

Cedar Swamp Natural Area Management Plan

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Table of Contents

List of Figures	ii
Introduction	1
Description and Management Concerns	4
Geology and Soils	4
Topography and Surface Hydrology	4
Biotic Communities	4
Endangered Species	9
Boundaries	10
Public Use	10
Research	11
Introduced Features	12
Management Techniques	13
Natural Areas System Rules	13
Designation Objective And Classification	13
Biotic Communities	14
Endangered Species	14
Boundaries	14
Public Use	15
Introduced Features	15
Literature Cited	16
Appendix A	19
Appendix B	25

List of Figures

1. General Location of Cedar Swamp Natural Area 2

2. Boundaries and Introduced Features 3

3. Biotic Communities 5

Introduction

This management plan for the Cedar Swamp Natural Area will describe the resource features which this site contains and then prescribe uses and practices that will be allowed and implemented to maintain and, if practicable, enhance these features.

Creation of the Natural Areas System was mandated under the Natural Areas System Act of 1976 (N.J.S.A. 13:1B-15.12a et. seq.). A "Natural Area" is defined as "an area of land or water, owned in fee simple or as a conservation easement by the Department, which has retained its natural character, although not necessarily completely undisturbed, or having rare or vanishing species of plant or animal life, or having similar features of interest, which are worthy of preservation for present and future residents of the State" (N.J.A.C. 7:5A-1.3).

Cedar Swamp Natural Area lies within Woodland Township, Burlington County and is part of the Outer Coastal Plain physiographic province of New Jersey. The natural area is located within Lebanon State Forest. Figure 1 shows the general location of the natural area. The current boundaries of the natural area are indicated in Figure 2.

The property that has come to be known as Cedar Swamp Natural Area was acquired in two steps. In 1908 and 1919 parcels were purchased by the State from Mr. William L. Durant and Mr. James D. Black, respectively. When these properties were purchased they were included in the Lebanon State Forest Reserve. The Cedar Swamp Natural Area was designated to the Natural Areas System in 1978.

The designation objective for this natural area under the Administrative Code includes "preservation of southern swamp and floodplain habitat, southern white cedar, red maple and pine/oak forest communities, and rare species habitat". The Administrative Code also mandates the preparation of this management plan.

The Division of Parks and Forestry, through Lebanon State Forest, serves as the administering agency, being responsible for implementing policy and, after consultation with other Divisions, organizations and individuals, making land management decisions affecting Cedar Swamp Natural Area. Lebanon State Forest shall implement the management policies necessary to achieve the designation objective of this plan.

The Office of Natural Lands Management (ONLM) is responsible for overall administration of the Natural Areas System, promulgation and revision of rules governing System lands, and preparation of management plans. The ONLM also periodically monitors implementation of the management techniques outlined in management plans, and may propose amendments to plans as needed.

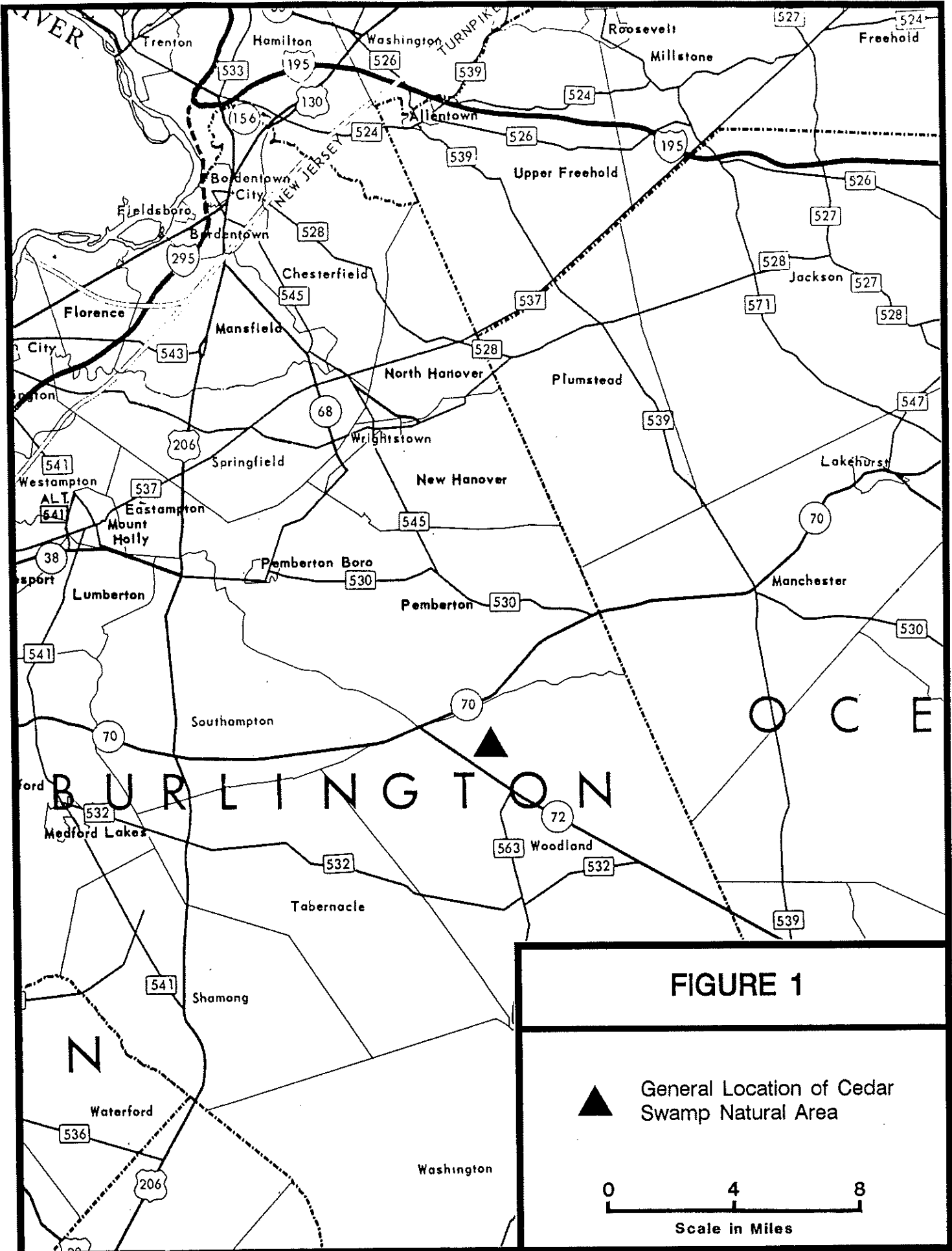


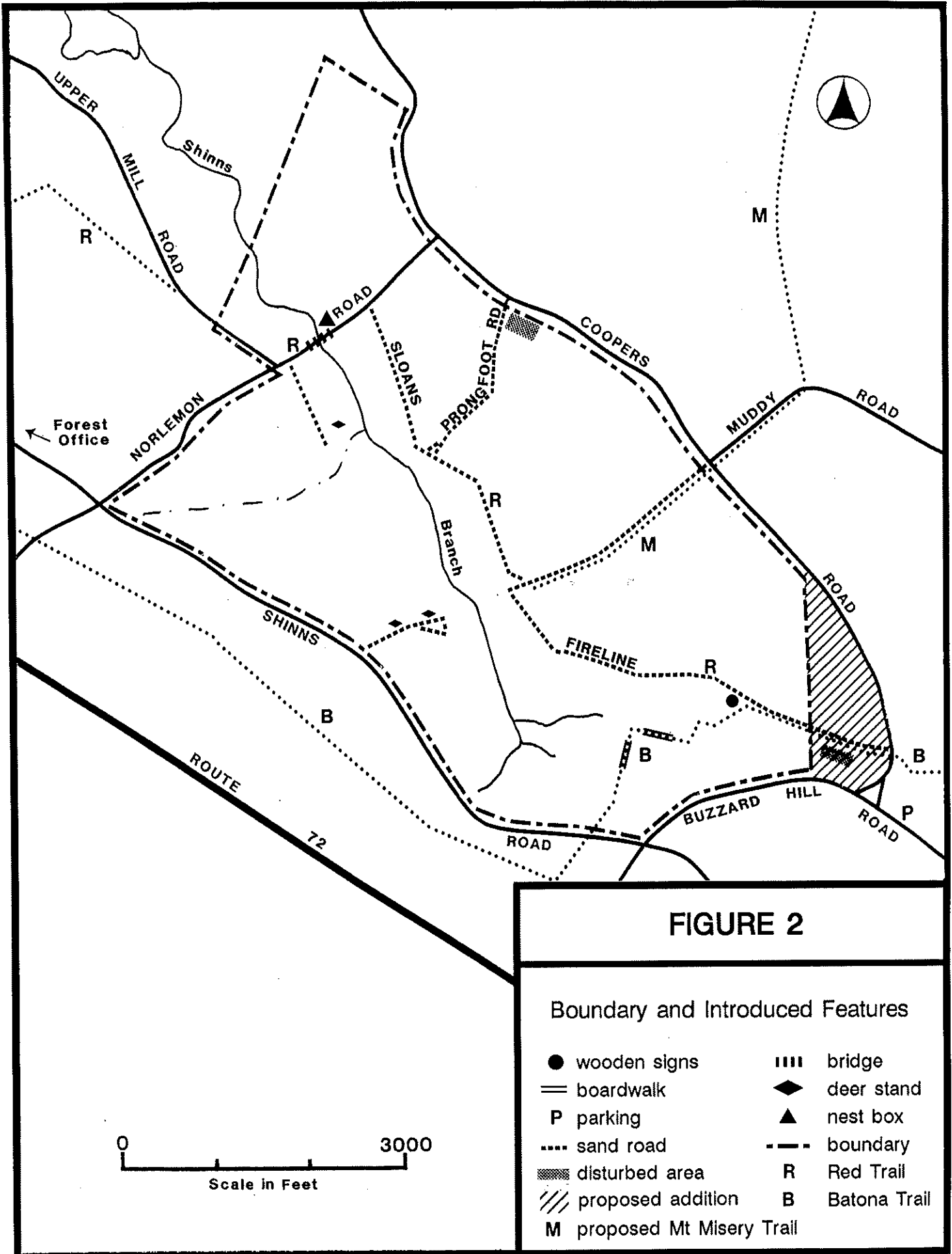
FIGURE 1



General Location of Cedar
Swamp Natural Area



Scale in Miles



Description and Management Concerns

Geology and Soils

The area consists geologically of Tertiary Cohansey Sand which is chiefly quartz sand with local beds of clay and gravel (Geologic Map of NJ, 1910-1912).

The soil associations within the natural area are the Lakehurst-Lakewood-Evesboro association and the Atsion-Muck-Alluvial land, sandy association. The Lakehurst-Lakewood-Evesboro association contains nearly level to strongly sloping, somewhat poorly drained to excessively drained soils that are rapidly and moderately rapidly permeable and have a loamy sand and sand subsoil or underlying material. This association occupies high positions on the Outer Coast Plain and primarily supports pine woodlands (U.S. Department of Agriculture, 1971).

The Atsion-Muck-Alluvial land, sandy association contains soils described in the preceding association along with very poorly drained Muck and Alluvial land subject to frequent flooding from streams. This association occupies low positions that are in scattered areas of the Outer Coastal Plain and usually contains Atlantic white cedar (*Chamaecyparis thyoides*) and blueberry (*Vaccinium spp.*) (U.S. Department of Agriculture, 1971).

Hydric soils within the natural area include Atsion sand, Lakehurst sand and muck (U.S. Department of Agriculture, 1990).

Topography and Surface Hydrology

Cedar Swamp Natural Area lies within the Outer Coastal Plain physiographic province (Wolfe, 1977). The elevation ranges from 95 to 115 feet.

The natural area is part of the Delaware River Basin and is within the Rancocas North Branch Watershed. Shinns Branch originates within the natural area and flows northwesterly joining McDonalds Branch and Coopers Branch to form Bisphams Mill Creek (Bethmann, 1982).

Biotic Communities

The community classifications and Figure 3 were derived from analysis conducted by Andropogon Associates, for the Pinelands Commission, on aerial photography dated November 1978 and March 1978, information obtained from Breden (1989), and field examination by the author on December 23, 1991 and by Ted Gordon and the author on January 8, 1992. Figure 3 indicates only general locations and approximate boundaries for the various community types. Animal species likely to be found in the natural area were derived from noted sources and the Department's Natural Heritage Database based on the suitability of the habitat to support these species. The Database search was conducted in January 1992.

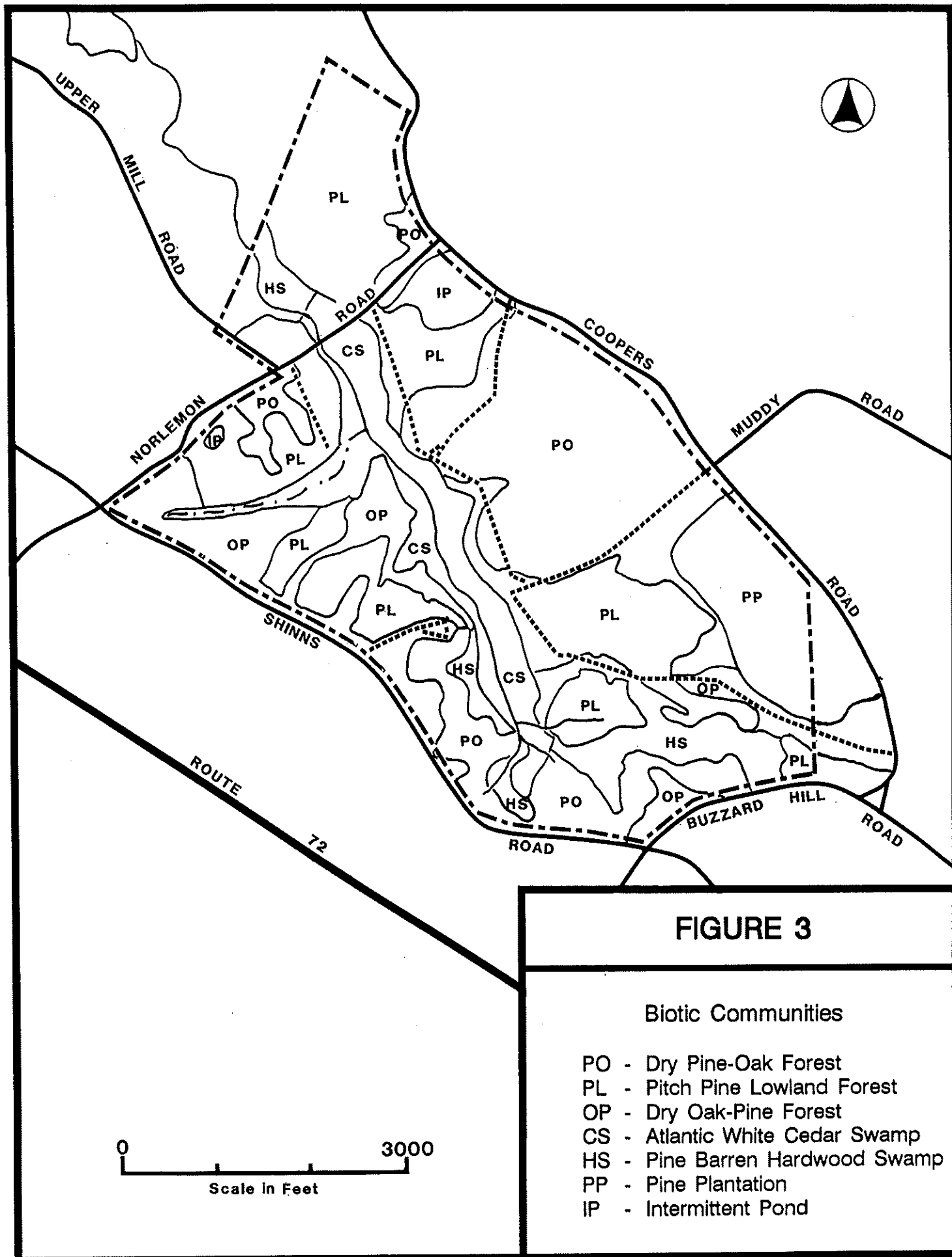


FIGURE 3

Biotic Communities

- PO - Dry Pine-Oak Forest
- PL - Pitch Pine Lowland Forest
- OP - Dry Oak-Pine Forest
- CS - Atlantic White Cedar Swamp
- HS - Pine Barren Hardwood Swamp
- PP - Pine Plantation
- IP - Intermittent Pond

The upland portions of the natural area contain suitable habitat for a variety of mammals including masked shrew (*Sorex cinereus*), short-tailed shrew (*Blarina brevicauda*), eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), southern flying squirrel (*Glaucomys volans*), white-footed mouse (*Peromyscus leucopus*), pine vole (*Pitymys pinetorum*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*) and white-tailed deer (*Odocoileus virginianus*) (Wolgast, 1979).

Avian species likely to be found in the upland portions of the natural area include turkey vulture (*Cathartes aura*), sparrow hawk (*Falco sparverius*), ruffed grouse (*Bonasa umbellus*), whip-poor-will (*Caprimulgus vociferus*), common nighthawk (*Chordeiles minor*), Carolina chickadee (*Parus carolinensis*), rufous-sided towhee (*Pipilo erythrophthalmus*), screech owl (*Otus asio*), great horned owl (*Bubo virginianus*), hairy woodpecker (*Picoides villosus*), downy woodpecker (*P. pubescens*), red-eyed vireo (*Vireo olivaceus*), pine warbler (*Dendroica pinus*) and prairie warbler (*D. discolor*) (Leck, 1979).

Amphibians and reptiles that may occur throughout the natural area include red-backed salamander (*Plethodon c. cinereus*), northern red salamander (*Pseudotriton r. ruber*), Fowler's toad (*Bufo woodhousei fowleri*), northern spring peeper (*Hyla c. crucifer*), New Jersey chorus frog (*Pseudacris triseriata kalmi*), green frog (*Rana clamitans melanota*), carpenter frog (*Rana virgatipes*), eastern mud turtle (*Kinosternon s. subrubrum*), spotted turtle (*Clemmys guttata*), eastern box turtle (*Terrapene c. carolina*), northern fence lizard (*Sceloporus undulatus hyacinthinus*), northern water snake (*Natrix s. sipedon*), northern pine snake (*Pituophis m. melanoleucus*), eastern kingsnake (*Lampropeltis g. getulus*) and black rat snake (*Elaphe o. obsoleta*) (Conant, 1979).

Dry Pine-Oak Forest

This community type occupies a majority of the northeast portion of the natural area and smaller pockets in the southern and northwestern portions of the area. Pitch pine (*Pinus rigida*) dominates the canopy, however, there is a high concentration of black oak (*Quercus velutina*) throughout. Other oaks scattered throughout this community include post oak (*Q. stallata*), scarlet oak (*Q. coccinea*) and blackjack oak (*Q. marilandica*). The shrub layer is characterized by sheep laurel (*Kalmia angustifolia*), mountain laurel (*K. latifolia*), inkberry (*Ilex glabra*) and huckleberry (*Gaylussacia sp.*), while the forest floor is sparsely covered with bracken fern (*Pteridium aquilinum*), turkeybeard (*Xerophyllum asphodeloides*), pyxie moss (*Pyxidantha barbulate*) and teaberry (*Gaultheria procumbens*).

Pitch Pine Lowland Forest

This community type occurs as a band between the Atlantic white cedar swamp and the dry pine-oak forest. This mesic forest is characterized by a dense canopy almost solely of pitch pine with scattered shortleaf pine (*Pinus echinata*) that has seeded in from surrounding plantings. The thick shrub layer includes inkberry, huckleberry, sweet pepperbush (*Clethra alnifolia*) and staggerbush (*Lyonia mariana*). Teaberry and bracken fern are scattered throughout the forest floor.

Dry Oak-Pine Forest

This community type occupies a small portion of the natural area along Shinns Road. Black oak is most abundant here, however, pitch pine occurs throughout this community. The shrub and herbaceous layer is similar to that of the dry pine-oak forest.

Coastal Plain Atlantic White Cedar Swamp

The cedar swamp community exists along Shinns Branch as a narrow band through the central portion of the natural area. Atlantic white cedar dominates this community although swamp magnolia (*Magnolia virginiana*) is abundant. In some places the younger cedar trees are so dense that access through the swamp is very difficult. Highbush blueberry (*Vaccinium corymbosum*), fetterbush (*Leucothoe racemosa*) and dangleberry (*Gaylussacia frondosa*) dominate the shrub layer. The sparse herbaceous layer includes teaberry, long sedge (*Carex folliculata*), and Virginia chain-fern (*Woodwardia virginica*) while a carpet of *Sphagnum* moss covers the ground.

Laderman (1989) indicates that mammals inhabiting cedar swamps may include virginia opossum (*Didelphus virginiana*), raccoon, southern bog lemming (*Synaptomys cooperi*) star-nosed mole (*Condylura cristata*), pine vole and white-tailed deer. The swamp can also support a variety of amphibians and reptiles including four-toed salamander (*Hemidactylum scutatum*), Pine Barrens treefrog (*Hyla andersoni*), carpenter frog (*Rana virgatipes*), bog turtle (*Clemmys muhlenbergi*), northern red-bellied snake (*Storeria o. occipitamaculata*), northern pine snake (*Pituophis m. melanoleucus*) and timber rattlesnake (*Crotalus horridus*). Leck (1979) indicates that breeding birds commonly found within the cedar swamps of the Pine Barrens are primarily insectivores and most are present only in summer. These may include eastern wood pewee (*Contopus virens*), catbird (*Dumetella carolinensis*), wood thrush (*Hylocichla mustelina*), white-eyed vireo (*Vireo griseus*), northern parula warbler (*Parula americana*), yellow warbler (*Dendroica petechia*), common yellowthroat (*Geothlypis trichas*), American redstart (*Setophaga ruticilla*) and song sparrow (*Melospiza melodia*).

David Burke, Division of Fish, Game and Wildlife, indicates that there are approximately 25-30 deer per square mile in hunting zone 21 of which Lebanon State Forest is a part. Although the use of this cedar swamp by white-tailed deer for wintering habitat may be more important than use of the cedar swamp for food, heavy browsing by deer can occur which could reduce cedar regeneration dramatically (David Burke, pers. comm.).

Pine Barren Hardwood Swamp

This community type occurs as a small area adjacent to the southern end of the cedar swamp. Red maple (*Acer rubrum*) dominates the hardwood swamp, while swamp magnolia and black gum (*Nyssa sylvatica*) also occur.

Management of Atlantic White Cedar

No clear consensus currently exists on the specific methods for maintaining Atlantic white cedar swamps, including that which exists in the Cedar Swamp Natural Area. However, as the designation objective for this Natural Area includes preservation of the cedar swamp community type, management for its continuance may be necessary in the future. Following is a summary of current knowledge on cedar regeneration.

Atlantic white cedar is a shade intolerant species and therefore does not regenerate well under canopy cover. Hardwoods such as red maple, sweet bay and black gum are shade tolerant and are able to thrive under a canopy. Because of this tolerance, hardwoods may seed into an Atlantic white cedar stand, either along the edge of the cedar stand or when a blowdown creates an opening in the cedar canopy, and outcompete the cedar seedlings. Eventually the cedar stand converts to a hardwood swamp. According to Little (1950), if white cedar stands remain undisturbed, a hardwood understory develops as the overstory thins out, and the hardwoods gradually replace the veteran white cedars as they die.

Zampella (1987) indicates that management of Atlantic white cedar in the Pinelands, as recommended by the New Jersey Bureau of Forest Management and required by the Pinelands Comprehensive Management Plan, includes several guidelines based principally on the silvicultural techniques presented by Little (1950). These guidelines are (1) manage cedar in even-aged tracts; (2) harvest by clearcutting; (3) remove or reduce slash; and (4) control competing hardwoods.

Many factors should be considered when deciding whether to harvest an area and, should the decision to harvest be affirmative, when determining the method and size of the clearcutting. These include swamp size, shape and orientation, stand age condition and composition, hydrology, adjacent forest type, and deer population demographics (Little, 1950; Zampella, 1987).

Deer browse of white cedar seedlings has proven to be one major obstacle to cedar regeneration in the Pinelands (Little and Somes, 1965; Zimmerman, 1992). The exclusion of deer by electric fence has proven effective based on preliminary findings by Zimmerman (1992), offering some future hope in treating this problem. Studies and management recommendations by Boyle (1992), Little (1950), Zampella (1987), Zimmerman (1992), and others suggest that cedar can be regenerated at an acceptable cost with proper management.

In the case of invasion of hardwoods, an alternative to clearcutting, based on examination of the above factors, may be to remove the hardwoods in that area of invasion (Robert Zampella, pers. comm.). The stand should be carefully monitored to determine the efficacy of the selective cut.

Clearly, the requirements of the individual stand with its many variables must be addressed before a method of controlling hardwood invasion and preserving the cedar community type is devised.

Intermittent Pond

Two intermittent ponds exist within the natural area. One pond is approximately one acre in size and occurs east of Norlemon Road at its intersection with Coopers Road. The other pond occurs on the east side of Norlemon Road approximately 1000 feet north of its intersection with Shinns Road. Both ponds are dominated by leatherleaf (*Chamaedaphne calyculata*) with sheep laurel mixed in. Scattered pines occur in the interior portions of the ponds.

Pine Plantation

Approximately one dozen pine plantations were planted within the natural area in the 1930's and 1940's, many by the Civilian Conservation Corps. The majority of the plantations occur along Coopers and Shinns Roads. A white pine (*P. strobus*) plantation occurs between the north side of Sloans Fireline, at its intersection with the Batona Trail, and Coopers Road. Various oaks are scattered throughout the plantation and blueberry dominates the shrub layer. The herbaceous layer is dominated by teaberry while bracken fern occurs near the forest edge. Two red pine (*P. resinosa*) plantations exist along Shinns Road approximately 1000 feet east of the loop road. The two plantings appear as small strips and are difficult to delineate in the field. Pitch pine was planted in 1934 along Shinns Road between Norlemon and the loop road. Loblolly (*P. taeda*) and shortleaf pine (*P. echinata*) plantings were completed in 1936 and 1940 respectively along Coopers Road between Norlemon and Muddy Roads (Chris Bethmann, pers. comm.). The latter three plantings are difficult to identify in the field because other pines have seeded into the area and have become established.

Endangered Species

According to the Natural Heritage Database, five rare species occur in Cedar Swamp Natural Area. Swamp pink (*Helonias bullata*) is listed as a federally threatened and state endangered plant. A known population of approximately 50 plants was observed in the Atlantic white cedar swamp and recorded in the Database in 1980. A portion of this population was observed by the author and Ted Gordon on January 8, 1992. Approximately one-quarter mile downstream from those plants the author observed 40 additional plants, five of which were flowering, on May 21, 1992. The major threat to swamp pink is loss and degradation of its wetland habitat due to encroaching development, sedimentation, pollution, succession and wetland drainage (U.S. Fish and Wildlife Service, 1991).

Other rare plants occurring in the natural area include pine barren bellwort (*Uvularia puberula* var. *nitida*) and pine barren reedgrass (*Calamovilfa brevipilis*) located near the bridge over Shinns Branch. Pine barren gentian (*Gentiana autumnalis*) has been observed along Shinns Road and New Jersey rush (*Juncus caesariensis*) has been observed in an open area of the cedar swamp.

The Database also indicates that one rare amphibian, the state endangered Pine Barrens treefrog and one rare invertebrate, *Catocala jair* spp. 2, an underwing moth, occur immediately adjacent to the natural area and may possibly exist within the natural area.

Based on the community types present, the natural area may support additional endangered and threatened wildlife species.

Ted Gordon (pers. comm.) identified the state endangered Pine Barrens treefrog and northern red salamander, a declining species in New Jersey, in the natural area.

Boundaries

The current boundary of Cedar Swamp Natural Area is indicated in Figure 2. Approximately one-half mile of the natural area boundary in the northwest portion of the natural area follows the Lebanon State Forest boundary. Superintendent Chris Bethmann indicates this 4-foot wide boundary is cleared periodically by Lebanon State Forest staff.

The eastern boundary of the natural area is defined by a transect running north-south from Coopers Road to Buzzard Hill Road. This boundary is artificial in that it does not conform to any physical features identifiable in the field. An area of approximately 62 acres was excluded from the boundary at the time of designation of the natural area in order to retain the option of future development as part of a planned recreation area for nearby Pakim Pond. Currently no plans exist to develop the Pakim Pond area. The area is entirely forested and is composed of pine-oak, oak-pine and pitch pine lowland communities that are contiguous with the adjacent designated natural area. The headwaters of the Shinns branch also extends into this area. A disturbed area containing dumped organic debris (grass clippings, brush, etc.) exists within the 62-acre exclusion just south of Sloans fireline (Figure 2). Several short sand roads lead from the fireline to the area where the dumping has occurred.

Public Use

Currently the area is used primarily for hiking, botanizing and bird watching. Some visitors use the sand roads through the area for pleasure driving, however Sloans Fireline from the eastern boundary to Muddy Road is restricted to foot traffic only (Figure 2). Although hunting and trapping are permitted, Superintendent Chris Bethmann indicates that very little trapping takes place in the natural area. Parking for visitors to the natural area is available at the Forest Office and at the Pakim Pond Picnic Area on Buzzard Hill Road. No research is currently being conducted in the natural area, but research has taken place in the last few years (Chris Bethmann, pers. comm.).

No entrance sign exists at the natural area although the boundary is posted with State Natural Area signs. Three wooden routed signs exist where the Batona Trail meets the Red Trail in the eastern portion of the natural area (Figure 2). One sign reads "Batona Trail-Pedestrian Traffic Only". The other two signs read "Pakim Pond" and "Office".

Sand roads crisscross the natural area (Figure 2). These roads include Sloans Fireline, running parallel to Shinns Branch; Norlemon Road, running northeast to southwest bisecting the northern portion of the natural area; Prongfoot Road and an extension of Muddy Road, both connecting Coopers Road with Sloans Fireline.

Portions of the Red Trail and the Batona Trail pass through the natural area (Figure 2). The Red Trail is a Lebanon State Forest trail which allows access from the Forest Office to Pakim Pond. The trail follows Sloans Fireline and a short portion of Norlemon Road within the natural area. The Batona Trail is a 49.5 mile trail stretching from Ong's Hat in Lebanon State Forest through Batsto and Wharton State Forest and into Bass River State Forest. The trail is maintained jointly by the Batona Hiking Club and the State Park Service. Approximately one mile of the Batona Trail traverses the southeast corner of the natural area with approximately one-third mile overlapping the Red Trail on Sloans Fireline.

Superintendent Chris Bethmann has proposed a Mount Misery Trail which would provide access from the Red Trail to Mount Misery. The portion of the Mount Misery Trail proposed for inclusion in the natural area would follow Muddy Road from Coopers Road to Sloans Fireline where it would intersect the Red Trail (Figure 2). This proposal will not require any clearing within the natural area. Only signage along an existing sand road will be needed.

Research

In the 1930's Silas Little performed timber stand improvement work within the natural area on an experimental basis (Chris Bethmann, pers. comm.). Mr. Little thinned the cedar stand on the west side of Norlemon Road. The thinning consisted of removal of an interim crop of pole-sized cedar to allow for increased growth of the residual stand. Instead, the thinning allowed for infiltration of hardwood species. Mr. Little readily admitted that his experiment had failed and does not recommend thinning of cedar in his later publications. In 1937 a small section of the cedar swamp north of Shinns Road near the intersection with Buzzard Hill Road was planted with Atlantic white cedar. In 1939 two large sections of the cedar swamp were also planted with Atlantic white cedar (Chris Bethmann, pers. comm.).

The Atlantic white cedar swamp along Shinns Branch was one of 30 study sites surveyed by Wade Wander in 1980. The general purpose of this study was to census birds in mature Atlantic white cedar swamps of various sizes from the northern Pine Barrens south to Cumberland and Cape May counties and, if possible, to make some preliminary correlation between variables such as size of swamp, vegetation structure and composition, and moisture regime, with bird species diversity (number of bird species) and density (Wander 1980). Wander (1980) reported that a total of 40 bird species were found in association with mature stands of Atlantic white cedar. However, a majority of these species were not nesting within cedar swamps, but rather in the surrounding habitats, and were classified as visitors to cedar swamps.

In 1982 and 1983 John P. Schneider conducted research in the natural area for his doctorate thesis entitled "The effects of suburban development on hydrology, water quality and community structure of *Chamaecyparis Thyoides* (L.) B.S.P. wetlands in the New Jersey Pinelands" (Schneider, 1988). Mr. Schneider established control plots within the Atlantic white cedar swamp along Shinns Branch. The data generated from this isolated, undeveloped and protected watershed was compared to data from the test plots, that were established near areas of suburban development with accompanying engineering features such as septic systems and storm sewers.

Schneider (1988) found that septic systems and especially storm sewers increased the concentration of nitrogen, phosphorus, chloride, lead, and zinc in wetland ground and surface water. Dams and channelized streams eliminated the normal fluctuation of the water table. Wetland drainage ditches lowered the water table. Along the gradient of increasing suburban development indigenous Pinelands cedar swamp species were lost; upland, non-Pineland and exotic species invaded; *Sphagnum* cover and total plant cover decreased; cedar seedling density decreased; and the concentration of nutrients and heavy metals in plant tissues increased. Changes in the hydrological regime and in water chemistry interacted to produce the observed changes in the biotic characteristics. However, water chemistry, especially when altered by storm sewers, had a greater impact on Pinelands cedar swamps than did the hydrological regime.

Robert A. Zampella currently has a special use permit to monitor water levels in Lebanon State Forest. Three water level monitoring wells occur at each of four study sites within the natural area. One site is at the loop road off of Shinns Road in the dry pitch pine lowland community. Another site occurs north of Sloans Fireline south of Muddy Road in a wet pitch pine lowland community. The third set of wells occurs in mesic pine-scrub oak community south of Sloans Fireline, east of Muddy Road. The fourth study site occurs in the mixed pine-hardwood swamp community in the headwaters of Shinns Branch west of the Batona Trail.

Introduced Features

A bridge exists where Norlemon Road crosses Shinns Branch (Figure 2). The bridge was built in the 1930's by the Civilian Conservation Corps and is maintained by Lebanon State Forest.

A boardwalk exists along wet portions of the Batona Trail (Figure 2).

Three deer stands have been observed in the natural area (Figure 2). Two exist along a loop road off of Shinns Road. One stand exists close to Shinns Road and the other occurs near the turnaround. The third deer stand exists at an area of cedar regeneration near a short sand road in the western portion of the natural area.

A nesting box occurs on a tree in the Atlantic white cedar swamp along Shinns Branch approximately 40 feet north of the bridge on Norlemon Road (Figure 2).

Numerous wells occur in sections of the cedar swamp. These wells are constructed from 3.8 cm inside diameter PVC pipe and were installed in 1982 during Schneider's field work (Schneider, 1988). Dr. Joan Ehrenfeld of Rutgers University expressed interest in monitoring these wells in the future.

A disturbed area exists approximately 50-feet east of Prongfoot Road and one-tenth of a mile south of its intersection with Coopers Road (Figure 2). Debris found at the site includes bottles, jars, cans, concrete, roof shingles, wood, tires, brush, metal culverts, two refrigerators, a hot-water heater and a mattress.

In the early 1960's a major fire damaged parts of the cedar swamp and salvage cuts

were performed through the mid-1960's. Some of the cut areas have regenerated as maple-gum swamps while others have regenerated healthy, young Atlantic white cedars (Bethmann, 1982). Raymond Holmes, Firewarden at the Division B Headquarters in Lebanon State Forest, indicates that although prescribed burns have been performed on some upland portions of the natural area, they do not burn within the cedar swamp. No prescribed burning has taken place within the natural area since Superintendent Chris Bethmann became employed at Lebanon State Forest in 1980 (pers. comm.) Ted Gordon indicates that to the best of his knowledge the last fire within the watershed occurred in 1963. He also does not recall any prescribed burning within the natural area between 1963 and the present (pers. comm.).

Zampella (1987) indicates that stands which are to be managed as outstanding examples of cedar swamp should be protected from wildfire and that a prescribed burning program in areas surrounding a selected cedar swamp may provide a means of achieving such protection. Ted Gordon indicates that prescribed burning for protection of the swamp along Shinns Branch may not be necessary because the swamp is located close to Pakim Pond, the Forest Office and the maintenance complex. The swamp is further protected because it is surrounded by wide, sand roads that act as firebreaks (Ted Gordon, pers. comm.).

Management Techniques

Natural Areas System Rules

Relevant sections of the rules and regulations concerning Natural Areas and the Natural Areas System (N.J.A.C. 7:5A-1.1 et seq.) appear in Appendix A. An important function of these rules is to provide general interim management guidelines for all natural areas for which management plans have not been prepared. Upon preparation of a management plan, interim management guidelines may continue or may be superseded by management techniques more appropriate to fulfill the designation objective of the natural area. The following analysis will outline management and uses contrary or supplemental to existing rules. Appendix A will be used for management issues not covered below.

Designation Objective And Classification

The designation objective for Cedar Swamp Natural Area is "preservation of southern swamp and floodplain habitat, southern white cedar, red maple and pine/oak forest communities, and rare species habitat".

The following management techniques are directly related to previous sections of this plan and the interim management guidelines found in Appendix A. Techniques are based in part on consultation with appropriate agencies, individuals and the Natural Areas Council, and are designed to adequately maintain, and if possible enhance the quality of the natural area.

Throughout this section, administering agency refers to the Division of Parks and Forestry, through Lebanon State Forest.

Biotic Communities

1. Although techniques to preserve the Atlantic white cedar community are not currently needed, if the administering agency determines that the integrity of the Atlantic white cedar community is being compromised, a plan summarizing specific methods to recover or enhance the cedar forest tract will be submitted to the Natural Areas Council for review and to the Commissioner for approval.

Endangered Species

1. The ONLM, in conjunction with the administering agency, will determine the exact location and extent of the swamp pink population by July 31, 1993 and perform periodic inspections to assess future management needs of this species.
2. The ONLM, in conjunction with the administering agency, will monitor the Pine Barrens treefrog, pine barren bellwort, pine barren reedgrass, New Jersey rush, pine barren gentian and northern red salamander on a periodic basis and assess future management needs. Should any additional endangered or threatened species be discovered in the natural area, they will be monitored on a periodic basis.
3. The ONLM will provide the administering agency with a map indicating known and possible locations of all endangered and threatened animals and all endangered plants and plant species of concern by July 31, 1993. The map will be updated by ONLM should locations for any additional species be discovered.
4. The administering agency will not widen Norlemon Road or any other road during grading or other activity so as to avoid destruction of endangered plant species populations. The roadside adjacent to Shinns Road where the pine barren gentian occurs will be mowed only in the fall (late October-early November) in order to allow the plant to flower and set seed.

Boundaries

1. The administering agency will post State Natural Area boundary signs at trail access points and along the natural area boundary at a maximum of five per mile by April 30, 1993. These signs will be replaced as needed.
2. The ONLM will provide the administering agency with State Natural Area boundary signs as needed.

3. The boundary of the natural area is revised to include a 62-acre State-owned parcel currently located within Lebanon State Forest at the intersection of Coopers Road and Buzzard Hill Road. The resulting acreage of the Cedar Swamp Natural Area is 735 acres.
4. The administering agency will maintain the cleared access along the natural area boundary where it shares the State Forest boundary.
5. The administering agency will determine an appropriate location for an entrance sign and construct the sign by April 30, 1993.

Public Use

1. The administering agency will obtain all applications to conduct research or collect specimens, forward a copy to the ONLM, and provide a response within 30 days of application submittal. The administering agency shall coordinate a response with the ONLM.
2. If the Mount Misery Trail is extended into the natural area, the administering agency will post appropriate signage along existing sand roads. No expansion of the existing trail and road system will be permitted to accomplish this trail delineation.

Introduced Features

1. The administering agency will remove all deer stands in the natural area by December 31, 1993.
2. The administering agency will remove all surface refuse from the disturbed areas along Prongfoot Road and Sloans Fireline by December 31, 1993, and thereafter on an ongoing basis if needed. The administering agency will take appropriate measures to discourage future dumping in these areas.
3. The administering agency will meet with staff from Forest Fire Management and the ONLM to assess the fire hazard situation within the natural area and prepare a prescribed burning plan, if needed, by April 30, 1993. The administering agency may perform prescribed burning on the upland portion of the natural area upon review of the prescribed burning plan by the Natural Areas Council and approval by the Commissioner.
4. Prior to conducting any ground disturbing activities, except for road closures, the administering agency will consult with the Office of New Jersey Heritage for evaluation to prevent impacts to potentially significant cultural remains.

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Appendix A

INTERIM MANAGEMENT PRACTICES FOR NATURAL AREAS

From Natural Areas System Rules
(N.J.A.C. 7:5A-1.1 et seq.)

7:5A-1.9 INTERIM MANAGEMENT PRACTICES

- (a) Interim management practices shall be implemented by the administering agency, provided that:
 - 1. The practice will have no direct or indirect adverse impact on natural features of concern;
 - 2. The administering agency notifies the secretary of the Council, in writing, no later than 30 days after initiating the practice;
 - 3. Approval of the Commissioner is not required by provision elsewhere in this subchapter; and
 - 4. The practice is consistent with terms of any conservation easement held by the Department.
- (b) Interim management practices listed at (e) or (f) below which require the approval of the Commissioner shall first be submitted to the Council for its review and recommendation.
- (c) Upon finding that an interim management practice listed below at (e) or (f) would be detrimental to achieving a specific designation objective, the Council shall recommend to the Commissioner the substitution of a more appropriate interim management practice. Should the Commissioner concur with the recommendation of the Council, the Commissioner may approve substitution by a more appropriate interim management practice.
- (d) Where there are conflicts between general practices described below at (e) and practices specific to a natural area classification described below at (f), the latter shall apply.
- (e) The following interim management practices apply generally to all natural areas upon designation to the System and until and unless superseded by the provisions of an adopted management plan:
 - 1. Natural area boundaries shall be made clearly evident by posting signs at a maximum density of ten signs per mile; entrance points shall be posted to indicate

- to users that they are entering a natural area; boundary signs shall be of a standard size and format as approved by the Commissioner and provided by the Division;
2. Boundary fences that are needed to protect the natural area may be installed provided the fence shall not have a detrimental effect on movement of wildlife, air circulation, or other natural conditions;
 3. Vehicular access lanes may be maintained within a natural area but may not be enlarged in any manner except upon approval of the Commissioner.
 4. Existing firebreaks within a natural area may be maintained for safety purposes; temporary firebreaks made by mowing, raking, plowing or wetting, may be used in conjunction with prescribed burning for habitat management;
 5. Existing structures may be maintained in a natural area; new structures and enlargement of existing structures may be undertaken upon approval by the Commissioner, provided the structures directly or indirectly contribute to the designation objective; new structures, of a temporary nature, may be constructed for research purposes in accordance with N.J.A.C. 7:5A-1.10;
 6. No measures, such as cutting of grass, brush, or other vegetation, thinning of trees, opening of scenic vistas, or planting, shall be taken to alter natural processes or features for the purpose of enhancing the beauty or neatness of a natural area;
 7. Except as otherwise provided in this section, there shall be no introduction, removal or consumptive use of any material, product, or object to or from a natural area; prohibited activities include grazing by domestic animals, farming, gathering of plants or parts thereof, mining or quarrying, and dumping, burying, or spreading of garbage, trash, or other materials; structures or materials may be removed as follows:
 - i. Old interior fences may be removed, giving consideration to leaving posts to mark boundaries between former land uses;
 - ii. Rubbish or any other waste material may be removed; and
 - iii. Structures having no historic, scientific or habitat value may be demolished and removed unless such structures are deemed essential for administrative purposes;
 8. Water levels within a natural area shall not be altered except to restore water levels which have been altered due to a sudden natural phenomena or man-induced conditions off-site; routine repairs to existing water control structures may be undertaken but the structures may not be enlarged;
 9. All wildfires shall be brought under control as quickly as possible; after a fire within a natural area, there shall be no cleanup or replanting except as approved by the Commissioner to achieve the designation objective or for reasons of health and safety;

10. Prescribed burning, to eliminate safety hazards and to manage habitat, may be conducted upon review of a proposal for prescribed burning by the Council and approval by the Commissioner; use of vehicles and equipment shall be specified in the proposal for prescribed burning;
11. Erosion control within a natural area shall not be undertaken except to restore existing grades which have been altered due to a sudden natural phenomena or man-induced conditions within or beyond the natural area;
12. Habitat manipulation may be undertaken if preservation of a particular habitat type or species of native flora or fauna is included in the designation objective of the natural area and upon approval by the Commissioner of a specific habitat manipulation plan prepared by the Department;
13. Gypsy moth control activities may be implemented as an interim management practice after approval of a gypsy moth control plan by the Commissioner; the Commissioner shall review a gypsy moth control plan only after the State Forester has determined that egg mass counts and prior year defoliation indicates that tree mortality will be severe without intervention; to the extent practicable, biological controls, rather than chemical means, shall be used to control gypsy moths;
14. There shall be no physical manipulation of a natural area or application of chemicals known as adulticides for the purpose of controlling mosquitoes; the application of larvacides may be permitted in salt marshes only and only as follows:
 - i. The application of *Bacillus thuringiensis* var. *israelensis* (BTI) may be initiated by a mosquito control agency at any time; and
 - ii. The application of other larvacides may be initiated upon approval by the Commissioner of a specific mosquito control plan submitted by a mosquito control agency; the plan shall identify the specific area where a larvacide application will be made, the types and amount of larvacide to be applied, the need for the application, and the reason why BTI cannot be used for this application;
15. Research activities and the collection of specimens may only be conducted in accordance with N.J.A.C. 7:5A-1.10 and upon approval of the administering agency; and
16. Public use of natural areas shall be allowed only to the extent and in a manner that it will not impair natural features; the administering agency may restrict access and use as necessary to protect the natural area; the following are permissible public uses of natural areas:
 - i. Hunting, trapping, and fishing are permitted in accordance with N.J.A.C. 7:25-5 and 7:25-6; except for the stocking of fish and game, habitats may not be manipulated for the purpose of enhancing hunting, trapping, or fishing;

- ii. Occasional camping along trails, boating, and swimming may be permitted in specified locations of natural areas in accordance with N.J.A.C. 7:2-2, 7:2-5, 7:2-7, 7:2-8, and 7:25-2, and are further limited as follows:
 - (1) No permanent structures may be erected;
 - (2) No motorized methods of boating or camping are permitted;
 - (3) Trailside shelters of the type called lean-tos are permitted, but there may not be two such shelters within three miles of each other; and
 - iii. Existing trails may be maintained, but not enlarged in any manner, by the administering agency to allow public use and prevent erosion, trampling of vegetation beyond the trails, and other deterioration as follows:
 - (1) New trails or enlargement of existing trails for interpretive purposes may be initiated subsequent to review of a plan by the Council and approval of that plan by the Commissioner;
 - (2) Rare plants may not be removed for the purpose of maintaining existing or constructing new trails; and
 - (3) To the extent possible, natural materials shall be used on and along trails; and
 - iv. All pets shall be kept caged or leashed and under immediate control of the owner except that dogs used while legally hunting shall be exempt from the leashing requirement.
- (f) The following interim management practices, unless superseded by an adopted management plan, apply to the appropriate specified natural area classifications:
- 1. Location markers identifying interpretation points of interest may be installed except within ecological reserves;
 - 2. Trail blazes may be used within any natural area;
 - 3. Existing vehicular access lanes may not be enlarged in any manner within an ecological reserve;
 - 4. New vehicular access lanes may be constructed only within buffer areas and upon approval by the Commissioner;
 - 5. The alteration of natural processes or features for the purpose of enhancing public use of the natural area may be conducted by the administering agency only within buffer areas; and

6. The following management practices shall not be permitted within ecological reserves:
 - i. New, existing, or temporary firebreaks;
 - ii. Construction of new trails;
 - iii. Alteration or restoration of water levels;
 - iv. Prescribed burning;
 - v. Erosion control measures;
 - vi. Gypsy moth control activities; and
 - vii. Manipulation of vegetation and wildlife habitats.

Appendix B

NATURAL AREAS SYSTEM MANAGEMENT PLAN TASKS AND RESPONSIBILITIES

Natural Area: Cedar Swamp

Plan Adoption Date: February 1, 1993

Name:

Date:

	<u>Date Indicated in Plan</u>	<u>Proposed Accomp. Date</u>	<u>Date Accomp.</u>
I. Lebanon State Forest Superintendent			
1. Although techniques to preserve the Atlantic white cedar community are not currently needed, if the administering agency determines that the integrity of the Atlantic white cedar community is being compromised, a plan summarizing specific methods to recover or enhance the cedar forest tract will be submitted to the Natural Areas Council for review and to the Commissioner for approval.	As needed	As needed	As needed
2. The administering agency will not widen Norlemon Road or any other road during grading or other activity so as to avoid destruction of endangered plant species populations. The roadside adjacent to Shinns Road where the pine barren gentian occurs will be mowed only in the fall (late October-early November) in order to allow the plant to flower and set seed.	Ongoing	Ongoing	Ongoing
3. The administering agency will post State Natural Area boundary signs at trail access points and along the natural area boundary at a maximum of five per mile by April 30, 1993. These signs will be replaced as needed.	4/30/93	_____	_____

4. The administering agency will maintain the cleared access along the natural area boundary where it shares the State Forest Boundary.	As needed	As needed	As needed
5. The administering agency will determine an appropriate location for an entrance sign and construct the sign by April 30, 1993.	4/30/93	_____	_____
6. The administering agency will obtain all applications to conduct research or collect specimens, forward a copy to the ONLM, and provide a response within 30 days of application submittal. The administering agency shall coordinate a response with the ONLM.	As needed	As needed	As needed
7. If the Mount Misery Trail is extended into the natural area, the administering agency will post appropriate signage along existing sand roads. No expansion of the existing trail and road system will be permitted to accomplish this trail delineation.	As needed	As needed	As needed
8. The administering agency will remove all deer stands in the natural area by December 31, 1993.	12/31/93	_____	_____
9. The administering agency will remove all surface refuse from the disturbed areas along Prongfoot Road and Sloans Fireline by December 31, 1993, and thereafter on an ongoing basis if needed. The administering agency will take appropriate measures to discourage future dumping in these areas.	12/31/93	_____	_____
10. The administering agency will meet with staff from Forest Fire Management and the ONLM to assess the fire hazard situation within the natural area and prepare a prescribed burning plan, if needed, by April 30, 1993. The administering agency may perform prescribed burning on the upland portion of the natural area upon review of the prescribed burning plan by the Natural Areas Council and approval by the Commissioner.	4/30/93	_____	_____

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|---|-----------|-----------|-----------|
| 11. Prior to conducting any ground disturbing activities, except for road closures, the administering agency will consult with the Office of New Jersey Heritage for evaluation to prevent impacts to potentially significant cultural remains. | As needed | As needed | As needed |
|---|-----------|-----------|-----------|

II. NJ DEPE Office of Natural Lands Management

- | | | | |
|--|---------------|-----------|-----------|
| 1. The ONLM, in conjunction with the administering agency, will determine the exact location and extent of the swamp pink population by July 31, 1993 and perform periodic inspections to assess future management needs of this species. | 7/31/93 | _____ | _____ |
| 2. The ONLM, in conjunction with the administering agency, will monitor the Pine Barrens treefrog, pine barren bellwort, pine barren reedgrass, New Jersey rush, pine barren gentian and northern red salamander on a periodic basis and assess future management needs. Should any additional endangered or threatened species be discovered in the natural area, they will be monitored on a periodic basis. | Ongoing | Ongoing | Ongoing |
| 3. The ONLM will provide the administering agency with a map indicating known and possible locations of all endangered and threatened animals and all endangered plants and plant species of concern by July 31, 1993. The map will be updated by ONLM should locations for any additional species be discovered. | 7/31/93 | _____ | _____ |
| 4. The ONLM will provide the administering agency with State Natural Area boundary signs. | As needed | As needed | As needed |
| 5. The boundary of the natural area is revised to include a 62-acre State-owned parcel located within Lebanon State Forest at the intersection of Coopers Road and Buzzard Hill Road. The resulting acreage of the Cedar Swamp Natural Area is 735 acres. | Upon adoption | _____ | _____ |