Washington Crossing Natural Area
Management Plan

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Introduction

This management plan for the Washington Crossing Natural Area describes the resource features which this site contains and prescribes uses and practices that will be allowed and implemented to maintain and, if practicable, enhance these features.

The Natural Areas System is established and administered pursuant to N.J.S.A. 13:1B-15.4 et seq. and 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).

Washington Crossing Natural Area is a 158-acre parcel located in Hopewell Township, Mercer County and is part of the Piedmont physiographic province of New Jersey. The natural area is in the northern portion of Washington Crossing State Park. The area lies approximately eight miles north of the City of Trenton and immediately east of the Delaware River. Figure 1 shows the general location of the natural area. The boundary of the natural area is indicated in Figure 2.

The area that is now Washington Crossing State Park has a rich history in part due to its fertile soils and favorable location on the Delaware River. During colonial times Washington Crossing was a crossroads for transportation between Pennsylvania and New Jersey and between rural farmland and areas of higher density such as Trenton, eight miles down river and Philadelphia, approximately 30 miles down river. In the eighteenth century, much of the land that currently includes Washington Crossing State Park was felled for timber and farmed (Stone 1993). The reconstruction of late 1700s property boundaries, ownership, and uses of the land at Washington Crossing State Park by Stone (1993) shows that the land was used for farming, grazing and for woodlots. It is estimated that 90 to 100 percent of the wildlife habitat in the park has been altered since colonial times (Wiles 1980).

The park has historical significance because it is the landing site of General George Washington's historic crossing of the Delaware River on Christmas night 1776. Because of the existing ferry crossing, General Washington's troops were able to cross the river without probable detection. This location was also significant because it was central to Washington's troops who were scattered along the river from Trenton to Lambertville. The Continental Army went on to battle the Hessian and British troops in Trenton and Princeton. These battles are viewed as the turning point of the revolution.

Washington Crossing State Park was established in 1912 and was one hundred acres in size. Over the years the park expanded to approximately 841 acres. The last tract of land acquired by the State that is currently included in the natural area was obtained in 1978. The Washington Crossing Natural Area was added to the System in 1978.

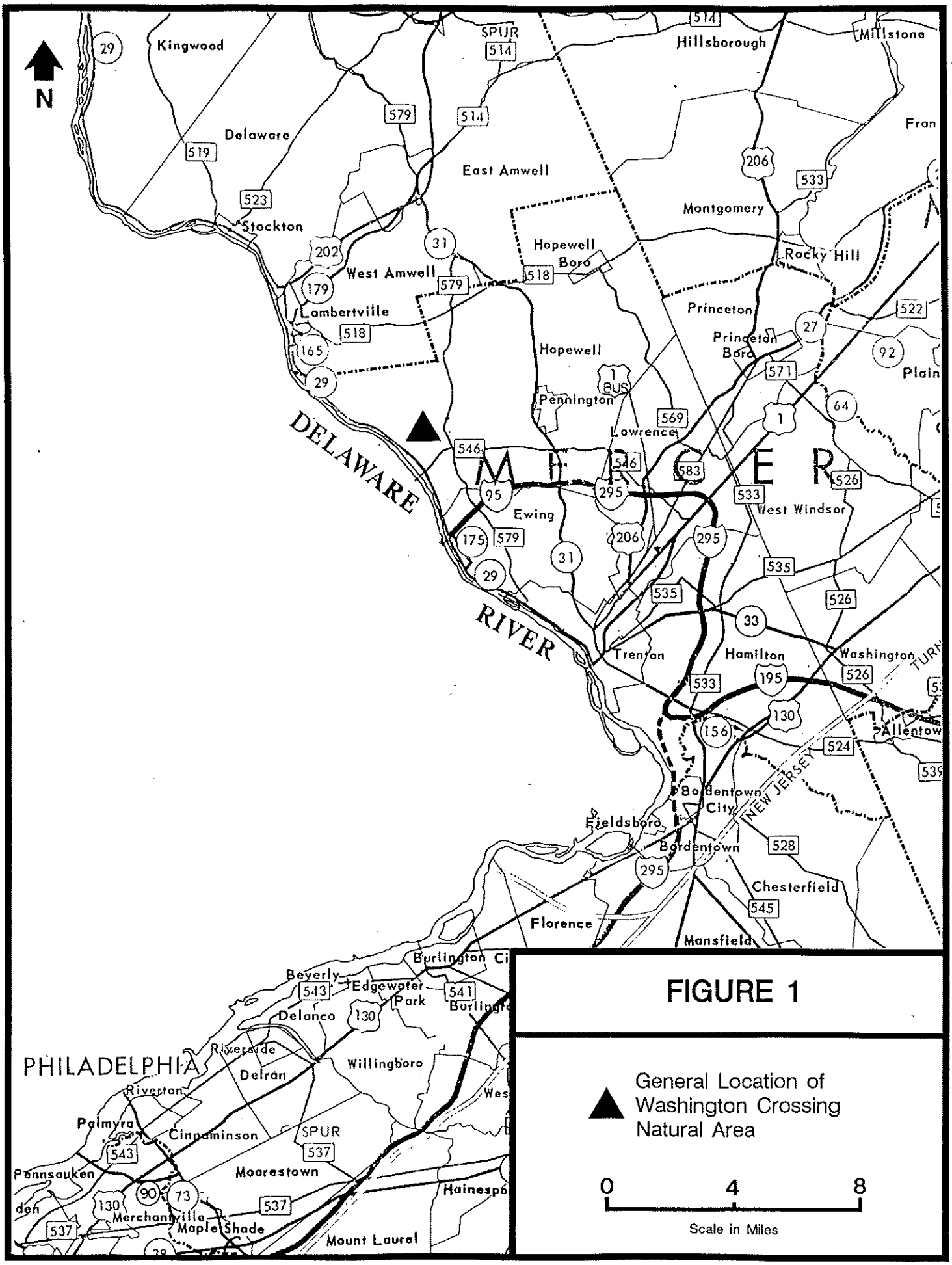

FIGURE 1

▲ General Location of Washington Crossing Natural Area

0 4 8

Scale in Miles

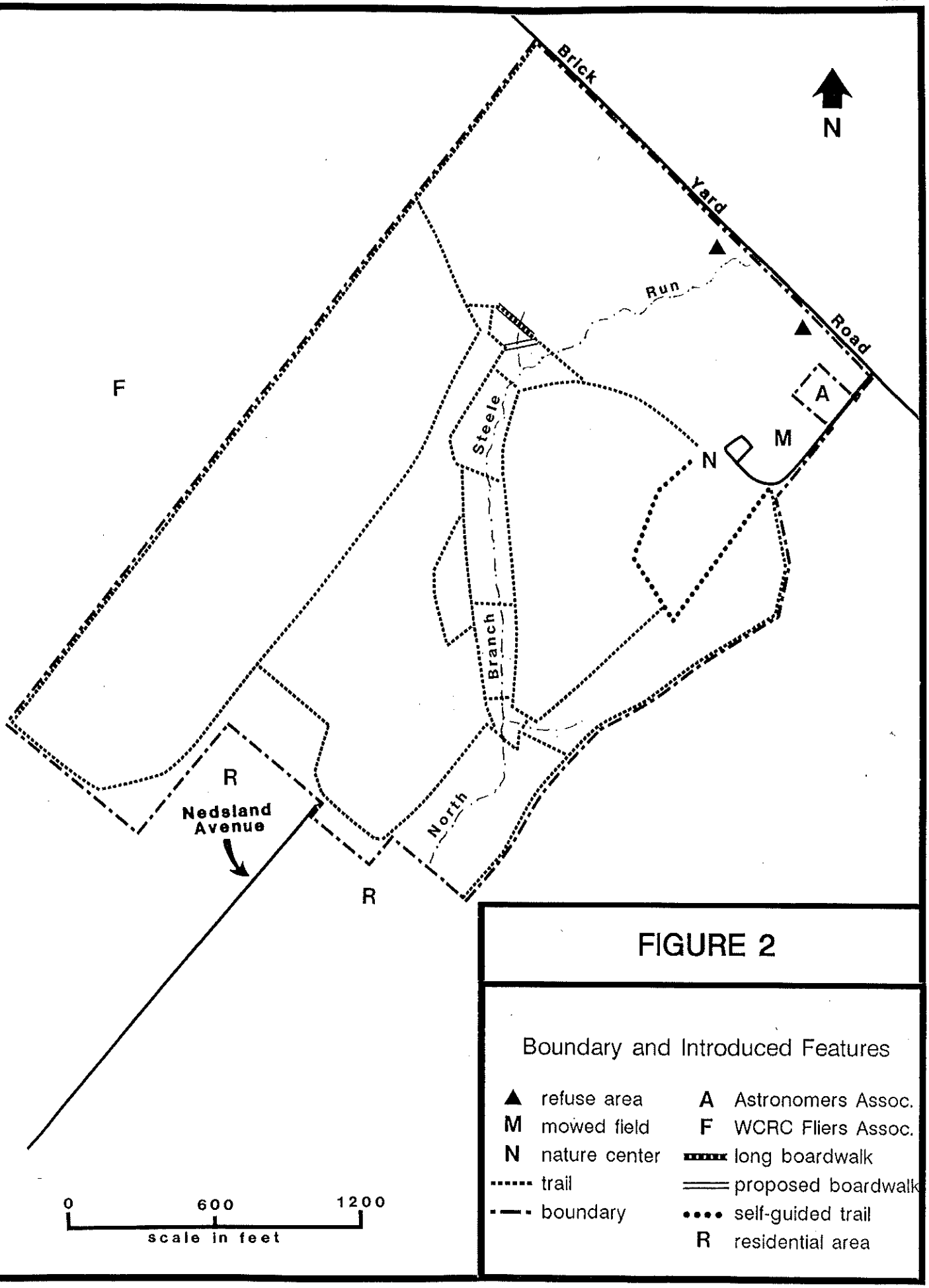

FIGURE 2

Boundary and Introduced Features

▲	refuse area	A	Astronomers Assoc.
M	mowed field	F	WCRC Fliers Assoc.
N	nature center	▭	long boardwalk
------	trail	═══	proposed boardwalk
- — -	boundary	••••	self-guided trail
		R	residential area

The management objective for this natural area under N.J.A.C. 7:5A-1.13(a)38ii is "preservation of natural succession and mixed hardwood forests, and rare species habitat". N.J.A.C. 7:5A-1.8 also mandates the preparation of this management plan.

The Division of Parks and Forestry, through Washington Crossing State Park, serves as the administering agency, being responsible for implementing policy and, after consultation with other Divisions, organizations and individuals, making land management decisions affecting Washington Crossing Natural Area. Washington Crossing State Park shall implement the management policies necessary to achieve the management 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.

Description and Management Concerns

Geology and Soils

Washington Crossing State Park lies within the Piedmont physiographic province. The surrounding area is a large alluvial floodplain with many small rounded hills and broad valleys (Wolfe 1977). The underlying bedrock is of the Brunswick Formation which is composed of mainly soft, hematite stained red shales with some interbedded sandstone (Wolfe 1977).

The soil association within the natural area is the Bucks-Penn-Readington association (U.S. Department of Agriculture 1972). This association contains moderately deep and shallow, well-drained and moderately well drained, gently undulating or gently sloping soils that have a silty subsoil. Underlying material includes red shale or siltstone. Representative soil series include Bucks silt loam, Penn shaly silt loam, Klinesville shaly loam and Reaville. The Reaville series is designated hydric or having a hydric component in Mercer County (U.S. Department of Agriculture 1990). Bucks silt loam ranges in slope from 2 to 12 percent over much of the upland regions. This loam is characteristically deep and well-drained. The Penn series soils typically range from 14-19 inches in depth to shale bedrock on 12-18 percent slopes to 20-28 inches or more on 0-6 percent slopes. These soils were formed from red shale and siltstone of the Brunswick Formation (U.S. Department of Agriculture 1972). In the natural area, these soils are found on slopes ranging from 0 to approximately 18 percent. Much of the old field in the natural area is composed of the Penn soil series. The Klinesville series occurs in the portion of the natural area that is traversed by the north branch of Steele Run. This region has moderately steep slopes (12 to 30 percent) and thus has a greater potential for erosion. These soils are excessively drained and available water capacity is low. Heavy rains yield saturated soil and river bank flooding. The remaining portions of the area are underlain by Reaville soils which are designated hydric only because of saturation (U.S. Department of Agriculture 1990).

This series is moderately well drained and is found on the nearly level to moderately sloping areas of the region (U.S. Department of Agriculture 1972).

Topography and Surface Hydrology

Washington Crossing State Park is located in an area of relatively gently sloping topography approximately one mile south of Baldpate Mountain. The elevation ranges from 220 feet at the nature center to approximately 100 feet at the stream bed at the southern corner of the natural area.

The natural area is part of the Delaware River Basin and is within the Steele Run sub-drainage of the Lockatong Creek Watershed. A forked stream, Steele Run, flows through the park and empties into the Delaware River at river mile 142. The north branch of Steele Run cuts through the natural area from the northeast to the southwest resulting in a curving corridor with steep slopes of up to 30 percent in some areas. Due to the soils and slope of the stream corridor, water runs off quickly resulting in variable flow volumes in the north branch. The NJ DEPE freshwater wetlands maps describe the stream corridor through the natural area as a palustrine, scrub/shrub, broadleaf deciduous, temporary wetlands. Most summers the northeastern portion of the north branch stream bed is dry (Wayne Henderek pers. comm.). There is a spring-fed brook, however, that contributes water to the north branch of Steele Run throughout the year. This brook, as well as subsurface flow and runoff from summer rains, maintain a low flow of water in the north branch stream bed throughout the summer from the point where the north branch curves southward. Other surficial hydrological features of the natural area include several intermittent streams that feed the north branch of Steele Run during high runoff periods.

Biotic Communities

The community classifications and Figure 3 were derived from aerial photographic analysis by J.R. Arsenault, Office of Environmental Analysis, in 1986 and through field examination by Patrick Brown on July 8 and 14, 1986 and by the authors on April 22, June 21, June 25, July 7, July 15, 1993 as well as information obtained from Breden (1989). 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 August 1993.

Serial Woodlands

The primary community type in the natural area, covering approximately 75 percent of the area, is serial woodlands. This community type is the successional stage between the old agricultural fields and pasture and the hardwood forests that will eventually dominate this area. The canopy height of these woodlands is more than 25 feet.

Eastern red cedar (*Juniperus virginiana*) often dominates with other tree species such as black walnut (*Juglans nigra*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*),

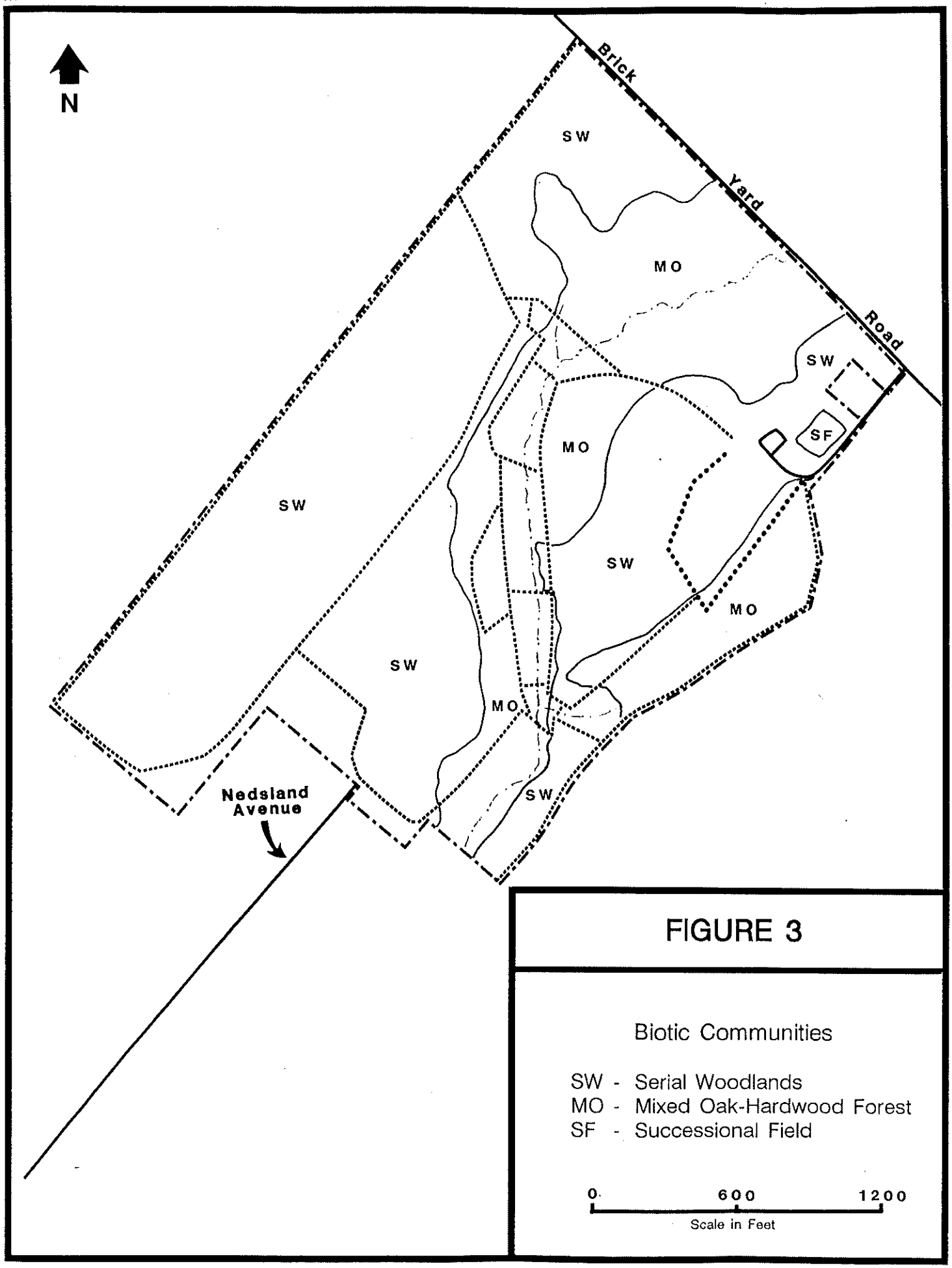

FIGURE 3

Biotic Communities

SW - Serial Woodlands
MO - Mixed Oak-Hardwood Forest
SF - Successional Field

0 600 1200
Scale in Feet

flowering dogwood (*Cornus florida*), hackberry (*Celtis occidentalis*), sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*), smooth sumac (*Rhus glabra*), staghorn sumac (*Rhus typhina*) and crabapple (*Pyrus* spp.) filling in over the shrub layer. Multiflora rose (*Rosa multiflora*), raspberries (*Rubus spp.*), black haw (*Viburnum prunifolium*), poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*) and common privet (*Ligustrum vulgare*) are some of the shrub and vine species found in these areas along with spicebush (*Lindera benzoin*) found in wetter areas, especially along the stream banks. Herbaceous plants of the serial woodland include smartweed (*Polygonum spp.*), garlic mustard (*Alliaria officinalis*), violets (*Viola* spp.), enchanter's nightshade (*Circaea quadrisulcata*) and Christmas fern (*Polystichum acrostichoides*). Various oak, hickory and maple seedlings are also present in this community.

Portions of the serial woodlands are nearly pure eastern red cedar stands and are found in the western portion of the natural area and in a small area off Brick Yard Road. The red cedar is very dense, crowding out most other vegetation where the stands are thickest. Poison ivy was observed growing on red cedar where trails cut through the stand. Smartweed and little bluestem (*Andropogon scoparius*) are sometimes seen where light penetrates through small gaps.

Mixed Oak-Hardwood Forest

This community type occupies about 20 to 25 percent of the natural area. The mixed oak-hardwood forest occurs in an irregular strip on either side of the north branch of Steele Run in the eastern portion of the natural area and along the eastern portion of the Red Dot Trail. Dominant species of the canopy in this forest include red oak (*Quercus rubra*), white oak(*Quercus alba*), black oak (*Quercus velutina*), mockernut hickory (*Carya tomentosa*) and shagbark hickory (*Carya ovata*). Also found in this forest are red maple, American beech (*Fagus grandifolia*), white ash, and slippery elm (*Ulmus rubra*). Additional species found in lesser numbers included black walnut, sugar maple (*Acer saccharum*), eastern red cedar, tulip poplar (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), black cherry, black locust (*Robinia pseudoacacia*), sassafras, and northern catalpa (*Catalpa speciosa*) (Brown 1986).

The understory of this community is relatively open and appears particularly park-like along the Red Dot trail south of the nature center. The sparse subcanopy growth may be due to past grazing of this area resulting in an even-aged stand with a dense canopy. The low light levels below the canopy may limit subcanopy growth. The subcanopy layer may also be suppressed by deer browsing. The dominant subcanopy species is flowering dogwood, typical of this forest type (Robichaud and Buell 1973). Common witch hazel (*Hamamelis virginiana*) is also found in the understory, particularly in the hardwood forest area north of the nature center where the north branch of Steele Run cuts through the woods. Multiflora rose and Virginia creeper are the dominant shrub and vine species. The herbaceous layer is dense with spring beauty (*Claytonia virginica*), mayapple (*Podophyllum peltatum*) and smartweed throughout the spring and early summer. Other species such as garlic mustard, white snakeroot (*Eupatorium rugosum*), jack-in-the-pulpit (*Arisaema atrorubens*) and bugbane (*Cimicifuga racemosa*) are seen in patches. The tree seedlings most often seen in the ground cover are white ash, red maple and American beech as opposed to oak and hickory (Wayne Henderek pers. comm.).

Successional Fields

An area of about one acre located east of the nature center along the nature center road is divided into four quadrants and is maintained in various stages of early succession by scheduled mowing (Figure 3). The vegetation in this area is dominated by grasses such as little bluestem, sedges, asters (*Aster* spp.), goldenrods (*Solidago* spp.) and shrubs such as raspberries, multiflora rose and poison ivy (Wayne Henderek pers. comm.). This field is mowed to show stages of early succession for interpretive and educational purposes. Each quadrant of the field ranges in age from mowed to three years old at any given time. Mowing does not follow a set schedule, however, at least one quadrant is mowed each year.

Wildlife

The natural area consists of several different biotic communities and has a stream corridor diagonally through it resulting in a large amount of edge habitat per total area. Edge habitat may increase the diversity of species that are likely to be found in a given area by increasing habitat diversity and habitat for species that are edge specialists (Holland and Risser 1991). Both white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*) are examples of species that use fields and/or forest edges and have been observed in the natural area using these habitats. Due to the favorable habitat and the fact that no hunting is allowed in the park, deer are numerous in this area; the average density of white-tailed deer in this portion of the state is 70-75 per square mile compared to the state-wide average of 30 per square mile of suitable habitat (Susan Predel pers. comm.). Other species that favor edge habitats and that may be found in the natural area are raccoons (*Procyon lotor*), red fox (*Vulpes fulva*), and long-tail weasel (*Mustela frenata*) (Wiles 1980, DeGraaf and Rudis 1987). Tracks of raccoons have been observed in mud at the stream, and in the winter fox tracks have been observed crisscrossing the natural area (Wayne Henderek pers. comm.).

The serial woodlands and old field communities may provide suitable habitat for a variety of species, some of which also use the oak-mixed hardwood forest and have already been listed. Additional mammals that may be found in serial woodlands and old fields include the red fox, eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), long-tailed weasel, least shrew (*Cryptotis parva*), eastern mole (*Scalopus aquaticus*) and the meadow vole (*Microtus pennsylvanicus*), among others (Wiles 1980). Many of the reptiles and amphibians that utilize the mixed-oak hardwood forest may also be found in the serial woodlands, and some may be found in the successional fields. Avian species that are likely to occur in these communities and were observed during summer field visits are the rufous-sided towhee (*Pipilo erythrophthalmus*), cardinal (*Cardinalis cardinalis*), mockingbird (*Mimus polyglottos*), brown thrasher (*Toxostoma rufum*), gray catbird (*Dumetella carolinensis*), mourning dove (*Zenaida macroura*), American robin (*Turdus migratorius*), common yellowthroat (*Geothlypis trichas*), American goldfinch (*Carduelis tristis*), song sparrow (*Melospiza melodia*), prairie warbler (*Dendroica discolor*) and wild turkey (*Meleagris gallopavo*). Many migratory birds may use these communities during seasonal migrations due to the proximity of the Delaware River flyway. Future research regarding the importance of the natural area to migratory birds is needed.

Animals typical of oak-mixed hardwood forests and that may inhabit this community type at the natural area include mammals such as white-tailed deer, grey fox (*Urocyon cinereoargenteus*), raccoon, opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), grey squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), southern flying squirrel (*Glaucomys volans*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), short tail shrew (*Blarina brevicauda*), star-nose mole (*Condylura cristata*) and little brown myotis (*Myotis lucifugus*) (Wiles 1980). Reptiles such as the northern water snake (*Nerodia sipedon sipedon*), eastern garter snake (*Thamnophis sirtalis sirtalis*), northern black racer (*Coluber constrictor constrictor*), eastern milk snake (*Lampropeltis triangulum triangulum*) and the eastern box turtle (*Terrapene carolina carolina*) and amphibians such as the spotted salamander (*Ambystoma maculatum*), red-backed salamander (*Plethodon cinereus cinereus*), American toad (*Bufo americanus*), wood frog (*Rana sylvatica*) and gray treefrog (*Hyla versicolor*) may also inhabit the oak-mixed hardwood forest (Wiles 1980, DeGraaf and Rudis 1987). Avian species typical of this community type that were observed in the natural area during summer field visits include the black-capped chickadee (*Parus atricapillus*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), white-breasted nuthatch (*Sitta carolinensis*), northern flicker (*Colaptes auratus*) and tufted titmouse (*Parus bicolor*).

Endangered Species

According to the New Jersey Natural Heritage Database, there is one rare plant species record within the natural area. This species is the State endangered plant, spring avens (*Geum vernum*). Until recently, this plant species was known only from historical collections in New Jersey, the last known specimen being collected in 1936 near Vincentown, Burlington County (Snyder, 1989). The plant was rediscovered in New Jersey in 1986 by David Snyder, and currently there are seven known extant populations of the species occurring in the State and one additional historical occurrence. Two of the extant occurrences are experiencing some protection in New Jersey; one is in a State Wildlife Management Area and the other is at the Washington Crossing Natural Area.

All of the known New Jersey populations are in the Delaware River watershed. The species grows in rich loamy soil of wooded slopes, thickets, floodplains, and moist limestone ridges. Its range is in rich woods from southern Ontario to Iowa and Kansas, reaching its southern extent in Tennessee and Arkansas. It is also known from coastal and southern New York, New Jersey and Pennsylvania (Gleason 1952).

The spring avens was first observed and documented at the natural area by David Snyder in 1988. Snyder again documented plants of this population fruiting and flowering in the spring of 1989. Recently, the population was observed by the authors on July 7, 1993.

The population was closely examined on July 15, 1993 by D. Lincoln. Plants were tentatively identified by basal leaves and, for a few specimens, by achenes. Those plants that had fruits still attached were positively identified. Identification of the species while in fruit is important since white avens (*Geum canadense*) co-occurs at this site. The entire population should be examined while the majority of the individuals are in fruit so that the population size can be better estimated. Spring avens flowers late April into mid May and

fruits from early May to early July.

According to the New Jersey Natural Heritage Database Element State Ranking Form, individual populations of spring avens tend to be large. If further investigation supports the tentative identification of the majority of the plants observed at the natural area, this population may be in excess of 900 plants. The plants in this population appeared to range no more than six to eight inches off the south side of the trail where they were found and no more than 10 to 12 inches off the trail to the north.

Vegetation along the trail was cut this spring or early summer as evidenced by cut leaves and stems of plants, including spring avens, in and along the trail. Wayne Henderek, Park Naturalist, said that vegetation is cut back to keep the trail open. The spring avens appears in greatest numbers in this relatively open portion of the trail (30 to 50 percent canopy cover). The plant was also observed on the edges of this trail further away from the slope but in declining numbers as the habitat became flatter and drier. Another slope on this trail was examined, however the canopy cover was greater, 50 to 75 percent, and the spring avens was not as plentiful. About seven times more plants per meter of trail were observed in the sunnier location as compared to the more shaded site.

This plant may prefer disturbed sites as most of the populations documented in the New Jersey Natural Heritage Database occur trailside, roadside or near pond, stream or river banks. The population at the natural area follows this trend since it appears to be most abundant on a trail where the canopy cover is not extensive (30 to 50 percent cover). This population, like some of the others in New Jersey, occurs on a wooded slope near a stream. The populations near trails or other edge habitat benefit from higher light levels and reduced competition as well as by increased seed dispersal as these clinging seeds are animal dispersed.

Boundary

The boundary of Washington Crossing Natural Area is indicated in Figure 2. The boundary of the natural area runs from a cement marker in the Red Dot trail, at the southwest corner of the area, northeast along the trail to the nature center access road. The boundary then follows the nature center access road northeast to Brick Yard Road, excluding the 0.8 acre parcel leased by the Amateur Astronomers Association of Princeton, Inc. Brick Yard Road is the boundary of the natural area to the point where the equine trail heads west-southwest. The boundary of the natural area along the equine trail is easily recognized by the narrow hedgerow of trees and shrubs that runs between the trail and the early successional and mowed fields to the north. As the equine trail turns south, so does the boundary of the natural area. The boundary then follows the state ownership boundary east of residential property lines and ending back at the Red Dot trail.

Encroachment into the natural area may be occurring at the boundary adjacent to the residential neighborhood. Residents may have cleared/mowed backyards into abutting state property, although recent delineation of this boundary has not taken place. Additional bicycle and walking trails have also been established from many backyards into the natural area.

Public Use

The natural area is currently used for nature interpretation, hiking, cross country skiing and horseback riding. The illegal riding of bicycles, all terrain vehicles (ATVs) and snowmobiles also occurs throughout this part of the park. Hunting is prohibited by the administering agency. The natural area is used by approximately 3,000 to 4,000 people that enroll in programs through the nature center as well as an additional 8,000 to 9,000 annually that use the nature center but who are not enrolled in nature center programs (Wayne Henderek pers. comm.). The nature center is open year round.

At the nature center there are interpretive displays and both active and passive nature programs. The passive programs that are offered include nature walks, stream investigations, bird watching, plant identification and nonconsumptive ecology activities. Other programs include activities that actively make use of materials found in the natural area. These activities include collecting natural dyestuff, wild edible plants and materials for nature crafts.

Throughout the natural area the illegal use of bicycles and ATVs is readily apparent via tracks, skid marks, and the frequent sighting of cyclists. There are many trails in the natural area that are not official hiking trails but that are suspected to have been made by people riding bikes on deer paths that crisscross the natural area. The bicycles and ATVs in the natural area are potentially destructive to vegetation, including the state endangered spring avens that grows along a hillside trail. This use also increases the rate of erosion and may pose a hazard to wildlife or people walking on trails.

Other uses include activities of the Washington's Crossing Radio Control Fliers Association (WCRC Fliers Association). The WCRC Fliers Association leases land that is northwest of the equine trail, in the park, but not in the natural area. The WCRC Fliers Association, however, currently has a special-use permit to fly their remote control model airplanes over the portion of the natural area encircled by the equine trail.

Introduced Features

The natural area has many introduced features due to historic and present uses (Figure 2). Features that compliment the current activities in the natural area include marked and mapped hiking trails (approximately 2.5 miles) and a trail for horseback riding (approximately 1.3 miles). There are thirteen small wooden boardwalks that cross the north branch of Steele Run and several intermittent streams. There is a long boardwalk on the Yellow Loop trail over a seepy area where an unnamed brook feeds the north branch of Steele Run and two ground level boardwalks along the Red Trail where it is wet in the spring. At one point on the Red Trail there is a wooden bench along the trail and at the Blue Loop trail near the stream there is a small wooden rail fence. A bird blind is located in a red cedar grove, although, the access trail is no longer open due to vandalism at the blind. A self-guided trail near the nature center is marked with numbered posts for use with a trail brochure.

At the head of the trails, in the natural area, is the nature center which is an old two-story house. Other features here are the entrance road, parking lot, picnic tables and

bird feeders. Also nearby is a small out-building, or corn house, where seed is kept. Adjacent to the entrance road is an early successional field (1 acre) that is maintained by scheduled mowing for interpretive purposes.

Features unrelated to the current activities in the natural area include foundations of several old buildings scattered primarily in the eastern portion of the natural area and a paved driveway at an old house lot in the northern corner of the natural area off Brick Yard Road. Two areas currently within the natural area are being used as dump sites for the Park. Both are on the west side of Brick Yard Road; one is used for brush and wooden debris and the other has dumpsters and barrels.

Additional introduced features are a wind sock on a 10-foot high metal stand on the south side of the equine trail, across from the field leased by the WCRC Fliers Association and a sign in this area that cautions people of low flying model aircraft. Also, there are several "No Bikes" signs throughout the natural area. There are remnants of a wooden dam south of the Yellow Loop boardwalk. This dam was installed to increase habitat diversity in the natural area. The dam crossed the spring-fed brook that delivers water to the north branch of Steele Run but is now in disrepair and does not retain water.

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 management 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.

Management Objective And Classification

The management objective for Washington Crossing Natural Area is "preservation of natural succession and mixed hardwood forests, and rare species habitat" (N.J.A.C. 7:5A-1.13(a)38ii). 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. An explanation of the reason for each technique is also provided below each itemized management technique.

Throughout this section, administering agency refers to the Division of Parks and Forestry, through Washington Crossing State Park. It is recognized that the State Park

Service is severely understaffed and, as a result, some management activities may need to be extended beyond the deadlines indicated. Priorities will be established on a case-by-case basis.

Endangered Species

1. The ONLM will survey/monitor for spring avens (*Geum vernum*) on a periodic basis and assess future management needs. Should additional locations of this or other endangered or threatened species be discovered in the natural area, they too will be monitored on a periodic basis.

   This management requirement is included to help ensure the preservation of this and other state endangered species.

2. The administering agency may continue to cut overhanging vegetation along the Yellow Trail between the long boardwalk and the Equestrian Loop Trail but should avoid cutting so close to the ground that spring avens plants are affected.

   Maintenance of existing trails is authorized by N.J.A.C. 7:5A-1.9(e)16iii. This management requirement is included to help ensure the preservation of the state endangered spring avens which sets seed between May and July.

3. When the long boardwalk on the Yellow Trail needs repair, the administering agency will place a short boardwalk in the area indicated in Figure 2 instead of rebuilding the long boardwalk in place. The administering agency will obtain any required freshwater wetlands and/or stream encroachment approvals from DEPE's Land Use Regulatory Program before construction of the proposed boardwalk that will replace the long boardwalk on the Yellow Trail indicated in Figure 2.

   This management requirement is included to decrease the cost and maintenance associated with rebuilding another long boardwalk. The Commissioner hereby approves this boardwalk relocation in accordance with N.J.A.C. 7:5A-1.9(e)5, which states that construction of new structures may be undertaken provided the structures directly or indirectly contribute to the management objective. This structure will contribute to the management objective of preservation of the mixed hardwood forest by preventing trampling of vegetation by the public in a wetland portion of the trail system.

4. The ONLM will provide the administering agency with a map indicating the known location of the state endangered spring avens, a written description and an illustration of the plant by December 31, 1994. The map will be updated by the ONLM should locations for this species or any additional species be discovered.

   This management requirement was included so that the administering agency can more effectively manage the natural area and the species within it, and to ensure consideration of these species in future planning in the natural area.

5. The Division of Parks and Forestry may perform gypsy moth control activities within the natural area only after Natural Areas Council review and approval of a gypsy moth control plan, including a spraying program environmental impact statement (EIS), prepared by the Division. The EIS must contain specific reference to impacts of gypsy moth control activities on lepidoptera, rare and endangered species and other non-target species.

   The Commissioner hereby approves of gypsy moth control activities to preserve the mixed hardwood forest in the natural area. Natural Areas Council review and approval of a specific gypsy moth control plan and EIS is required prior to implementation of each control event.

Boundary

1. The administering agency will post State Natural Area boundary signs at trail access points and along the natural area boundary, where practicable, at a maximum of ten per mile by December 31, 1994. These signs will be replaced as needed.

   Posting of the boundaries of all natural areas is required in accordance with N.J.A.C. 7:5A-1.9(e)1.

2. The ONLM will provide the administering agency with State Natural Area boundary signs as needed.

   The ONLM, which is responsible for overall administration of the Natural Areas System, designs and distributes paper boundary signs for posting of all State Natural Areas.

3. Lands leased by the Amateur Astronomers Association of Princeton, Inc. for the purpose of astronomical observation are excluded from the natural area under the boundary change procedure at N.J.A.C. 7:5A-1.12.

   In accordance with N.J.S.A. 13:1B-15.12a7, no land in the Natural Areas System may be leased except by authorizing special legislation.

4. The southern boundary of the natural area, as indicated on natural area boundary maps filed in the ONLM, will be changed to correspond to the Red Dot Trail. This is a correction to the boundary under N.J.A.C. 7:5A-1.12(c) and is technical in nature.

   Due to a technical error, maps filed in the ONLM show the southern boundary as corresponding to trails other than the Red Dot Trail, which has been generally recognized as the boundary in this area. Therefore, a minor correction will be made to the filed maps. This change will also be reflected in maps distributed by the administering agency. In accordance with N.J.A.C. 7:5A-1.12(c), the Department may correct errors in the boundary of a natural area effective upon publication of notice of the correction in the New Jersey Register.

Public Use

1. Current uses of the natural area, which include hiking, bird watching, botanizing, horseback riding and nature center educational programs, will be allowed to continue in the Natural Area. The ONLM and the administering agency will continue to monitor the above uses and/or any illegal uses to determine any changes in the impact on the natural features occurring in this area.

   The above uses will continue to be allowed in the natural area because they are compatible with preservation of the species and natural communities that occur within the natural area.

2. The administering agency will attempt to reduce illegal ATV and bicycle use in the natural area by posting signs at all access points stating the prohibition on motorized vehicles and bicycles and by employing such techniques as placing a gate, guard rail or boulder at access points, including the end of Nedsland Avenue, by December 31, 1994.

   This management technique is included to help ensure the preservation of the natural communities and species of the area. Motorized vehicles are prohibited on lands administered by the State Park Service in accordance with N.J.A.C. 7:2-3.0. Bicycles are prohibited in the Park in accordance with State Park Service Rules and Regulations at 7:2-2.25(l) except for the designated mountain bike trail located east of the natural area and on roadways within the park.

3. Upon expiration of the current special-use permit (March 1994) granted to the Washington's Crossing Radio Controlled Flyer's Association, Inc. the administering agency will revise any future agreements so that the southern extent of their flyover area will be the natural area boundary.

   This management requirement is included because remote controlled planes can be heard throughout the natural area and create a disturbance as well as a safety hazard to visitors and wildlife. The Delaware River corridor is an important flyway for migratory birds and this activity may prevent nesting by some of these birds. The natural area boundary provides a distinct visible boundary beyond which planes should not be flown.

4. The administering agency will obtain all applications to conduct research or collect specimens, forward a copy to the ONLM, and provide a response within a reasonable date of application submittal. The administering agency shall coordinate a response with the ONLM.

   This requirement is included in accordance with procedures for conducting research and collecting specimens in natural areas as outlined in N.J.A.C. 7:5A-1.10, and to ensure thorough review of all proposals.

5. The administering agency will modify maps distributed to the public to accurately reflect the locations of trails within the natural area.

Field examination has revealed that the current map of the State Park containing mapped trails within the natural area is incomplete and somewhat inaccurate. Correction of the map upon its next revision will better serve the visiting public.

6. The administering agency will close unmarked trails to visitors by felling small trees or placing posts in the ground.

   These trails are not represented on the trail map for the area and can be confusing to the visitor. Many of these trails are created and/or used illegally by ATV's and bicyclists. There already are an adequate number of marked trails to access the natural area and closing of the unmarked trails and revegetation of the trail corridors may be pursued by the administering agency at its own discretion.

7. The administering agency will forward any plans that include activities that may disturb historical features of the natural area to the New Jersey Historic Preservation Office for review.

   This requirement is included to help ensure preservation of any historical features within the natural area. It is likely that historical features are present within the natural area since it is adjacent to the Washington Crossing Historic Site.

Introduced Features

1. The administering agency will remove surface refuse located in the northeast section of the natural area at two locations along Brick Yard Road by March 31, 1996. Use of land within the natural area for this purpose will be discontinued.

   In accordance with N.J.A.C. 7:5A-1.9(e)7 prohibited activities in a natural area include dumping, burying, or spreading of garbage, trash, or other materials.

2. The administering agency will remove the vandalized bird blind and bird feeders near the nature center by December 31, 1994.

   In accordance with N.J.A.C. 7:5A-1.9(e)7 structures having no historic, scientific or habitat value may be demolished and removed unless such structures are deemed essential for administrative purposes.

3. A new bird blind, planned for relocation within the natural area, may be constructed by the administering agency only after Natural Areas Council review of the building plan prepared by the Division.

   The Commissioner hereby approves construction of a new bird blind in accordance with N.J.A.C. 7:5A-1.9(e)5 which states that new structures or enlargement of existing structures may be undertaken provided the structures directly or indirectly contribute to the management objective. Natural Areas

Council review and approval of construction plans is still required prior to construction.

4. The administering agency may continue to maintain the successional fields near the nature center for educational purposes.

   Preservation of successional fields is a component of the management objective for this natural area and will contribute towards interpretation and education. In accordance with N.J.A.C. 7:5A-1.9(e)12, habitat manipulation may be undertaken if preservation of a particular habitat type or species of native flora or fauna is included in the management objective of the natural area.

5. The administering agency may resurface the entrance road and parking area within the natural area. The extent of such resurfacing should only include the current footprint of the entrance road and parking area.

   In accordance with N.J.A.C. 7:5A-1.9(e)3, vehicular access lanes may be maintained within a natural area but may not be enlarged in any manner except upon approval by the Commissioner.

6. The Nature Center may be rebuilt or expanded in its current location or the immediate vicinity only after Natural Areas Council review and approval of the construction/renovation plans.

   The Commissioner hereby approves of construction of a new nature center or expansion of the current nature center in accordance with N.J.A.C. 7:5A-1.9(e)5 which states that new structures or enlargement of existing structures may be undertaken provided the structures directly or indirectly contribute to the management objective. Natural Areas Council review and approval of construction plans is still required prior to construction.

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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 management 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 management 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 management 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 management 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 thuringensis* var. *israeliensis* (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 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: Washington Crossing

Plan Adoption Date:

Name:

Date:

		Date Indicated in Plan	Proposed Accomp. Date	Date Accomp.
I.	**Washington Crossing State Park Superintendent**			
1.	The administering agency may continue to cut overhanging vegetation along the Yellow Trail between the long boardwalk and the Equestrian Loop Trail but should avoid cutting so close to the ground that spring avens plants are affected.	As needed	As needed	As needed
2.	When the long boardwalk on the Yellow Trail needs repair, the administering agency will place a short boardwalk in the area indicated in Figure 2 instead of rebuilding the long boardwalk in place. The administering agency will obtain any required freshwater wetlands and/or stream encroachment approvals from DEPE's Land Use Regulatory Program before construction of the proposed boardwalk that will replace the long boardwalk on the Yellow Trail indicated in Figure 2.	As needed	As needed	As needed
3.	The administering agency will post State Natural Area boundary signs at trail access points and along the natural area boundary, where practicable, at a maximum of ten per mile by December 31, 1994. These signs will be replaced as needed.	12/31/94	_____	_____

4.	Lands leased by the Amateur Astronomers Association of Princeton, Inc. for the purpose of astronomical observation are excluded from the natural area under the boundary change procedure at N.J.A.C. 7:5A-1.12.	N/A	N/A	N/A
5.	Current uses of the natural area, which include hiking, bird watching, botanizing, horseback riding and nature center educational programs, will be allowed to continue in the Natural Area. The ONLM and the administering agency will continue to monitor the above uses and/or any illegal uses to determine any changes in the impact on the natural features occurring in this area.	Ongoing	Ongoing	Ongoing
6.	The administering agency will attempt to reduce illegal ATV and bicycle use in the natural area by posting signs at all access points stating the prohibition on motorized vehicles and bicycles and by employing such techniques as placing a gate, guard rail or boulder at access points, including the end of Nedsland Avenue, by December 31, 1994.	12/31/94	_____	_____
7.	Upon expiration of the current special-use permit (March 1994) granted to the Washington's Crossing Radio Controlled Flyer's Association, Inc. the administering agency will revise any future agreements so that the southern extent of their flyover area will be the natural area boundary.	As needed	As needed	As needed
8.	The administering agency will obtain all applications to conduct research or collect specimens, forward a copy to the ONLM, and provide a response within a reasonable date of application submittal. The administering agency shall coordinate a response with the ONLM.	As needed	As needed	As needed
9.	The administering agency will modify maps distributed to the public to accurately reflect the locations of trails within the natural area.	As needed	As needed	As needed

10.	The administering agency will close unmarked trails to visitors by felling small trees or placing posts in the ground.	As needed	As needed	As needed
11.	The administering agency will forward any plans that include activities that may disturb historical features of the natural area to the New Jersey Historic Preservation Office for review.	As needed	As needed	As needed
12.	The administering agency will remove surface refuse located in the northeast section of the natural area at two locations along Brick Yard Road by March 31, 1996. Use of land within the natural area for this purpose will be discontinued.	3/31/96	_____	_____
13.	The administering agency will remove the vandalized bird blind and bird feeders near the nature center by December 31, 1994.	12/31/94	_____	_____
14.	A new bird blind, planned for relocation within the natural area, may be constructed by the administering agency only after Natural Areas Council review of the building plan prepared by the Division.	N/A	N/A	N/A
15.	The administering agency may continue to maintain the successional fields near the nature center for educational purposes.	As needed	As needed	As needed
16.	The administering agency may resurface the entrance road and parking area within the natural area. The extent of such resurfacing should only include the current footprint of the entrance road and parking area.	As needed	As needed	As needed
17.	The Nature Center may be rebuilt or expanded in its current location or the immediate vicinity only after Natural Areas Council review and approval of the construction/renovation plans.	N/A	N/A	N/A
II.	**NJ DEPE Office of Natural Lands Management**			
1.	The ONLM will survey/monitor for spring avens (*Geum vernum*) on a periodic basis	Ongoing	Ongoing	Ongoing

	and assess future management needs. Should additional locations of this or other endangered or threatened species be discovered in the natural area, they too will be monitored on a periodic basis.			
2.	The ONLM will provide the administering agency with a map indicating the known location of the state endangered spring avens, a written description and an illustration of the plant by December 31, 1994. The map will be updated by the ONLM should locations for this species or any additional species be discovered.	12/31/94	_____	_____
3.	The ONLM will provide the administering agency with State Natural Area boundary signs.	As needed	As needed	As needed
4.	The southern boundary of the natural area, as indicated on natural area boundary maps filed in the ONLM, will be changed to correspond to the Red Dot Trail. This is a correction to the boundary under N.J.A.C. 7:5A-1.12(c) and is technical in nature.	N/A	N/A	N/A
III.	**NJ Division of Parks and Forestry**			
1.	The Division of Parks and Forestry may perform gypsy moth control activities within the natural area only after Natural Areas Council review and approval of a gypsy moth control plan, including a spraying program environmental impact statement (EIS), prepared by the Division. The EIS must contain specific reference to impacts of gypsy moth control activities on lepidoptera, rare and endangered species and other non-target species.	As needed	As needed	As needed