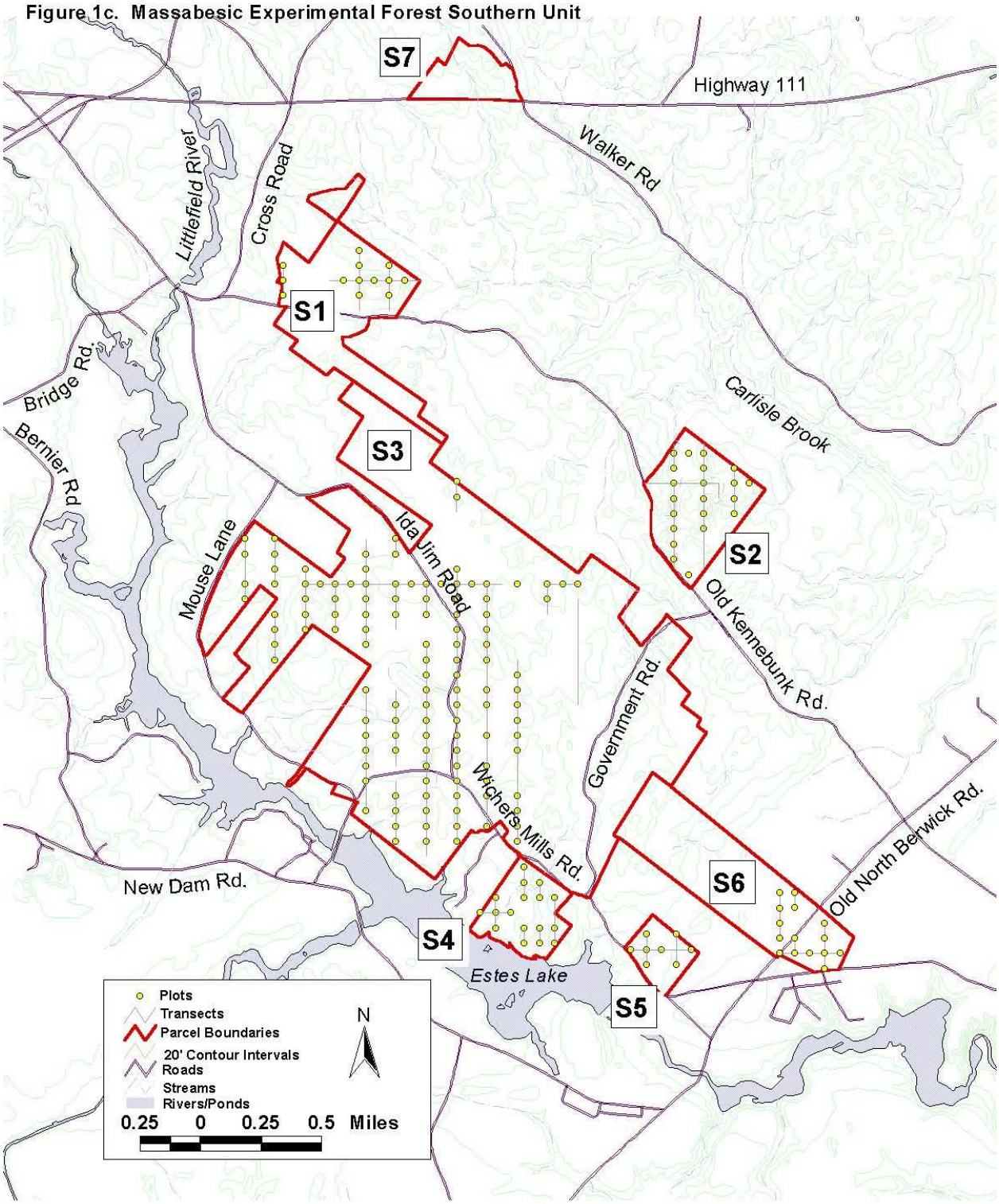
MAPS

1. Northern Unit of the Massabesic Experimental Forest.
2. Southern Unit of the Massabesic Experimental Forest.
3. Reserve area; Atlantic white-cedar swamp and associated buffer.
4. Reserve area; old growth white pine and hemlock, including the B.C. Jordan Interpretive Trail

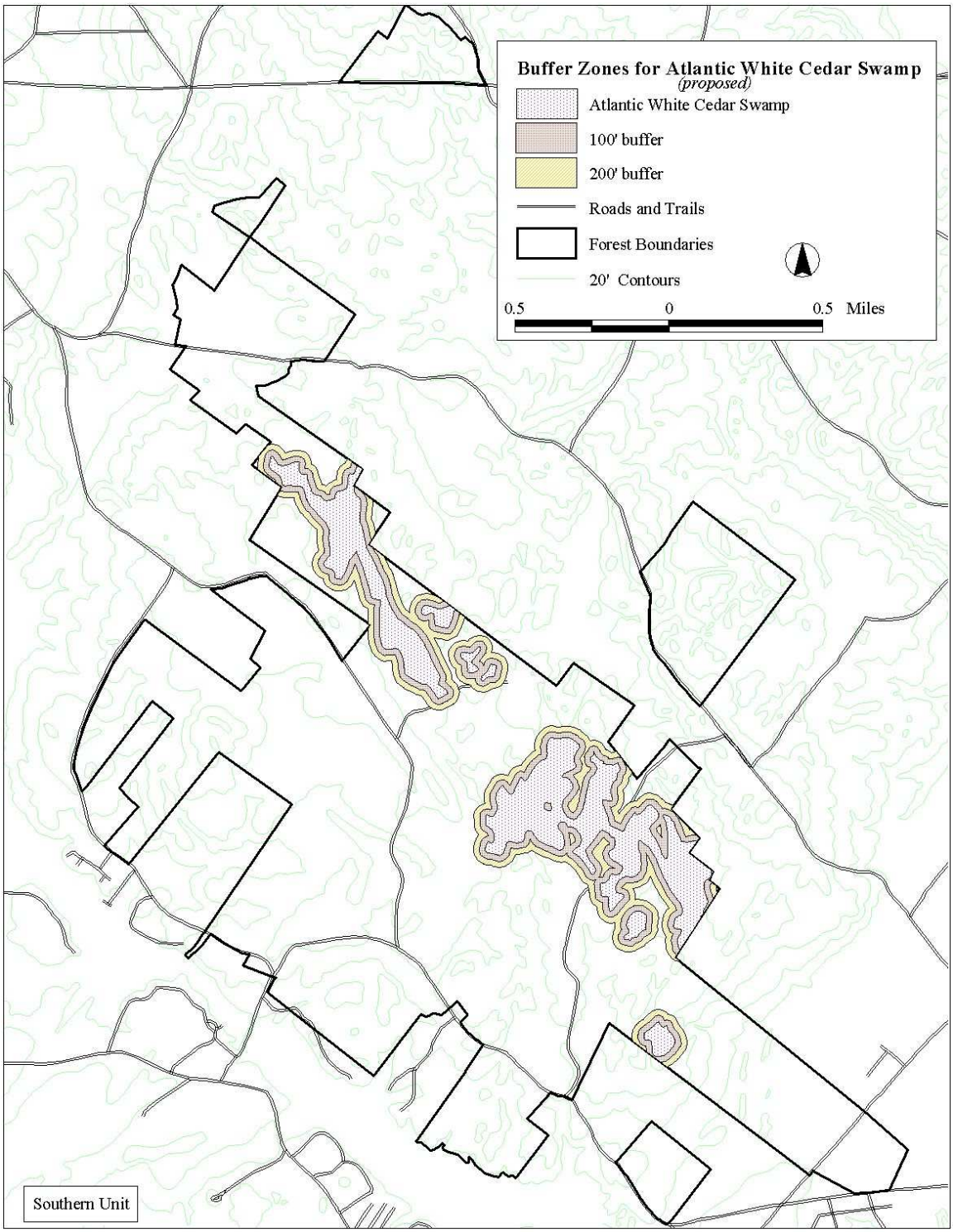
5. Roads, trails, and associated buffers.
6. Streams, ponds, and associated buffers.



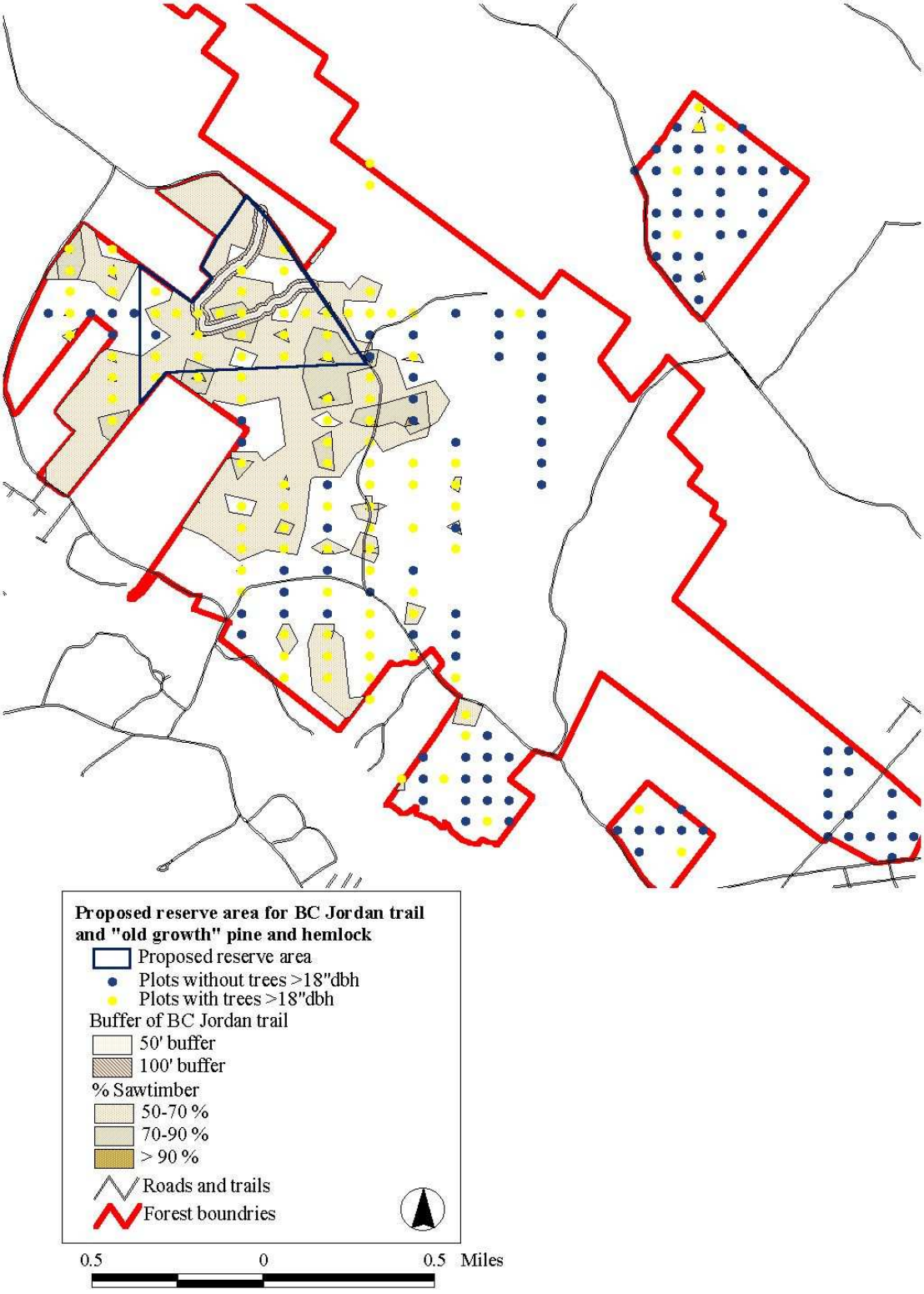
Map 1. Northern Unit, Massabesic Experimental Forest.



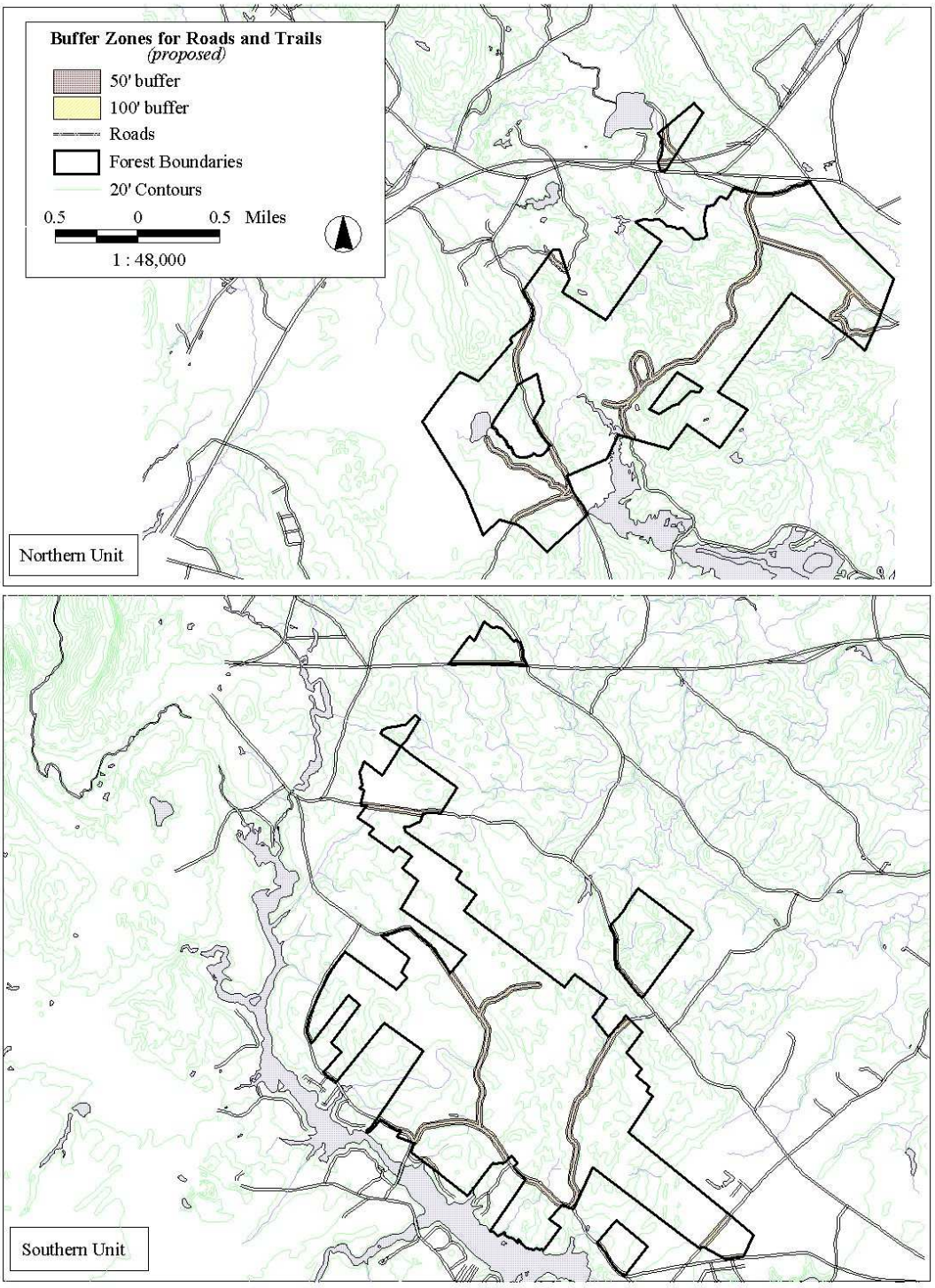
Map 2. Southern Unit, Massabesic Experimental Forest.



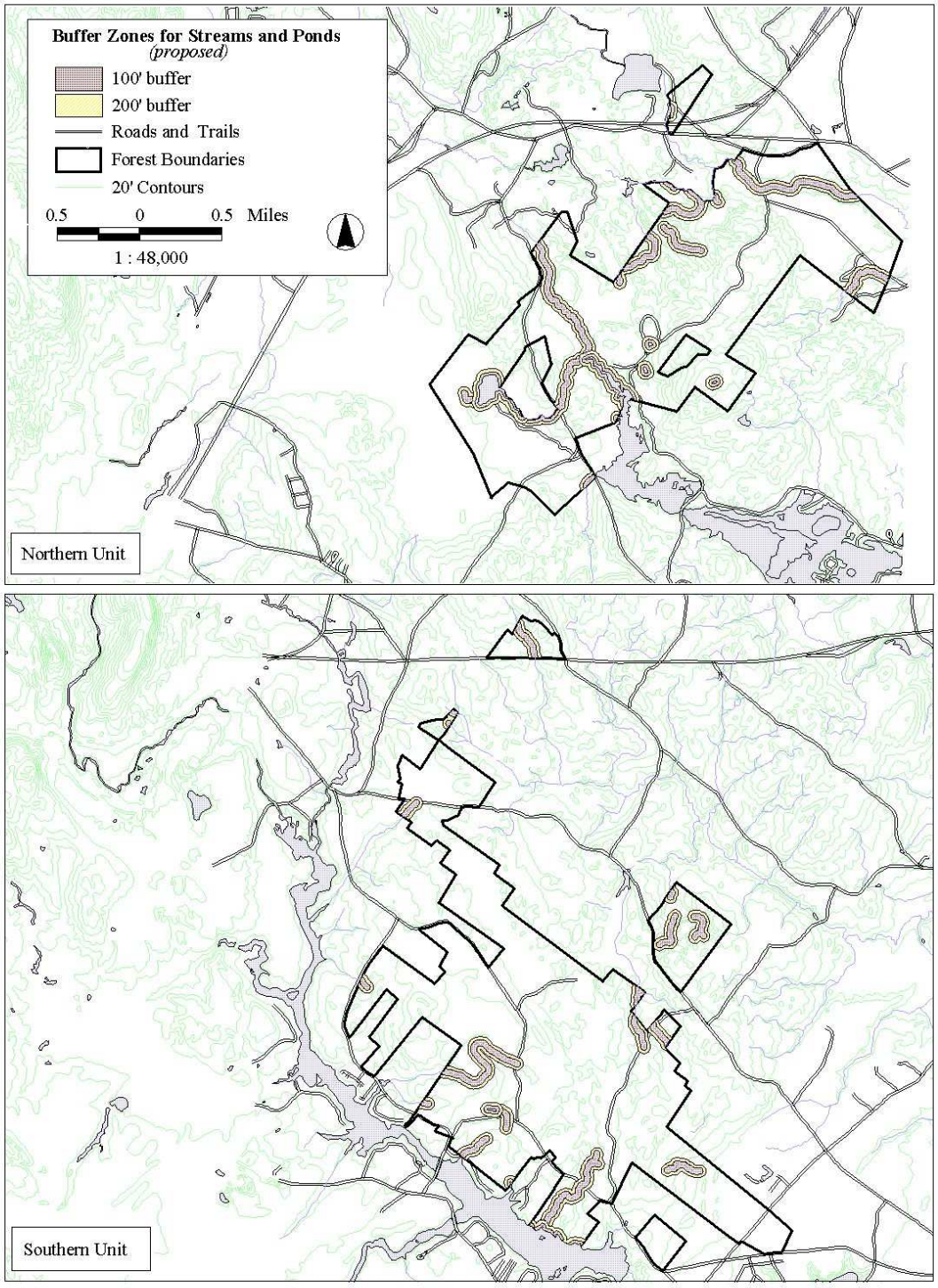
Map 3. Reserve area, Atlantic white-cedar swamp and associated buffer. The buffer was used to estimate acreage and has no management implication.



Map 4. Reserve area; old growth white pine and hemlock, including the B.C. Jordan Trail. The buffer was used to estimate acreage and has no management implication.



Map 5. Roads, trails, and associated buffers. Buffers were used to estimate acreage and have no management implication.



Map 6. Streams, ponds, and associated buffers. Buffers were used to estimate acreage and have no management implication.

APPENDIX

STANDARDS AND GUIDELINES

Standards (Requirements):

Std-1. All applicable laws, executive orders, regulations, rules, and direction established in the Forest Service Manual must be followed.

Std-2. Both camp fires and camping are prohibited.

Std-3. Firewood cutting and/or collecting is not allowed.

Std-4. Station Director's Orders will be used to restrict or close activities or uses in order to prevent, mitigate, or correct existing or potential resource impacts, trail development, health and safety issues, regulation enforcement issues, research conflicts, or other management concerns.

Std-5. Before beginning any significant manipulative research activity (e.g., timber harvest), the area proposed for treatment will be examined as required by the National Environmental Policy Act (NEPA), analyzing both environmental and cultural values and describing appropriate mitigation actions. In particular, the cultural/heritage values need to be carefully assessed before any management activity.

Std-6. Requests to conduct research will be submitted as proposals to the Project Leader of RWU-NRS-4155 in Durham, NH, for review. Within the constraints of NEPA, the Project Leader has authority to approve non-manipulative and manipulative research at most spatial and temporal scales; however, large scale and long-term manipulative research may need approval from the Director of the Northern Research Station.

Std-7. Standards for experimental design and quality assurance/quality control (QA/QC) policies for conducting research on the MEF are established by the strategic plans and priorities of the Northern Research Station, and will be followed for all research on the MEF.

Std-8. If conflicts occur over land use, research and education take precedence over recreation.

Guidelines (Expectations):

Gdl-1. Management emphasizes education over law enforcement.

Gdl-2. Public education efforts emphasizing the research and demonstration mission of the MEF, natural resource protection, safety, and personal responsibility are encouraged.

Gdl-3. While educational areas are not reserved from manipulative research, such activities should be at a scale that will enhance demonstration and educational values.

Gdl-4. Reserve areas may be considered for most kinds of non-manipulative research and some kinds of manipulative research (e.g.; soil pits, increment coring) on a case-by-case basis.

Gdl-5. Areas with rare plants may be subject to manipulative research directed specifically at understanding rare plant dynamics.

Gdl-6. Research will be designed to maximize discovery, development, and synthesis of knowledge needed for sustainable forest management.

Gdl-7. Principles of experimental design will be followed to encourage appropriate and rigorous statistical analyses. However, due to the heterogeneity of sites and forest structure and composition, some studies will of necessity be case histories.

Gdl-8. The demonstration and education value of any manipulative research will be an important consideration.

Gdl-9. When feasible, research will be replicated on, or coordinated with, studies on other long-term research sites in the pine – oak region (e.g., local sites like the Holt Research Forest, Arrowsic, Maine, and the Caroline A. Fox Research and Demonstration Forest, Hillsborough, New Hampshire, and more distant but similar sites in the Lake States).

Gdl-10. Our aim is to limit vehicular (motorized and non-motorized) and equestrian travel to existing roads and to work with area clubs to develop a limited, designated multiple-use trail system (not to include the interpretive trails) between Forest Service roads or to connect with established, authorized trails off the MEF.

Gdl-11. Skid trails, truck roads, etc. will generally follow the standards and guidelines in the WMNF plan (USDA Forest Service 2005) and related documents, as well as state and local rules and best management practices when appropriate.