Dryden Kuser Natural Area
Management Plan

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New Jersey Department of Environmental Protection
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Introduction

This management plan for the Dryden Kuser Natural Area describes the natural resources, uses and other features which this site contains and prescribes techniques, uses and practices that are consistent with or will aid in achieving the management objective of the natural area.

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).

Dryden Kuser Natural Area is a 1,451-acre parcel located at High Point State Park in Wantage and Montague Townships, Sussex County. The natural area is located in the northern portion of the park abutting the New York State border. The natural area lies approximately three miles east of the Delaware River and approximately five miles south of the City of Port Jervis, New York. Figure 1 shows the general location of the natural area. The boundary of the natural area is indicated in Figures 2 and 3.

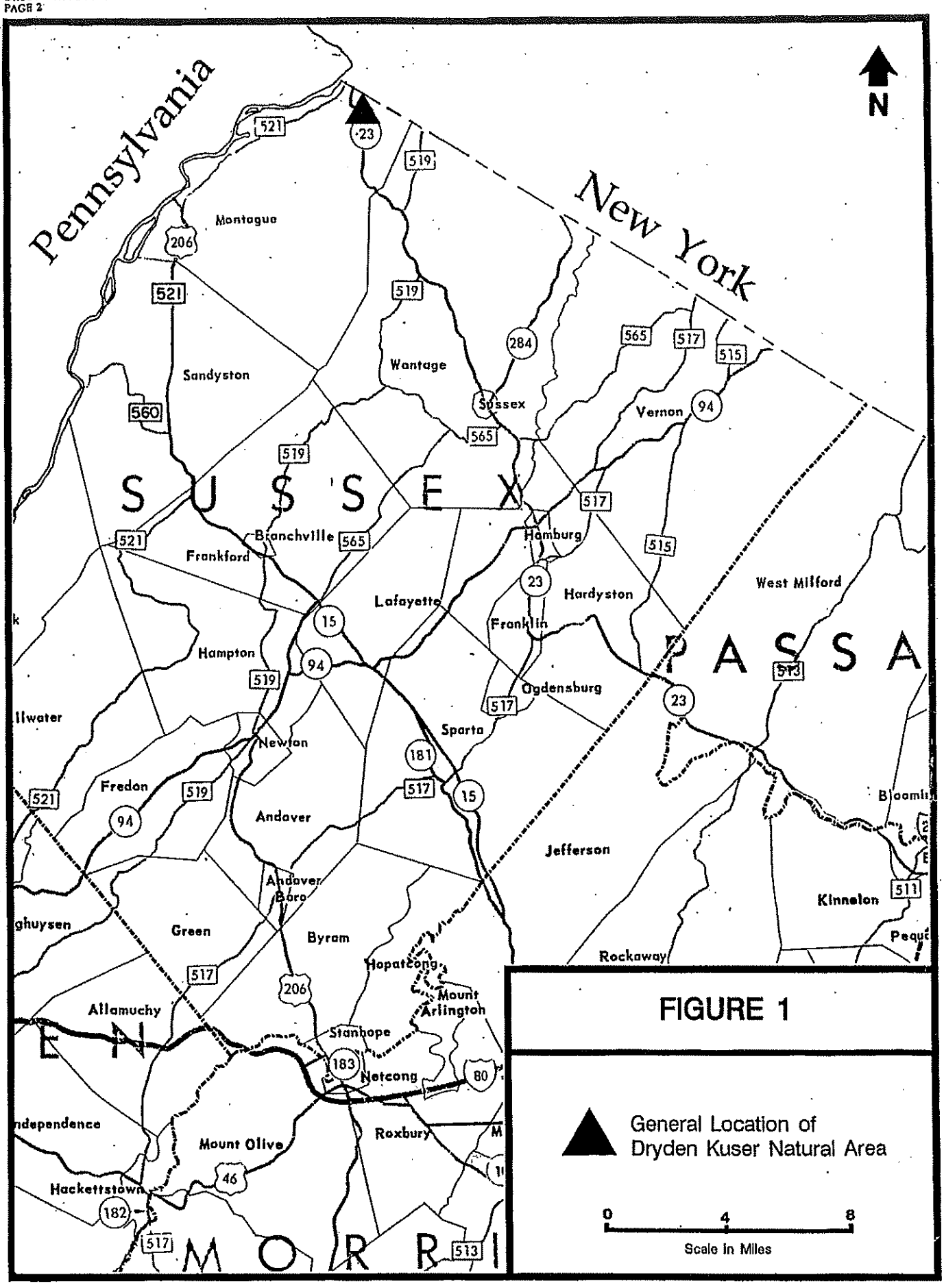
The management objective for this natural area under N.J.A.C. 7:5A-1.13(a)14ii is "preservation of a northern bog habitat, and rare species habitat". N.J.A.C. 7:5A-1.8 also requires the preparation of this management plan.

The Division of Parks and Forestry, through High Point 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 Dryden Kuser Natural Area. High Point 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.

History

Historically, the area that is now High Point State Park was used by Native Americans and later settlers for the abundant plant and animal resources of this site. At the time of early settlement the Menissinghs, or Minisink Branch of the Lenni Lenape Indians, lived in the upper Delaware Valley, grew crops on fertile land and used the upland areas for hunting and gathering (Dupont and Wright 1990). Dupont and Wright (1990) make reference to a rock shelter at High Point described by Dalton (1976) in the bulletin, *Caves of New Jersey* that "reportedly yielded evidence of Indian occupation." Native inhabitants


Pennsylvania
New York
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Montague
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Branchville
Frankford
Lafayette
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West Milford
Hampton
Ogdensburg
Sparta
Newton
Fredon
Andover
Andover Boro
Green
Byram
Jefferson
Kinnelon
Rockaway
Hopatcong
Mount Arlington
Stanhope
Netcong
Allamuchy
Mount Olive
Roxbury
Hackettstown
SUSSEX
PASSA
MORRI
521
519
206
560
565
284
517
515
94
15
23
181
183
80
46
182
513
511
General Location of
Dryden Kuser Natural Area
0
4
8
Scale in Miles

FIGURE 1

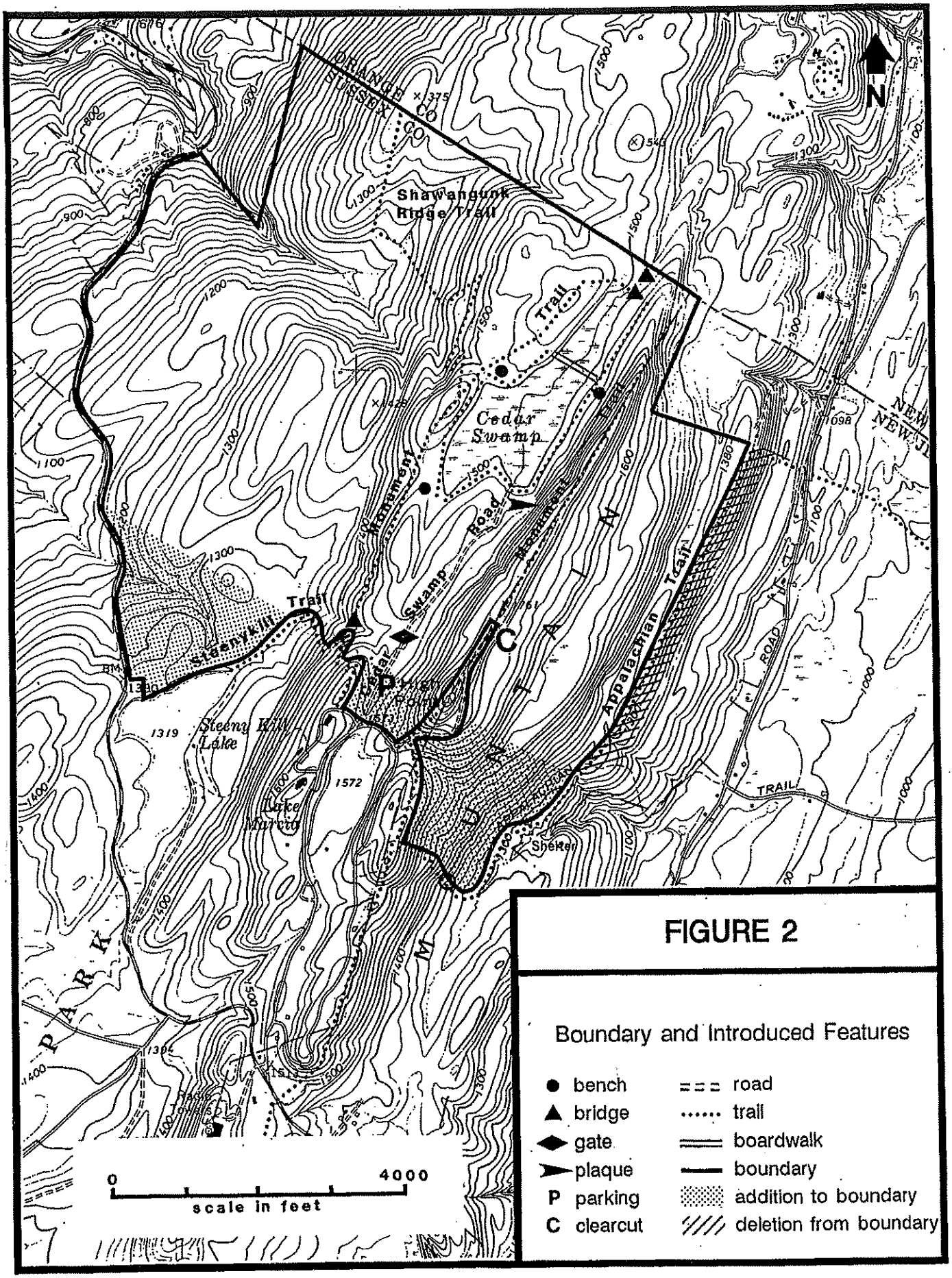

FIGURE 2

Boundary and Introduced Features

● bench	road
▲ bridge	trail
◆ gate	boardwalk
➤ plaque	boundary
P parking	addition to boundary
C clearcut	deletion from boundary

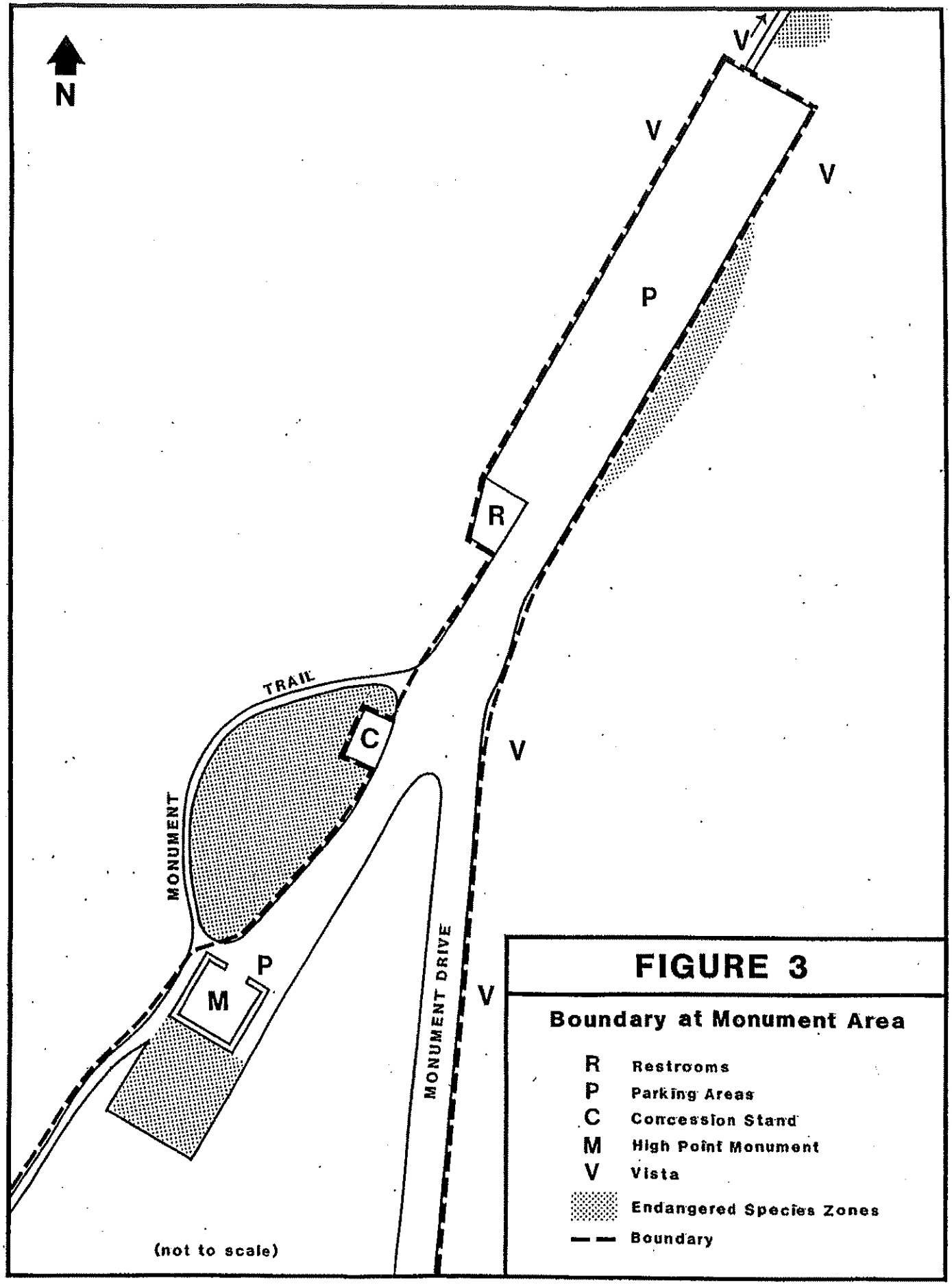

FIGURE 3

Boundary at Monument Area

R	Restrooms
P	Parking Areas
C	Concession Stand
M	High Point Monument
V	Vista
	Endangered Species Zones
— —	Boundary

of this region may have manipulated portions of the landscape by setting small fires to enhance production of edible fruits and habitat for game animals, or to aid in hunting and travelling (Niering 1953, Day 1953, Russell 1983). Settlers used the more fertile land in the valleys for agriculture while moderate slopes were used to graze domestic animals (Dupont and Wright 1990). The mid 1800s saw extensive cutting for fuel wood used as charcoal for the iron smelting industry prior to the widespread use of anthracite blast furnaces (Niering 1953). This practice diminished after about 1850. However, due to previous cutting and to forest fires, much of this region was already denuded (Niering 1953). Much of the forests surrounding the valley settlements were also cut for timber (Niering 1953). Sawmills were located throughout the area that is now the park. Dupont and Wright (1990) report that Sawmill Pond was once a cedar swamp that was impounded to power a mill that produced cedar shingles and that Steenykill Lake had also been a cedar swamp. It is clear that much of the accessible forested areas were utilized to provide wood for the local population (Dupont and Wright 1990, Niering 1953).

In 1890 Charles Saint John, Jr. purchased a 1700-acre tract of land from the Rutherford family that encompassed the Kittatinny Mountain summit. St. John built the High Point Inn on a bluff above Lake Marcia that opened for business in June of 1890. The Inn was a popular summer resort but for a number of reasons, a lack of convenient transportation to the site being one of them, St. John could not make the Inn profitable for the long term and it closed in 1908 (Dupont and Wright 1990).

Colonel Anthony Kuser and his twin brother John purchased the Inn in 1910 as a commercial venture. Soon after this initial purchase, the Kusers began acquiring other lots to add to the estate. In 1911, Anthony Kuser's father-in-law, John F. Dryden, purchased 7,000 acres of land from the Rutherford family, including the tract that contained the cedar swamp. The combined family estate amounted to about 10,400 acres. Ultimately, the Kuser tract at High Point was composed of five major parcels purchased between 1910 and 1916 (Dupont and Wright 1990). John Kuser conveyed his portion of the property to his brother and so Anthony and his wife Susie established their summer mountain estate where the Inn used to stand. They also established additional carriage trails throughout the property including the trail around the cedar swamp. In 1916 Susie Kuser and her brother Forrest Dryden inherited title to their father's 8,038 acres in Wantage and Montague and Forrest sold his half-interest to his sister. Thus, Anthony and Susie Kuser obtained the title to the entire estate.

The Kusers eventually wished to dispose of this summer retreat, probably for a host of reasons (Dupont and Wright 1990). They finally decided to donate the land, in memory of John F. Dryden, to the State for use as a public park. In 1923 the Kusers deeded the estate to the newly established Commissioners of High Point Park. Two restrictions applied to the land, one being that there would be no shooting or trapping of birds on the property and that there would not be a hospital or sanitarium located within four miles of High Point (Dupont and Wright 1990). In the 1930s the Civilian Conservation Corps (CCC) had two camps at the park. The young men at these camps improved roads, constructed trails, picnic pavilions, a restaurant that is now the nature center, shelters, stone fireplaces, cabins, bathhouses, camping sites, and the old Iris Inn that is now the park office. The CCC also created Steenykill Lake by constructing the current dam there. The Monument Trail that loops through the natural area is one of the trails constructed by the CCC. In 1965, the cedar swamp was set aside as an area of special interest within the park. It was dedicated

The John Dryden Kuser Memorial Natural Area, the first such area in the State, in memory of the former New Jersey State Senator and son of Colonel and Mrs. Anthony Kuser. The natural area was designated the Dryden Kuser Natural Area and incorporated into the Natural Areas System in 1978.

Description and Management Concerns

Geology and Soils

The Dryden Kuser Natural Area lies within the Ridge and Valley physiographic province. This area of New Jersey is part of the Appalachian Valley and Ridge Province that extends 1,200 miles from Alabama to the St. Lawrence Valley (Wolfe 1977) and is characterized by nearly parallel ridges and valleys with a northeast to southwest structural trend. Kittatinny Mountain is one of these ridges located between the Delaware Valley to the northwest and Kittatinny Valley to the southeast. The ridge is underlain by the very resistant lower Silurian Shawangunk conglomerate and High Falls sandstone whereas the valleys are underlain with limestones and shales (Wolfe 1977). These formations are the result of sedimentary deposition that was later uplifted and then repeatedly eroded and uplifted again (Wolfe 1977). The present landscape is a result of these episodes of deposition, erosion, and uplifting as well as more recent glaciation and weathering processes.

Glacial drift in northern New Jersey resulted from three glacial stages: the Kansan, Illinoisan and the Wisconsin (Wolfe 1977). The Wisconsin was the most recent glacial advance and its effect is most visible in the glacial till and stratified drift left behind. The composition of the till is largely of local origin and reflects the character of the underlying bedrock (Wolfe 1977). Bedrock that was scraped clean of topsoil shows glacial striae and grooves that indicate the direction that the glacier was moving. These groves and striae are visible at High Point on the bedrock that was scoured and polished by the glacier overriding Kittatinny Ridge.

The soil association within the natural area from the ridgetop westward is the Rock outcrop-Oquaga-Swartswood association (U.S. Department of Agriculture 1975). A small portion of the natural area east of the ridgetop includes the Nassau-Bath-Norwich association (U.S. Department of Agriculture 1975). Both these associations, found in uplands, are characterized by soils formed in glacial till or in material weathered from bedrock. The Rock outcrop-Oquaga-Swartswood association is well-drained, very stony and extremely stony loamy soils. The Nassau-Bath-Norwich association tends to be somewhat excessively drained and well-drained loamy soils on gently sloping to very steep slopes and very poorly drained very stony loamy soils on nearly level terrain.

The soil series in the natural area include the Oquaga, Nassau, Wurtsboro and Norwich series (U.S. Department of Agriculture 1975). The Rock outcrop-Oquaga association and the Oquaga-Rock outcrop association soils cover approximately three quarters of the natural area. The Oquaga-Rock outcrop association is 50 to 75 percent extremely stony Oquaga soils and 10 to 20 percent bedrock Rock outcrop. This association

is predominately found on slopes of 15 to 25 percent. The bedrock is hard quartzite, sandstone, or interbedded sandstone and shale. Included in this association mapping unit are small areas of extremely stony Swartswood and Lackawanna soils and some areas of less sloping and less stony Oquaga soils. The Rock outcrop-Oquaga association is 40 to 60 percent bedrock outcrop, rock rubble, or soil material less than 10 inches thick and 20 to 35 percent extremely stony Oquaga soils. Slopes for this association range from 25 to 35 percent. This association mapping unit may also include small areas of extremely stony Lackawanna and Swartswood soils in narrow areas between bedrock outcrops. The Nassau-Rock outcrop complex, found on 25 to 45 percent slopes, is located in a narrow band along the eastern edge of the natural area. This complex is about 75 percent Nassau soils and 25 percent shale Rock outcrop. The depth to bedrock of this Nassau soil is about 12 inches.

The remaining soil types in the natural area are the Wurtsboro very stony silt loam and the Norwich very stony silt loam. Both of these soil types are hydric soils occurring on the relatively level step-like areas on the east side of the Kittatinny ridge or within gently sloping corridors of intermittent streams to the west of Kittatinny ridge (U.S. Department of Agriculture 1990, U.S. Department of Agriculture 1975). Both the Wurtsboro and Norwich soil series are strongly acidic and have a fragipan layer within two feet of the surface. The Wurtsboro very stony silt loam occurs on 0 to 8 percent slopes, the Norwich very stony silt loam on 0 to 3 percent slopes.

Topography and Surface Hydrology

As mentioned, the natural area is located in the Ridge and Valley physiographic province which is characterized by parallel ridges and valleys running northeast to southwest. Kittatinny Mountain dominates this area reaching its highest elevation of 1,803 feet at High Point. This summit, excluding the monument and associated parking lot, is within the natural area. North-northeast from the summit the ridge extends in a narrow crest with steep slopes to either side. The crest decreases in elevation gradually for about a mile before descending more steeply. Southeast of this crest the slope of the mountain is interrupted twice by areas of more level terrain resulting in two step-like features between the ridgetop and the broad valley bellow. Northwest of the ridge the slope is steep and then moderate to a plateau at 1,500 feet where a cedar swamp is found at the toe of the slope. This cedar swamp has the distinction of being the highest elevation Atlantic white cedar (*Chamaecyparis thyoides*) swamp in the world (Laderman et al. 1987). Knobby hills rise to 1,560 feet west of the cedar swamp and then the land slopes moderately to steeply toward the Delaware Valley. Several intermittent streams cut these slopes forming narrow, steep ravines. One of these stream beds cuts a path that reaches a low elevation in the natural area of 860 feet before running under Route 23.

The Kittatinny Mountain ridge runs northeast to southwest for 36 miles in New Jersey. At High Point State Park, portions of the ridge act as a watershed divide with slopes east of the divide flowing to the Hudson River and the slopes west of the divide draining to the nearby Delaware River. North of New Jersey, in New York, the ridge forms the Shawangunk Mountains and in Pennsylvania the formation extends to the southwest as the Blue Mountains.

The cedar swamp is the most prominent surficial hydrological feature in the natural area. The swamp exhibits standing water between hummocks of *Sphagnum*-covered fallen logs and the usual tea color of water high in complexed humic and fulvic acids characteristic of acidic bogs (Gorham 1987, Laderman 1989). The pH of the water in the cedar swamp was tested and found to be 3.4 to 4.3 in the summer of 1988 (Karlin 1988).

A small brook flows northeast out of the cedar swamp bog through a mucky, relatively level area before the water course heads more quickly down hill into New York. The brook was observed July 20 and August 4, 1993 to have a low flow running over the sandy bottom, with shallow pools between rocks. On October 12, 1993 the brook had a steady, quick flow. Intermittent stream beds in the natural area are quite rocky and add visual interest to the scenery when dry or when full with runoff. This brook, although originating west of the summit of Kittatinny ridge, flows eventually to the Hudson River as part of the Walkill watershed.

Other surficial hydrological features of the natural area include wet depressions at the base of the long slopes that form the "steps" of the east side of Kittatinny Mountain. The depression on the second step, at approximately 1,360 feet, observed during a site visit on September 16, 1993, had a small brook running slowly through it, parallel to the toe of the slope. On either side of this brook the ground was saturated and supported wetland vegetation such as skunk cabbage (*Symplocarpus foetidus*), spicebush (*Lindera benzoin*), sedges (*Carex spp.*), various ferns and mosses including *Sphagnum* species. Another surficial feature is a small intermittent pond along the road leading to the cedar swamp. This pond, of less than an acre, was dry when the site was visited on August 4, 1993, however, leaves in the pond depression showed evidence of water staining and overlying silt. During a visit on October 12, 1993 the pond held standing water. According to Eric Karlin (pers. comm.), this intermittent pond is the only known location of *Sphagnum pylaesii* between the New Jersey Pine Barrens and the high peaks of the Adirondacks. At times of high runoff, this pond may overflow to the cedar swamp, as shown on the 1969 U.S.G.S. topographic map.

Biotic Communities

The descriptions of biotic communities within the natural area and Figure 4 are based on aerial photo interpretation of vegetation by J.R. Arsenault (New Jersey Department of Environmental Protection 1986) and by J. Mortimer (NJDEP 1994), the descriptions of community types by Breden (1989), Brown (1986), Robichaud and Buell (1973), Niering (1953) and the authors on July 20 and 28, August 4, and September 16, 1993. Additional information regarding the occurrence of particular species within the different communities was also obtained from Anderson (1991), Niering (1953) and from NJDEP (1993). The biotic communities at the natural area range from xeric ridgetop and rock outcrops to hydric swamps. Some of the communities at the natural area occur at the highest elevations found in New Jersey. The primary biotic community at the natural area is the chestnut oak forest. This community forms a matrix within which the other communities are interspersed. Other biotic communities in the natural area are the cedar swamp, red maple swamp, mixed oak forest, and hemlock dominated forest that occurs in moist pockets along the streams that drain the area. The communities are not only interesting in the range of their moisture regimes but also because of the combination of species of northern and

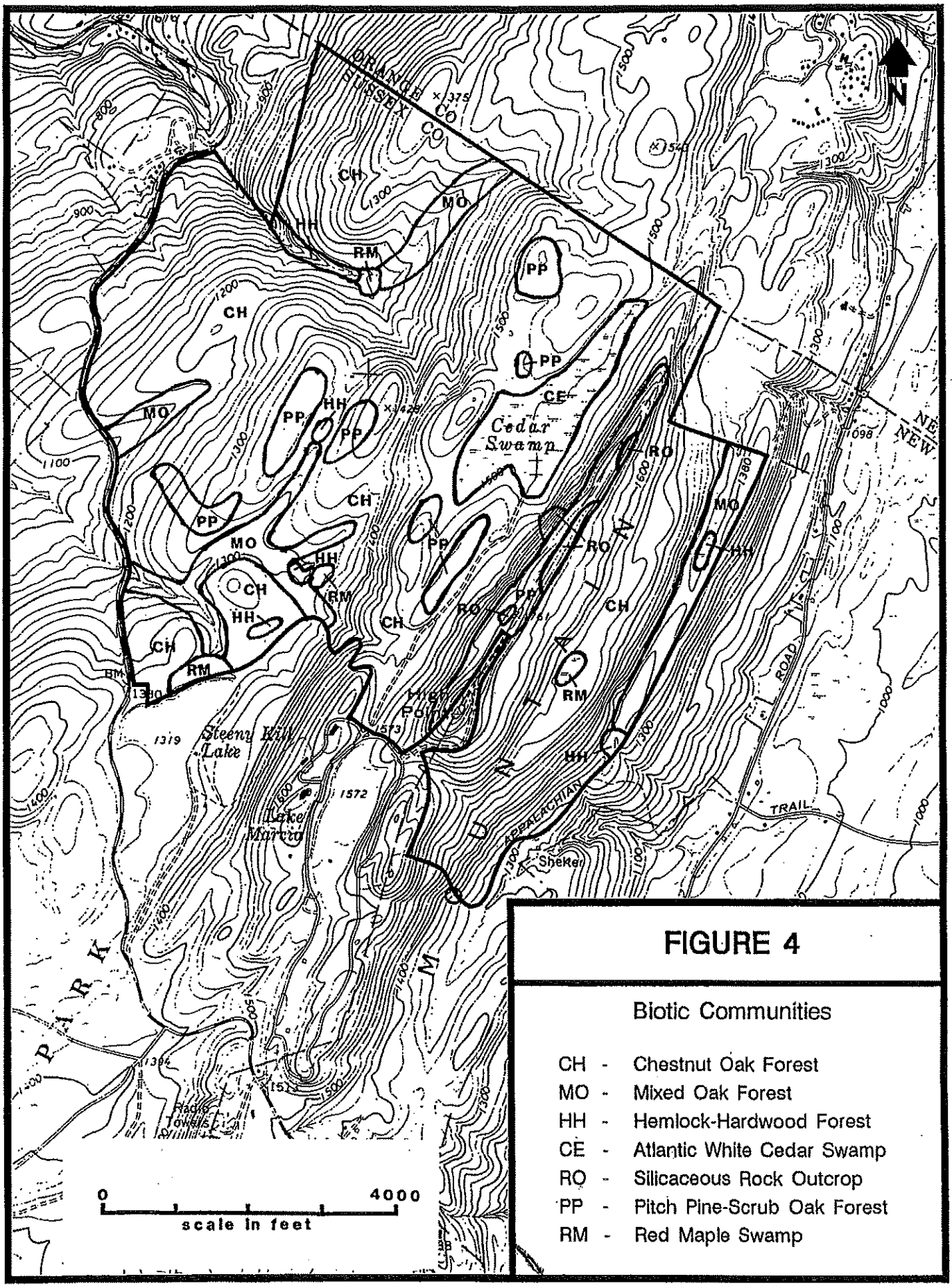

FIGURE 4

Biotic Communities

- CH - Chestnut Oak Forest
- MO - Mixed Oak Forest
- HH - Hemlock-Hardwood Forest
- CE - Atlantic White Cedar Swamp
- RO - Siliceous Rock Outcrop
- PP - Pitch Pine-Scrub Oak Forest
- RM - Red Maple Swamp

southern affinities that are at the extent of their range here. The species listed in the following community descriptions include examples often found in that particular community or species actually observed at the site. The lists are not meant to be comprehensive.

Silicaceous Rock Outcrop Community

The rock outcrop community in the natural area is an open-canopied community that is in an early stage of succession (Breden 1989, Niering 1953). The summit at High Point was scoured by glaciation resulting in an area of bedrock outcrops. Pioneer species that make up the rock outcrop community are tolerant of the acidic, base-poor soils, xeric conditions, and the wide range of temperatures experienced at the summit. Primary colonizers of the bare rock include the lichens *Rinodina* sp. and *Umblicaria* spp. (Breden 1989). Niering (1953), in his study of the vegetation at High Point, lists these lichens as well as *Crocynia neglecta* and *Parmelia conspersa* as bare rock pioneers occurring at the site. In rock crevices, where dust and plant debris starts to accumulate, the mosses *Bryum capillare* and *Ceratodon purpureus* occur with the three-toothed cinquefoil (*Potentilla tridentata*) (Niering 1953). In areas where more soil has collected common hair grass (*Deschampsia flexuosa*), little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon geradi*), common wild oat-grass (*Danthonia spicata*) and sedges such as *Carex pensylvanica* can be found (Anderson 1991). Between rocks common polypody fern (*Polypodium virginianum*) and pale corydalis (*Corydalis sempervirens*) were observed. Low shrubs of this community include lowbush blueberry (*Vaccinium angustifolium*), black huckleberry (*Gaylussacia baccata*) and black chokeberry (*Pyrus melanocarpa*) growing where soil has accumulated. Where soil is thickest between rock outcrops and in deep crevices larger shrubs occur including scrub oak (*Quercus ilicifolia*) (Niering 1953).

Ridgetop Pitch Pine-Scrub Oak Forest

The ridgetop pitch pine-scrub oak community is dominated by pitch pine (*Pinus rigida*) with individuals of lower stature and gnarled character in the more exposed areas. Scrub oak shares this rocky habitat in the more exposed sites. This community of the ridgetop is also found in patches throughout the natural area east of the summit on steep rocky slopes and west of the summit on the tops of lower hills between the ridgetop and the Delaware Valley. Chestnut oak (*Quercus prinus*) also occurs along the ridgetop in high numbers and increases in stature and dominance on ridge slopes. Other tree species found in lower densities include grey birch (*Betula populifolia*), black birch (*Betula lenta*), red oak (*Quercus rubra*), scarlet oak (*Quercus coccinea*) and red maple (*Acer rubrum*) (Brown 1986, Niering 1953). The shrub layer is dominated by lowbush blueberry and black huckleberry on the summit ridgetop. Other species in the shrub layer are scattered sassafras (*Sassafras albidum*) saplings, striped maple (*Acer pensylvanicum*), Juneberry (*Amelanchier spp.*), sweetfern (*Comptonia peregrina*) and black chokeberry. Black huckleberry and sweetfern are particularly abundant and replace much of the scrub oak in this community on the lower hilltops west of the summit ridge. Herbs of this community include grasses and sedges of the rock outcrop community, particularly the wild oat-grass which appears to be abundant in this community. Other herbs include bracken fern (*Pteridium aquilinum*) which is quite abundant, marginal wood fern (*Dryopteris marginalis*), hoary mountain mint

(*Pycnantheum incanum*), cow-wheat (*Melampyrum lineare*) and wild columbine (*Aquilegia canadensis*).

Chestnut Oak Forest

The chestnut oak community is found throughout the natural area and is the dominant community type, occupying most of the uplands. This is a community typical of slopes and ridgetops of higher elevations where drier and poorer soil conditions are characteristic (Breden 1989, Robichaud and Buell 1973). Chestnut oak is the dominant tree species of this community. Other trees that are common include red oak, black oak (*Quercus velutina*), white oak (*Quercus alba*), black birch and pitch pine. Less common trees include scarlet oak, sassafras, pignut hickory (*Carya glabra*), shagbark hickory (*Carya ovata*), sugar maple (*Acer saccharum*) and black cherry (*Prunus serotina*). The understory is relatively open but includes red maple, black birch, witch hazel (*Hamamelis virginiana*) and American chestnut (*Castenea dentata*) saplings and young trees. During site visits in August and October 1993 two young chestnut trees at different locations along the Cedar Swamp Trail were observed in fruit. Shrubs of this community type include members of the heath family such as blueberries (*Vaccinium spp.*), black huckleberry and mountain laurel (*Kalmia latifolia*) as well as sweetfern along trails. The herbaceous layer of this community is sparse but includes wild sarsaparilla (*Aralia nudicaulis*), sweet cicely (*Osmorhiza claytoni*), teaberry (*Gaultheria procumbens*), Canada mayflower (*Maianthemum canadense*), bracken fern and hay-scented fern (*Dennstaedtia punctilobula*) (Anderson 1991).

Threats to this community may include outbreaks of the gypsy moth (*Lymantria dispar*) caterpillar which appear to prefer chestnut oak and white oak to other tree species (Grace 1980). Chestnut oak is vulnerable to the resulting defoliation, especially during two or more years of drought (Kiviat 1988) or if stressed by disturbance such as fire, wind-throw or erosion (Peterson 1990).

Inland Atlantic White Cedar Swamp

The Atlantic white cedar swamp is one of seven known cedar swamps in glaciated New Jersey and is one of only three of these that contain more than a few trees at present (Laderman et al. 1987). This swamp is approximately 40 acres with an area of about seven to nine acres where the Atlantic white cedar is dense (NJDEP 1993). The cedar swamp, at 1,500 feet above sea level, is the highest elevation Atlantic white cedar swamp in the world (Laderman et al. 1987). This cedar swamp, like others in glaciated north Jersey, shares more characteristics of northern bogs than the bogs in south Jersey. A number of plants that are common to the north reach their southern limit in northern New Jersey and can be found at the cedar swamp (Robichaud and Buell 1973). Examples of plants of more northern affinity found at or near the bog include black spruce (*Picea mariana*), possibly red spruce (*Picea rubens*) or a hybrid of red and black spruce, bunchberry (*Cornus canadensis*), gold thread (*Coptis groenlandica*), clintonia (*Clintonia borealis*), dwarf mistletoe (*Arceuthobium pusillum*), three leaved false solomon's seal (*Smilacina trifolia*) and painted trillium (*Trillium undulatum*) (NJDEP 1993, Anderson 1991, Karlin 1988).

The cedar swamp is in a late stage of bog succession (Niering 1953). The original basin that is now the cedar swamp was possibly a lake formed when glacial debris blocked this small valley (Niering 1953). Samples of sediments filling in the cedar swamp were obtained to a depth of 30 feet (Niering 1953). The lowest levels consisted of 8 to 10 feet of clay, overlain by an organically derived substance called gyttja of which 10 to 15 feet is described as fine detritus ooze in the lower levels and course detritus ooze in the upper levels (Niering 1953). Above the gyttja are four feet of sedge and *Sphagnum* peat and above that six feet of woody peat (Niering 1953). There is no longer any open water left at this bog as it is nearly completely covered with a mixed conifer and deciduous forest. The forest includes eastern hemlock (*Tsuga canadensis*), black spruce and Atlantic white cedar.

The structure of the cedar swamp is one of mature trees comprising a canopy cover of 80 to 90 percent, an understory layer of large shrubs and a sparse herbaceous layer growing on the dense *Sphagnum* moss carpet. The area where a road was cut through the swamp around 1950 remains open, and smaller open areas exist due to tree falls or standing dead trees. The canopy of the cedar swamp is dominated by hemlock and red maple as it was in the early 1950s when Niering estimated they composed 55 percent of the canopy cover. Atlantic white cedar and yellow birch (*Betula lutea*) are the next most numerous canopy species in the area of the old road clearing. The relative dominance of these species appears to have not changed dramatically since the Niering study of the early 1950s. Other species of the canopy include black spruce, black gum (*Nyssa sylvatica*), white pine (*Pinus strobus*) and pitch pine. In a small area of the cedar swamp, south of the old road clearing and boardwalk, tree seedlings were observed August 4, 1993, growing on the hummocks of *Sphagnum*-covered logs and roots. The most numerous seedlings were those of hemlock, followed in abundance by red maple and yellow birch. Very few Atlantic white cedar seedlings were observed. Those that were seen were in small gaps where the cover overhead was less than 30 percent, however, even here the number of hemlock seedlings outnumbered the cedar by greater than ten to one. Cedar seedlings observed along the open boardwalk area were larger than those found in the gaps. This may be an area where seedlings have a greater probability of survival.

A threat to the young cedar is the white-tail deer (*Odocoileus virginianus*) population that utilizes the cedar swamp (David Edelman pers. comm., Frank Gallagher pers. comm.). Cedar foliage and twigs are a preferred winter food for deer in the northeast (Laderman 1989). Management of cedar in other parts of the state has included clearing non-cedar woody vegetation from half acre plots, using herbicide in some instances to retard growth of woody competitors, and fencing off these areas to exclude deer (David Edelman pers. comm.). This practice has resulted in thousands of cedar seedlings being established in cedar swamps that had declining cedar populations due to competition and deer browse (David Edelman pers. comm.).

The shrubs found in the cedar swamp include great rhododendron (*Rhododendron maxima*) which is dominant, highbush blueberry and swamp azalea (*Rhododendron viscosum*). These are also found along the bog edges as are witch hazel, winterberry (*Ilex verticillata*), sweet pepperbush (*Clethra alnifolia*) and mountain holly (*Nemopanthus mucronata*). Herbs are scarce in the shade of the bog, although *Sphagnum* moss carpets the substrate and wild calla (*Calla palustris*) is abundant in the wettest pockets. Sundew (*Drosera rotundifolia*) and pitcher plants (*Sarracenia purpurea*) are also known to occur in the bog (Frank Gallagher pers. comm., Anderson 1991). In the open area along the

boardwalk various sedges were seen, as well as wild calla and blue flag (*Iris versicolor*). Many other species occur along the edge of the bog including star flower (*Trientalis borealis*), swamp dewberry (*Rubus hispidus*), sensitive fern (*Onoclea sensibilis*), New York fern (*Thelypteris noveboracensis*), marsh fern (*Thelypteris palustris*), bog fern (*Thelypteris simulata*), cinnamon fern (*Osmunda cinnamomea*), interrupted fern (*Osmunda claytoniana*), royal fern (*Osmunda regalis*) and others previously mentioned in this section (Anderson 1991).

Mesic Hemlock-Hardwood Forest

The mesic hemlock-hardwood forest community exists in narrow bands along the corridors of streams that form small ravines. This community is represented primarily by hemlocks, contributing 50 percent or more to the canopy cover. Associated species typical of this community type include yellow birch, black birch, sugar maple (*Acer saccharum*), red maple and American basswood (*Tilia americana*). Other species that may be present include American beech (*Fagus grandifolia*), red oak, white ash (*Fraxinus americana*) and tulip poplar (*Liriodendron tulipifera*). Shrubs and herbs are typically sparse in this community type due to dense shading by canopy trees. At one of the hemlock ravines the understory consists of scattered witch hazel, red maple, dogwood and striped maple with the witch hazel being the dominant species. The shrub layer is sparse with a few rhododendron, mountain laurel and an occasional lowbush blueberry. The herbaceous layer is dominated by wild sarsaparilla on the upper slope and ferns such as lady fern (*Athyrium felix-femina*) and marsh fern on the lower slope. Common polypody fern was abundant on and between boulders. Canada mayflower, star flower, spotted wintergreen (*Chimaphila maculata*), teaberry, Indian pipe (*Monotropa uniflora*), violets (*Viola* spp.) and mosses are also scattered in the sparse herbaceous layer. A second hemlock ravine, with a higher percent of hemlock cover, had even less dense subcanopy and herbaceous layers.

This community is threatened by the hemlock woolly adelgid (*Adelges tsugae*), an insect that feeds on the young branches and twigs of the hemlock. The woolly adelgid is a non-native aphid that was first reported in the eastern U.S. in the late 1960s in southeastern Pennsylvania (McClure 1987). Infestation of a hemlock with the woolly adelgid can cause mortality of the tree within a year. Evidence of infestation can be easily seen when the woolly adelgid lays small, white, cottony egg masses at the base of needles starting about the middle of February. When the woolly adelgid feeds in the late winter and early spring it retards the new growth of the hemlock and causes existing needles to discolor, desiccate and drop from the branches (McClure 1987). Strong evidence of the presence of the woolly adelgid was not observed during a September 1993 field examination of several hemlock ravines within the natural area. September, though, is not the time of year when one would expect to see egg masses. However, a few branches were bare of needles on some trees and several patches of yellow needles were seen on other branches. The woolly adelgid has been causing more apparent damage to hemlocks in other areas of the park (John Keator pers. comm.). It has been found that the woolly adelgid can be controlled by a number of sprayed pesticides, including insecticidal oil and soap (McClure 1987). Control, however, is currently only achieved by complete saturation of each tree which is exceedingly difficult in the field. Research to find a means of woolly adelgid control is ongoing. These control methods should be considered as they are made available to protect the hemlocks, as well as the other biotic and abiotic components of this community.

Dry-Mesic Inland Mixed Oak Forest

The chestnut oak forest of the slopes gives way to a mixed oak forest in several locations within the natural area. The mixed oak forest community exists along the stream corridors that drain the area and on the step-like plateau on the east side of Kittatinny Ridge along the Appalachian Trail. The species dominating this community are a mix of chestnut oak, white oak, red oak and black oak. Other associated species include white ash, red maple, pignut hickory, shagbark hickory, yellow birch, grey birch, black cherry and American beech. American chestnut saplings were also seen in this community. Other sub-canopy trees were various oak saplings and witch hazel. The shrub layer was sparse with lowbush blueberry and huckleberry occasionally in patches. The herbaceous layer was also sparse except in the northern portion of this community near the state property boundary where it was very grassy.

Inland Red Maple Swamp

The inland red maple swamp community is found in several locations within the natural area in association with intermittent streams and the hemlock-hardwood forest community. Red maple is the dominant tree species of this community. Other trees typical of this community include black gum, ash, and yellow birch. Shrubs common in the red maple swamp include speckled alder (*Alnus rugosa*), common spicebush and sweet pepperbush. The typical herbaceous layer consists of skunk cabbage, cinnamon fern, sensitive fern and *Sphagnum* moss.

Wildlife

The following description includes animal species that could possibly occur at the natural area based on general life history information available for the species. Sources include lists of common mammals and birds of High Point State Park, DeGraaf and Rudis (1987), NJDEP (1993) and other noted sources.

White-tail deer were observed in the open forest, on shrubby slopes and at the cedar swamp during visits to the natural area. High Point State Park is in deer management zone one which has an average density of 27 deer per square mile. However, since there is no hunting in the natural area the deer density here could be quite a bit higher. Annual studies have been conducted by the New Jersey Division of Fish, Game and Wildlife to determine the cause of winter mortality of deer at High Point (Susan Predel, pers. comm.). Deer carcasses found throughout 88 acres surrounding the cedar swamp, a known deer overwintering area, are counted during a search conducted annually in April. The cause of death is estimated from examining wounds to the carcass and the condition of the bone marrow. The 1992/1993 winter mortality was 29. This is significantly higher than counts of recent past years (4 in 1990, 0 in 1991, no count taken in 1992) but not as high as a count conducted in March of 1978 when 49 were found. It is thought that the cause of death of 28 of the 29 deer found this year was due to predation by canines, particularly coyotes. Nearly all of the deer taken by predation were also malnourished. The high deer population at High Point may be particularly vulnerable to these attacks after harsh winters when food has been difficult to obtain or when the population exceeds the capacity of this

overwintering area to support them.

Although black bear (*Ursus americanus*) were not seen, there is a population of at least 15 bears at High Point State Park that are known to utilize portions of the natural area (Carol Forbes pers. comm., Patricia McConnell pers. comm.). A bear was sighted in the cedar swamp in the summer of 1991 as students were conducting a vegetation survey (Frank Gallagher, pers. comm.). The cedar swamp and other wetlands throughout the park are extremely important to the bears for food and for cover (Patricia McConnell pers. comm.). The bears eat the early skunk cabbage flowers in the spring and berries from bushes in and around the wetlands throughout the summer. Mast such as acorns is particularly important to the bears in the fall. The size of the Kittatinny Ridge population, one of two major populations of black bears in the state, saw a dramatic increase in the early eighties. This was possibly the result of dispersal of an expanding bear population in Pennsylvania. This New Jersey population is still expanding, though not at the rate of the early eighties. This population appears to have a higher than average reproduction rate with females reaching estrus at two and a half years and producing two to three cubs (Patricia McConnell pers. comm.). This increased fecundity is possibly due to these bears being well nourished with the rich food supply in this area as well as from the agricultural crops with which they supplement their diet (Patricia McConnell pers. comm.). Evidence that these bears are better nourished than others in the state stems from research indicating that the females of this region are, on average, 40 pounds heavier than female bear in the western Passaic County area (Patricia McConnell pers. comm.).

Based on suitability of habitat, other mammals that may inhabit or utilize the forests at the natural area include the red fox (*Vulpes fulva*), grey fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), porcupine (*Erethizon dorsatum*), grey squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), southern flying squirrel (*Glaucomys volans*), eastern chipmunk (*Tamias striatus*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis*), long-tailed shrew (*Sorex dispar*), woodland jumping mouse (*Napaeozapus insignis*), smoky shrew (*Sorex fumeus*), Thompson's pygmy shrew (*Sorex hoyi thompsoni*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*) and the little brown myotis (*Myotis lucifugus*), among others.

Reptiles such as the common garter snake (*Thamnophis sirtalis*), racer (*Coluber constrictor*), milk snake (*Lampropeltis triangulum*), eastern hognose snake (*Heterodon platirhinos*), rat snake (*Elaphe obsoleta*), brown snake (*Storeria dekayi*), and the eastern box turtle (*Terrapin c. carolina*), among others, may inhabit the woodlands of the natural area. Several snakes that may also be found in the natural area are those that utilize habitats that include talus or other bare rock areas. These include the timber rattlesnake (*Crotalus horridus*) and copperhead (*Agkistrodon contortrix*). Amphibians such as the spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), northern red salamander (*Pseudotriton r. ruber*), and the American toad (*Bufo americanus*) may also inhabit the deciduous or the coniferous forests of the natural area (DeGraaf and Rudis 1987). The eft form of the red spotted newt (*Notophthalmus viridescens*), the slimy salamander (*Plethodon g. glutinosus*), the lead phase of the red-backed salamander (*Plethodon c. cinereus*), and the spring peeper (*Pseudacris crucifer*) were observed in the chestnut oak forest during 1993 field visits.

Avian species observed in the pitch pine-scrub oak forest along the ridgetop during summer field visits include the black-and-white warbler (*Mniotilta varia*), American redstart (*Setophaga ruticilla*), eastern bluebird (*Sialia sialis*), downy woodpecker (*Picoides pubescens*), wood thrush (*Hylocichla mustelina*), song sparrow (*Melospiza melodia*) and rufous-sided towhee (*Pipilo erythrophthalmus*). Northern junco (*Junco hyemalis*) were seen on the ridgetop in October. Ruffed grouse (*Bonasa umbellus*) were seen in open chestnut oak forest and wild turkey (*Meleagris gallopavo*) were seen along the Appalachian Trail in an open area of mixed hardwood forest. Turkey vultures (*Cathartes aura*) were often seen overhead, circling the ridges.

The cedar swamp and the brook that leads from it may support additional animals that require or prefer those habitats for a portion of their activities. Small mammals were trapped at the cedar swamp as part of a 1989 study by FitzGerald (1991). The species trapped at this site were the eastern chipmunk, short-tailed shrew (*Blarina brevicauda*), masked shrew (*Sorex cinereus*), red backed vole (*Clethrionomys gapperi*), white footed mouse *(Peromyscus leucopus)* and the meadow vole (*Microtus pennsylvanicus*) (FitzGerald 1991). Other mammals that may inhabit or use the cedar swamp and the area around it include the water shrew (*Sorex palustris*), southern bog lemming (*Synaptomys cooperi*), star-nosed mole (*Condylura cristata*), mink (*Mustela vison*), long-tail weasel (*Mustela frenata*) and raccoon (*Procyon lotor*). Reptiles that may be found in or near the cedar swamp include some of those that were listed as inhabiting the forests throughout the natural area, as well as the eastern ribbon snake (*Thamnophis sauritus*) and redbelly snake (*Storeria occipitomaculata*). Amphibians that utilize the cedar swamp may include those previously listed as well as green frog (*Rana clamitans*), wood frog (*Rana sylvatica*) and four-toed salamander (*Hemidactylium scutatum*). Avian species observed at the cedar swamp during summer field visits were the black-capped chickadee (*Parus atricapillus*), gray catbird (*Dumetella carolinensis*) and ruby-throated hummingbird (*Archilochus colubris*).

The topography of Kittatinny Ridge may be important to wildlife species that use the Appalachian ridges as part of their migration route. The ridges that comprise the Shawangunk Mountains are used by a variety of hawks and other birds as a flyway (Kiviat 1988). New Jersey Audubon Society (1989) estimates that an average of 30,000 hawks a year follow Kittatinny Ridge during their migration. Species of hawk, falcons and vultures that are known to use the Shawangunk Ridge flyway include the broad-winged hawk (*Buteo platypterus*), red-tail hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), rough-legged hawk (*Buteo lagopus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), northern goshawk (*Accipiter gentilis*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), peregrine falcon (*Falco peregrinus*), turkey vulture, osprey (*Pandion haliaetus*), golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaetus leucocephalus*) (Kiviat 1988). Other animals such as insects may also use the Appalachian ridges for migration or dispersal routes (Kiviat 1988). Plants may also be dispersed along the ridges by associated migrating animals. A possible example of this relationship is the three-toothed cinquefoil and the snow bunting (*Plectrophenax nivalis*). The snow bunting migrates from its summer home range in the arctic to winter in the northern and central United States and Eurasia (Peterson 1980). Richard Radis and others have witnessed snow buntings consuming seeds of three-toothed cinquefoil during their migration along the Appalachian ridges, including High Point near the monument (Radis 1993).

Endangered Species

According to NJDEP (1993), there are eight records for State endangered plants in the natural area and one record for a plant species of concern (New Jersey Department of Environmental Protection and Energy 1992a). Two of these records are for recently observed rare plant species, the three-toothed cinquefoil and bunchberry, while the rest are historical occurrences (the most recent observation of any of these plants was in 1968).

There are also records for several rare animals at High Point State Park outside the natural area (NJDEP 1993). Based on habitat preferences and the average size of their home range, some of these species may utilize portions of the natural area as part of their home range or during specific activities. In particular, the timber rattlesnake population in the vicinity of High Point State Park probably uses part or all of the natural area as its home range (NJDEP 1993). The status of these plant and animal species is listed below:

Plant Species	Status
three-toothed cinquefoil (*Potentilla tridentata*)	SE
bunchberry (*Cornus canadensis*)	SC
dwarf mistletoe (*Arceuthobium pusillum*)	SE
erect bindweed (*Calystegia spithamaea*)	SE
finely-nerved sedge (*Carex leptonervia*)	SE
showy lady's-slipper (*Cypripedium reginae*)	SE
slender wheatgrass (*Elymus trachycaulus*)	SE
slender mountain rice grass (*Oryzopsis pungens*)	SE
slender panic grass (*Panicum xanthophysum*)	SE

Animal Species	
Cooper's hawk (*Accipiter cooperii*)	SE/SE
timber rattlesnake (*Crotalus horridus*)	SE
barred owl (*Strix varia*)	ST/ST
wood turtle (*Clemmys insculpta*)	ST
long-tailed shrew (*Sorex dispar*)	U

Explanation of Status Codes

SE - Listed as State Endangered
ST - Listed as State Threatened
SC - Species of concern in New Jersey
U - Undetermined
/ - Status of breeding population/Status of migratory or winter population

The three-toothed cinquefoil (*Potentilla tridentata*) is the only State endangered plant in the natural area that is listed as a current occurrence (NJDEP 1993). This plant was

observed by the authors on July 20, 1993. The plant was further observed by D. Lincoln on July 28, 1993 to determine the size of the population at the natural area. The three-toothed cinquefoil is a small alpine plant that ranges from northern Canada to the northern U.S. and south on open, mountainous areas with acidic, rocky soil (Peterson and McKenny 1968). It has been found on rocky and gravelly shores from Greenland to Mackenzie and to Connecticut, New York, Michigan, Minnesota and Iowa and at scattered stations in mountains south to Georgia (Gleason 1952). This plant is "restricted to exposed rock outcrops, ledges, and scrubby thickets on the summit of the Kittatinny Mountains" (NJDEP 1993). This member of the Rose family flowers from late May into early July with peak flowering in mid June and begins fruiting in late June and continues through early August (NJDEP 1993).

The only location for this plant in New Jersey is on Kittatinny Mountain (Schuyler 1990). The population at the High Point summit was noted by N.L. Britton in a record from 1858 (Radis 1993). Numerous specimens from this population have been collected between 1883 and 1980 (NJDEP 1993). During building of the High Point monument, from 1928 to 1930, a portion of the population was destroyed due to the construction at the site. R.H. Torrey reported in 1929 that the capacity for the species to persist at and colonize disturbed sites probably accounts for its continued presence at High Point despite its apparent disappearance during the construction of the monument (Schuyler 1990). M.A. Chrysler noted in 1941 that the three-toothed cinquefoil was becoming more common since the completion of the construction of the monument (NJDEP 1993).

The results of a population survey of three-toothed cinquefoil by the author on the summit at High Point indicate that the population is locally large. This population has apparently recovered from past disturbance when the monument was built and currently appears to be as abundant as it ever was (Schuyler 1990). Impacts to the population, however, were noted on the portion of the rock outcrop near the small parking area where there is a binocular stand. This area is very similar to adjacent rock outcrop which supports abundant three-toothed cinquefoil, yet this 60 square meter area does not harbor any of these plants. This striking absence of three-toothed cinquefoil may be due to excessive trampling at this location. Threats to this species include succession of its habitat and recreational overuse, specifically trampling by excessive foot traffic, however there is no evidence that the species is declining (NJDEP 1993). In a study conducted at Franconia Ridge, New Hampshire, it was concluded that three-toothed cinquefoil that had been disturbed by trampling apparently regenerated most successfully via underground shoots rather than by seed (Marchand and Roach 1980). If access to the area that is currently under stress from heavy trampling was restricted, the three-toothed cinquefoil in the adjacent area may spread to this portion of the outcrop. Another management concern regarding this population is the natural succession of the rock outcrop community. The three-toothed cinquefoil was observed in areas where enough soil was found in crevices for grasses to become dense. In these areas the three-toothed cinquefoil was less numerous, possibly due to the competition of the grasses. It is not expected that grasses will quickly displace the three-toothed cinquefoil due to the limitations that the high exposure rock outcrop community imposes, however, ongoing population surveys could determine the impact of succession on this colonizing species.

Bunchberry (*Cornus canadensis*) is a perennial herb in the Dogwood family that occurs in moist acid woods and bogs (Gleason 1952). A cluster of approximately 200 plants was

observed by C. Coritz on June 10, 1994. The plants are growing along the Cedar Swamp Trail on an embankment adjacent to the cedar swamp. Radis (1985) has observed this plant along the damp border of a black spruce bog (not in the *Sphagnum* zone) and along the edge of a black spruce bog in a moist area intermediate between the bog proper and the drier upland woods. Bunchberry grows from a horizontal rhizome from which dense colonies can form (Gleason 1952). This 3"-8" high plant has whorled leaves around a flower made up of four white petal-like bracts surrounding a cluster of tiny flowers (Newcomb 1977). Bunchberry flowers from May to July and clusters of red berries can be seen from late July to October (Hough 1983).

Dwarf mistletoe (*Arceuthobium pusillum*) is a parasitic plant found in upland bogs predominantly on black spruce trees (Gleason 1952). The following information comes from NJDEP (1993) except where indicated otherwise. Dwarf mistletoe is mostly found in more open areas of black spruce/tamarack bogs. This species reaches the southern limits of its range in northern New Jersey. There are a total of seven documented occurrences of this plant in the state, but only two populations are thought to still exist. The plant resembles white cedar in that its leaves are scale-like and compressed. Fernald (1950) indicates that dwarf mistletoe flowers from April to June and describes the fruit as a greenish brown berry. This plant can cause the host tree to grow abnormal tufts of short branches called witches' brooms which are fairly visible in the field.

Erect bindweed (*Calystegia spithamaea*) is a member of the Morning Glory family that grows in dry rocky or sandy fields and open woods (Gleason 1952). This species is also known from roadsides, railroad banks and woodland edges and has been historically noted in dry open sandy pine-oak scrub forest (NJDEP 1993). Because it seems to establish itself in open situations, it may be likely that this species is vulnerable to habitat succession and requires fire or other disturbances to maintain an open habitat (NJDEP 1993). This 4"-18" tall plant bears large, white or pink funnel-shaped flowers that can be seen from late May through June (Gleason and Cronquist 1991). The historically known population at High Point State Park is the only population out of 17 that is on state-owned property (NJDEP 1993).

Finely-nerved sedge (*Carex leptonervia*) is a perennial herb that occurs in moist rocky woods (NJDEP 1993). Niering, who collected this sedge in 1950, indicated that it was associated with hemlocks (Niering 1953). The following information comes from NJDEP (1993). This sedge fruits from late May into July, however most specimens have been collected in mid June. Only six occurrences, less than 25 plants total, of this plant are known within the state. Four of these sites are considered historical, although plants may still occur there and should be surveyed for. A characteristic of this plant is that is has nerveless or obscurely nerved perigynia (a special type of bract in *Carex*).

Showy lady's-slipper (*Cypripedium reginae*) is our largest native North American orchid and grows in direct and indirect sunlight in various wetland habitats, such as swamps, bogs and wet woods, although not usually found in *Sphagnum* bogs (Rooney undated). This orchid occurs in open thickets in calcareous fens and wooded swamps (NJDEP 1993). This 1'-2 1/2' tall orchid bears one to three flowers with white petals and sepals and a white lip streaked with pink during June and July (Gleason 1952). Mature fruit occur in late August through September (NJDEP 1993). Only one confirmed extant occurrence with a single plant is known for this orchid (NJDEP 1993). Rooney (undated) indicates that showy

lady's-slipper is an early to mid-successional species and is vulnerable to being shaded out by a maturing forest canopy. In a shaded situation, the population may decrease and the remaining plants may enter a vegetative state until an opening in the canopy, due to blow down or disease for example, provides sunlight for the plants to flower again (Rooney undated). Protection of this species should involve insuring the hydrological integrity of the area as well as physical manipulation of sites to allow openings in the forest canopy (Rooney undated). In Maine, S.C. Rooney has implemented some management techniques such as clearing overtopping brush and trees to open sites and reports that the stations have responded very well. Rooney (undated) suggests that any cutting be performed in the late fall where the species is present but in decline.

Slender wheatgrass (*Elymus trachycaulus*) is a perennial grass with a dense spike of alternating spikelets at the terminus of the stem. It grows in several habitats including open woods and rocky ledges (Gleason 1952) as well as high rocky woods and dry roadside banks (NJDEP 1993). This species fruits from mid-June through July (NJDEP 1993).

Slender mountain ricegrass (*Oryzopsis pungens*) is a perennial grass whose only location in the state is within High Point State Park; however, it is a historical occurrence and the plant has not been seen there in the last 20 years despite several recent searches (NJDEP 1993). This plant has been "documented from xeric, thin, gravely soil on exposed rock outcrops and ledges on the summit of the Kittatinny Mountains" (NJDEP 1993). The slender mountain ricegrass is threatened by succession of its habitat and by recreational overuse such as excessive trampling. If plants are relocated at this site, they may need to be fenced for protection. This species flowers in mid April through early May and bears its non-persistent fruits from May into early June. It is thought that flowering may be triggered by burning.

Slender panic grass (*Panicum xanthophysum*) is another perennial grass whose only location in the state is within High Point State Park. Although it is considered a historical occurrence at High Point, plenty of suitable habitat remains to be searched (NJDEP 1993). This plant occurs in "dry woodlands and high rocky ridges" and flowers and fruits from mid June into early July (NJDEP 1993).

According to Anderson (1991) and Karlin (1988), three-leaved false solomon's seal and painted trillium, although not documented from the area in NJDEP (1993), have been observed in the natural area near the cedar swamp. These species are not State endangered, but are considered species of concern in New Jersey (NJDEPE 1992a).

Three-leaved false solomon's seal (*Smilacina trifolia*) is a member of the Lily family usually with three large leaves (no basal leaves) and a slender raceme of small white flowers (Gleason 1952). This 2"-8" plant grows in wet woods and *Sphagnum* bogs and flowers from May through June (Gleason and Cronquist 1991). It exhibits a dark red berry from July through August (Hough 1983).

Painted trillium (*Trillium undulatum*) is a perennial herb that grows in moist or wet woods (Gleason 1952), swamps and bogs (Hough 1983). This 8"-20" plant has a characteristic whorl of three large leaves encircling the stem just below the single three-petaled white flower (Newcomb 1977). Painted trillium probably got its name from the red veining at the base of its petals. This plant flowers from May through July and fruits in

August (Hough 1983).

Although the Cooper's hawk (*Accipiter cooperii*) is primarily a migrant in New Jersey, a small number breed and overwinter in the state (NJDEP 1993). Both the breeding and migrant or winter populations are considered State endangered. The following information was obtained from NJDEP (1993). The Cooper's hawk inhabits primarily mature hardwood forests, but is also known to use open woodland and forest edge. This hawk hunts from an inconspicuous perch and preys primarily upon medium-sized birds. Small mammals and reptiles are also prey. Breeding seems to be restricted to the Highlands and Ridge and Valley provinces of New Jersey. Nests are usually found on a horizontal branch or in a crotch near the trunk. Breeding activity begins in March and April and ends with the fledglings becoming independent in July. Threats to the Cooper's hawk include loss of suitable nesting habitat and human disturbance.

The timber rattlesnake is State endangered and, in New Jersey, is decreasing or stable at low numbers within its range. The current geographic range of the timber rattlesnake encompasses an area bounded by New Hampshire and Minnesota to the north, the eastern coastal plain to northern Florida, and Texas and southeast Nebraska to the west (Brown 1991). The highest densities of the snake occur in the Appalachian Mountains from northern Alabama to Pennsylvania (Brown 1991). Toward the northern and western portions of the snake's range, habitat modifications have lead to its decline, and in some areas extirpation, resulting in isolation of some populations (Brown 1991).

Loss of suitable habitat is one reason for the timber rattlesnake's decline. Other causes include hunting of the snakes, collection, mortality due to automobiles and the reproductive biology of the snake. Except where indicated, the following information is obtained from Brown (1991). Timber rattlesnake habitat includes "mountainous terrain characterized by steep ledges and rock slides" and "deciduous forest, especially of open type, with dry, rocky areas and rugged terrain." Timber rattlesnakes use three types of habitat: open, rocky den sites (in winter), summer habitat which is more heavily forested and a "transient" habitat between the den and summer habitat. The migratory timber rattlesnake undergoes an annual cycle related to seasonal changes. In New York State, a majority of the rattlesnakes emerge from the den in May and a majority of the rattlesnakes appear at the den in late September. A typical den site is described as a rocky area with an underground cave or fissure for the rattlesnake to overwinter (Sciascia 1983). Determining the size of a den would be difficult. The snakes use the open areas around the den site for basking during the spring, before migrating to their summer habitat, and during the fall, before entering the den to hibernate. The size of the basking area around the den site is dependent upon the number of animals using the den (Jim Sciascia pers. comm.). Determining the size of a basking area around a den site would have to be done on a case-by-case basis. The mean maximum migratory distance from the den for males is 2.5 miles and 1.3 miles for nongravid females. Gravid (pregnant) females stay closer to the den site and utilize the more open canopy. Sciascia (1983) indicates that "basking is... critical to pregnant females... to maintain relatively high metabolism rates for the proper development of their young."

The timber rattlesnake is a species that has a pattern of low-frequency birthing and delayed age of reproduction. Some data indicate a biennial pattern of birthing for females and a first reproduction at four to six years of age. However, other data from northeast New York indicate that the majority of marked females had reproductive cycles of three

years with some as long as six years and the age of first reproduction from seven to eleven years of age. These data indicate that the timber rattlesnake is a slow reproducer and that recovery of populations will also be slow. Also, it has been noted that the data concerning reproductive rate indicates a possible correlation with climate; the southern populations possibly growing faster and reproducing at a higher rate than northern populations. A reason for this is that the frequency of reproduction is affected by the female snake's ability to store body fat, which is influenced by environmental factors such as climate and food supply (Peterson 1990).

The primary food item of timber rattlesnakes is small mammals, particularly mice (DeGraaf and Rudis 1987). Oak mast is a primary food of small mammals, including white-footed mice (Peterson 1990), which appear to be one of the primary food items of timber rattlesnakes in New Jersey (NJDEP 1993). Peterson (1990), in a study of timber rattlesnakes in south central New York, found that there was a positive correlation between annual mast production and the small mammal trapping success rate in the denning area. Since repeated defoliation of oaks due to gypsy moths can cause mast failure, there may be a correlation between gypsy moth defoliation, small mammal populations and, ultimately, the number of timber rattlesnakes in a given area (Peterson 1990). Peterson (1990) concludes that gypsy moth defoliation should be considered an undesirable component of rattlesnake denning ecology.

Other important considerations for rattlesnake management include locating den sites since these are important areas for hibernation, birthing and basking (Brown 1991, Peterson 1990, DeGraaf and Rudis 1987). The area around the mouth of the den is heavily utilized during early spring and late fall for basking (Sciascia 1983). Since natural succession sometimes makes denning areas unfit for the snakes when the canopy blocks the sun, management should include clearing the den area (Peterson 1990, Sciascia 1983). Also, anthropogenic disturbance to the denning areas should be minimized and mortality caused directly or indirectly by humans should be monitored (Peterson 1990).

The barred owl (*Strix varia*) is a year-round resident in New Jersey and will live and breed in the same area annually (NJDEP 1993). Both the barred owl's breeding population and migratory or winter population are State threatened. The following information was obtained from NJDEP (1993). Habitat includes dense mixed-oak forest, mixed hardwoods and conifers, and white cedar swamps. These owls usually nest in tree cavities, but are known to use abandoned nests of squirrels, crows and hawks. Breeding typically occurs between March and April however nesting could continue into May. After a 28-day incubation period the young hatch and may leave the nest at four to five weeks and fly at about six weeks. Both parents raise the young, which may remain with the parents throughout the summer, sometimes longer.

The wood turtle (*Clemmys insculpta*), a State threatened species, is restricted to hardwood forests in the northern and central sections of New Jersey (Zappalorti et al. 1984). The following information was obtained from NJDEP (1993). The species hibernates in the banks or bottoms of streams from October to April and then moves into the surrounding woods and fields from mid-May to mid-October. Wood turtles also use the streams for mating in spring and/or fall. Eggs are laid in open, sunny areas of sandy soil in May or June and then hatch between August and October. The wood turtle is an omnivore and feeds in the water as well as on land.

The long-tailed shrew or rock shrew (*Sorex dispar*) is restricted to mountainous, forested areas with loose talus and requires cool, damp forest with deep talus; it may also occur along small mountain streams (Norris 1992). This species is listed in New Jersey as undetermined (NJDEPE 1992b). The following information was obtained from Norris (1992). This shrew is uniformly gray with a long tail and long snout. Its diet consists primarily of small invertebrates. Consuming invertebrates that have been sprayed with pesticides causes accumulation of these pesticides and heavy metals in their tissues. If the long-tailed shrew is found to occur within the natural area, the negative impact from pesticide use should be considered before gypsy moth spraying is permitted.

According to Superintendent John Keator, a bobcat was positively identified in 1992 in the area of the Steenykill Boat Launch. The sighting has not been documented in the New Jersey Department of Environmental Protection's Natural Heritage Database. The bobcat, a State endangered species, inhabits mixed deciduous-coniferous forests, hardwood forests and swamps (DeGraaf and Rudis 1987, Burt and Grossenheider 1976). Bobcats favor brushy, rocky woodlands broken by fields, old roads and farms (DeGraaf and Rudis 1987). This cat dens in rock crevices, hollow logs and beneath fallen trees. Bobcats prey upon small mammals, birds and their eggs, snakes, fish, crustaceans, insects, carrion and deer (DeGraaf and Rudis 1987). A number of bobcat were released in the Bearfort Mountain area of Passaic County from 1978 to 1982 during a reintroduction program by the New Jersey Division of Fish, Game and Wildlife's Nongame and Endangered Species Program (Jim Sciascia pers. comm.).

Boundary

The portion of the boundary that is a straight line from Route 23 to the monument area and from the Monument Drive to the Appalachian Trail does not conform to the requirements of the Natural Areas System Rules. The Rules (N.J.A.C. 7:5A-1.12b) state that the boundary must follow features identifiable in the field or the boundary of state property. Much of the southern boundary is artificial. Also, the eastern-most boundary along the toe of a steep slope, although discernable in the field, could be made more-so by a slight revision.

Revisions to the boundary of the natural area, highlighted in Figure 2, include changing the eastern boundary to follow the Appalachian Trail and the southern boundary to follow various roads and trails. Revision of the eastern boundary involves removing acreage from the natural area, while revisions to the southern boundary entail adding acreage to the natural area (with the exception of two small areas along the Steenykill Trail that will be excluded from the natural area). The boundary at the summit excludes the area of the monument, Monument Drive, parking areas and two small areas adjacent to the parking lots where there is a concession stand and rest rooms (Figure 3). The natural area includes most of the rock outcrop community due to the rarity of this community type in New Jersey and the presence of state-listed rare plants. The boundary is being defined at the summit to include as much of the three-toothed cinquefoil habitat as possible since this is the only location in New Jersey where this species occurs. These changes remove a portion of the natural area along the eastern edge and add a larger area along the southern edge. Implementing these changes results in a net increase in the size of the natural area of approximately 10 percent (124.3 acres).

Public Use

The natural area is currently used for nature interpretation and study, hiking, cross country skiing, snowshoeing, bird watching and botanizing. The Friends of High Point State Park is an organization active at the park, sponsoring interpretive activities and promoting conservation. The New York-New Jersey Trail Conference is also active at the natural area where they established a portion of the Long Path trail, known as the Shawangunk Ridge Trail, for Trails Day in June 1993. The Trail Conference is responsible for trail maintenance of the Shawangunk Ridge Trail as well as all other trails in Dryden Kuser Natural Area. Also, the well travelled Appalachian Trail brings hikers to the natural area where it skirts the southeast corner. It is estimated that during the spring, summer and fall seasons there are 1000 people per weekend visiting High Point State Park; approximately two thirds of these people hike the park and natural area trails (Carol Forbes pers. comm.). Activities not allowed on the hiking trails in the natural area include horseback riding and bicycle riding. Picnicking is popular at the High Point summit adjacent to the parking area where an overlook affords an expansive and impressive view of Kittatinny Valley and the highlands in the distance.

Permits for research at High Point State Park, which may include research or collection in the natural area, have been issued for collection of rocks for geological studies, collection and study of lepidoptera, odonata and coleoptera, study of deer ticks along the Appalachian Trail, a small mammal study conducted the summer of 1989, studies of terrestrial snails, and botanical studies that include collection of rhododendron root and fungi samples. Other research that is known to have been conducted are vegetation surveys such as those of Niering (1953), Grace (1980) and Anderson (1991). The NJDEP Division of Parks and Forestry and Division of Fish, Game and Wildlife also conduct gypsy moth surveys, deer mortality studies and black bear population studies.

Hunting is not allowed at High Point State Park except in the area south of the Deckertown Turnpike. This portion, which is less than ten percent of the area of the park, is indiscernible in the field from the adjacent Stokes State Forest where hunting is allowed. Hunting is not allowed in the rest of High Point State Park due to the deed restriction prohibiting hunting of birds on the property. The Division of Parks and Forestry has extended this restriction to all hunting. In 1978, however, a deer hunt was held in portions of High Point State Park but excluded the natural area. This hunt was initiated after deer mortality during the winter of 1977-1978 indicated that the deer population was higher than the resources of the cedar swamp could support. The hunt was held on December 14, 1978 and a total of 40 deer were taken by 163 individuals. There has not been a hunting season at the park since the 1978 hunt.

An illegal use of the natural area is the current problem of plant collection. The Rules and Regulations of the New Jersey State Park Service (N.J.A.C. 7:2-2.10) states that collection of any plant or animal or natural resource of the park without a permit is prohibited. In particular, collection of large quantities of fiddleheads of young ferns has been documented to occur in the spring by people presumably intending to sell them to produce markets (Hampton 1991). This is apparently an on-going problem at the natural area (Carol Forbes pers. comm.).

Activities associated with potential uses include a cross country ski concession and sled dog training and racing. In 1988 a cross country ski concessionaire operated at High Point State Park and is planning to reintroduce this concession in the winter of 1994/1995 (John Keator pers. comm.). In the past, this concession was allowed to groom and maintain ski trails throughout the park, including the natural area. However, they were prohibited from making snow in the natural area or bringing snow into the natural area. Controversial issues regarding the concession included the use of mechanized vehicles in the natural area to aid grooming and the cutting of leaning, live cedar in the cedar swamp boardwalk area as part of trail maintenance activities (John Keator pers. comm., Frank Gallagher pers. comm.).

The New Jersey Sled Dog Club is currently allowed to run their dogs and sleds on snowmobile trails and closed roads in High Point State Park throughout the year. However, they are currently not allowed to run the dogs and sleds on trails through the Dryden Kuser Natural Area. The reason for this is threefold; there are no snowmobile trails or closed roads within the natural area, the activity conflicts with other uses of the trails, and the activity could negatively impact the condition of the trails. Superintendent John Keator indicated that the Club may seek permission for use of the natural area in the future.

Introduced Features

Gypsy moth induced defoliation was extensive at High Point State Park in 1970, 1971, 1978, 1979, 1982, and more recently in 1989 and 1990 (George Koeck pers. comm.). Many standing dead oaks on the western slopes of the natural area are the result of these infestations. The natural area, including the cedar swamp, was sprayed with the insecticide Sevin in 1971 and small portions of the natural area on the ridge north of the High Point Monument were also sprayed with Sevin in 1978, 1979, and 1982 (George Koeck pers. comm.). Due to the suppression activities in 1971 most of any disjunct specialized fauna from the vegetation, water, and upper litter were probably eliminated unless there were no rare species to begin with (Dale Schweitzer pers. comm.). According to Dr. Schweitzer, much of northern New Jersey was heavily sprayed with DDT and/or Sevin during 1956-1971, and during this time over 30 species of Lepidoptera were extirpated from the region. Dr. Schweitzer suggests that Lepidopteran surveys be conducted throughout the natural area to assess the current status of this segment of the fauna and as an indicator of forest health in terms of past pesticide use. Communities suggested for survey include chestnut oak, pitch pine-scrub oak and the dry ridgetop. Species that should be surveyed and their appropriate habitat type include the following: buckmoth (*Hemileuca maia*)/scrub oak on ridge; Edward's hairstreak (*Satyrium edwardsii*)/scrub oak; hoary elfin (*Incisalia polios*)/ridgetop near bearberry; and frosted elfin (*Incisalia irus*)/ridgetop near *Baptisia* or *Lupinus* plants.

Though it is speculative, runoff from slopes in the natural area may carry higher nutrient loads in years of severe gypsy moth infestations due to caterpillar frass and fine particulate organic matter resulting from gypsy moth caterpillar defoliation (George Koeck pers. comm.).

The natural area has very few introduced features that are unrelated to the current public uses of this area (Figure 2). There are four trails within the natural area: Monument Trail, Steenykill Trail, Shawangunk Ridge Trail (a portion of the Long Path) and the Appalachian Trail. An old unmarked carriage road, now known as Cedar Swamp Road, provides the main access to the natural area from the State Park. The Cedar Swamp Trail is a fifth trail that is contained within the natural area, encircling most of the cedar swamp. On January 26, 1993 the Natural Areas Council approved an agreement whereby the New York-New Jersey Trail Conference would create and maintain the Shawangunk Ridge Trail. The Trail Conference maintains the rest of the trails within Dryden Kuser Natural Area according to an informal agreement between the Trail Conference and the Division of Parks and Forestry. According to Anne Lutkenhouse of the Trail Conference, the Conference and the Division may develop a formal memorandum of understanding in the future which will address trail maintenance issues.

Although the Appalachian Trail is not within the natural area, the Appalachian Trail Management Plan delineates two management zones along the trail that encompass habitat within the natural area. The AT Management Plan specifies a primary zone 200 feet to either side of the AT and a secondary zone 300 feet beyond the primary zone that creates a 1000 foot wide corridor along the AT. Management guidelines in the AT Management Plan indicate that the AT Management Committee, the Appalachian Trail's governing body, must have the ability to relocate the AT and that creation of new side trails and/or enlargement of the existing AT should be reviewed by the AT Management Committee.

Currently, parking for disabled visitors is available adjacent to the High Point Monument. According to John Garcia, Office of Resource Development, the Monument Trail may be modified in the future to provide access to the monument for the disabled.

Along the Cedar Swamp Self-guided Trail there are 25 numbered, flexible Carsonite markers that correspond to descriptions in a trail guide. This self-guided trail was field checked August 4, 1993 and all markers were found to be intact. Also on this trail there are three park benches and a boardwalk (Figure 2), approximately 18 inches wide, 370 feet long and raised about five inches, through the wettest portion of the cedar swamp. This area of the cedar swamp where the boardwalk now crosses was created by a forest road cut during the 1950s (Niering 1953). This trail, and the old carriage road that runs between the cedar swamp brook and the base of the slope to the east, are laid with crushed shale.

Another introduced feature in the natural area is a clearcut of approximately one acre located below the parking and picnicking area at the northeast side of the summit. This area is occasionally cut to provide a scenic vista at the picnic area (Carol Forbes pers. comm.). Four smaller scenic vistas also occur along the ridgetop (Figure 3). The vista along the east side of Monument Drive near the top of the ridge has been cleared in the past and will require clearing in the near future. The vista due east of the concession stand is not cleared, but tree limbs are periodically removed. The vista on the west side of the parking area is cleared of tall common trees, while less common trees are allowed to remain. The fourth vista is along the west side of the Monument Trail north of the High Point Monument parking lot. This vista is a natural clearing in the woods that provides a scenic view through the forest.

A feature that has been proposed in the past for the summit at High Point and which could effect the natural area is the construction of transmission towers in this area. Currently, communication towers are located south of the park office building. Correspondence indicates that in 1986 there was a proposal for locating a microwave communications dish at the High Point summit north of the monument parking lot. This should highlight the importance of precise boundary delineation at the summit.

Other introduced features include two wooden bridges on the Monument Trail; one where it crosses an intermittent stream near the Steenykill Trail juncture and one where it crosses the brook that leads from the cedar swamp (Figure 2). Another bridge, of piled stones and boards, crosses the cedar swamp brook slightly north of the wooden bridge. In this area, just northwest of the brook, is a small deer blind and associated refuse. Also, along the old carriage road, a short distance north of the stone bridge, there are signs posting the state property. This appears to be the New York-New Jersey state line. Posted signs also occur where the Shawangunk Ridge Trail crosses the state line. At this point near the trail there is a cement boundary marker. No state property or natural area signs were seen at the boundary with private property where the Appalachian Trail leaves the park.

Along the Appalachian Trail within the natural area there are eight coils of rusted wire fencing. These fence remains may be left over from when the Kusers had elk fenced in the forest. In this same area there are also stone walls and large stone piles. Some of these stone walls and piles have trees growing up through the rocks; one of these stone walls running parallel to and about 100 feet east the Appalachian Trail is approximately three feet high and about ten feet wide. This area was probably used to graze livestock before the Kusers purchased the land and let it revert back to forest.

A paved road leads into the natural area at the southern boundary (Figure 2). This is the main access point into the natural area. Across the paved road there are two gates to limit vehicular traffic to park personnel and two wooden routed signs informing visitors that they are entering the natural area (Figure 2). A small gravel parking area exists along the paved road near the gates (Figure 2). According to Superintendent John Keator, this parking area may be proposed as the location for a new nature center. Several picnic tables occur along the paved road south of the gates. A well, drilled in 1988, exists in the natural area on the east side of the paved access road near its juncture with Kuser Road. John Keator indicated that this area was once the site of the two CCC companies comprising Camp Kuser. At the north end of the paved road, the dirt and slate-covered Cedar Swamp Trail begins. At this point there is a plaque on a large rock that reads: John Dryden Kuser Memorial Natural Area (Figure 2).

Superintendent John Keator indicated that because of the park's historical features Mr. William DuPont submitted a nomination application for inclusion of the High Point State Park Historic District on the New Jersey and National Registers of Historic Places. This application was favorably recommended by the New Jersey State Review Board for Historic Sites at their June 15, 1994 meeting. A District is placed on the New Jersey and National Registers of Historic Places after approval by the Deputy Historic Preservation Officer. The rules and regulations applying to property on these registers appear to be consistent with rules governing the Natural Areas System.

Features located in other parts of High Point State Park may affect resources within the natural area. John Keator has noticed a rise in the water level of the cedar swamp over his last 10 years as superintendent of the park (John Keator pers. comm.). This observation is based on the wetness of the boardwalk area along the Cedar Swamp Trail during the growing season. Keator indicated that, whereas the boardwalk area used to be wet in the spring and dry in the summer, it is now wet year round. During field visits in July and August 1993, the area around the boardwalk was saturated and water-filled shallow depressions were observed with wild calla growing abundantly. Factors that may effect the water level of the cedar swamp are the amount of and seasonal distribution of precipitation, evapotranspiration rates and changes in ground water flow. The groundwater hydrology of the natural area may be effected by the water level of other surface impoundments such as Steenykill Lake and Lake Marcia as well as beaver ponds that are located within the park. Also, the well along the paved access road may affect the local hydrology.

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. Should an issue arise that is not addressed in the management techniques of this plan, the interim management techniques at N.J.A.C. 7:5A-1.9 (Appendix A) will apply and should be consulted. The following analysis will outline management and uses contrary or supplemental to existing rules.

Management Objective And Classification

The management objective for Dryden Kuser Natural Area is "preservation of a northern bog habitat and rare species habitat" (N.J.A.C. 7:5A-1.13(a)14ii). The following management techniques are derived from issues discussed in 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 protect the features of the natural area and further its management objective. An explanation for each technique is also provided.

Throughout this section, administering agency refers to the Division of Parks and Forestry, through High Point 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 implementation dates indicated.

Biotic Communities

1. The Office of Natural Lands Management (ONLM) in cooperation with the Bureau of Forest Management and the administering agency, will gather baseline data on forest composition, distribution and age within the Atlantic white cedar swamp in order to assess the potential for forest regeneration without human intervention. If, as suspected from casual observation, the potential for cedar regeneration is found to be low, a strategy for cedar regeneration within the swamp will be developed and implemented. Techniques that may be used to preserve this forest community include deer management (exclosures, contraceptives, hunting, repellents) and silvicultural techniques such as hardwood control/removal.

   This management technique serves to further the management objective of preservation of a northern bog habitat by fostering cedar regeneration in this Atlantic white cedar swamp. Baseline data is necessary because it provides a foundation for future management decisions. The growth habit of cedar is such that it has difficulty regenerating. Cedar seedlings require open sunlight and are intolerant to shade. However, when openings occur in cedar stands, hardwoods often develop in the understory, inhibiting cedar seedlings from establishing in the opening. Eventually the cedar swamp may convert to a hardwood swamp. Should baseline data confirm the need for fostering cedar regeneration, several potential methods should be explored to control herbivory by deer and promote cedar establishment.

2. The Division of Parks and Forestry may perform gypsy moth control activities in the natural area if the following three criteria are met: counts of at least 400 egg masses/acre are recorded; the previous year defoliation occurred during or immediately preceded a severe drought; and a significant amount of tree mortality (not defoliation) will be expected if control activities are not performed. If these criteria are met, the Division should submit a gypsy moth control plan, including a spraying program environmental impact statement (EIS), with data that substantiates the above criteria, to the ONLM. The EIS should contain methods to avoid impacts on lepidoptera, rare and endangered species and other non-target species. If spraying is conducted, the following spraying guidelines must be followed: one application of B.t. is permitted per year; spraying will be conducted from mid to late May; and the pitch pine-scrub oak, hemlock, and Atlantic white cedar communities will be considered no spray zones. Should a more environmentally sound method of gypsy moth control become available in the future, this new gypsy moth control method will be allowed upon Natural Areas Council review and Commissioner approval.

   The Commissioner hereby approves of gypsy moth control activities in accordance with N.J.A.C. 7:5A-1.9(e)13. Performing gypsy moth control will further the management objective by helping to maintain suitable habitat for State endangered and threatened species documented at High Point State Park, such as the timber rattlesnake and barred owl, and preserve mast producing capability needed for maintaining the small mammal population which is a major food source for the State endangered timber rattlesnake. High egg mass counts and defoliation during or preceding a drought are

known to increase the susceptibility of the forest to mortality from gypsy moth defoliation (Schweitzer 1988). Drought places an additional stress on already defoliated trees which increases the chance of mortality from a second defoliation. Gypsy moth control within the pitch pine-scrub oak, hemlock and Atlantic white cedar swamp communities is prohibited for the following reasons: pitch pine and the vegetation within the Atlantic white cedar and hemlock communities is not considered a primary food source for gypsy moth, therefore, is not in jeopardy of defoliation; defoliation will not kill scrub oak trees; and spraying may negatively impact non-target invertebrates inhabiting these communities.

3. No specific techniques are proposed to control the hemlock woolly adelgid. Should a control technique be developed, woolly adelgid control methods will be allowed upon Natural Areas Council review and Commissioner approval.

   This technique is included to address the significant threat that hemlock woolly adelgid poses to the integrity of hemlock stands within the natural area. However, there is currently no proven technique for adequate treatment in an interior forest condition.

Endangered Species

1. The administering agency will remove the binocular stand, binocular base and wooden benches on the rocky outcrop near the High Point Monument by December 31, 1995.

   This management requirement is included to help ensure preservation of New Jersey's only population of the State endangered three-toothed cinquefoil by reducing trampling in a high visitation area of the park. The plant is considered critically imperiled in New Jersey because of extreme rarity.

2. The ONLM will survey/monitor the three-toothed cinquefoil population on a periodic basis and assess future management needs. Special attention will be paid to monitoring any impacts of succession, trampling and browsing by deer on this species. 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 the State endangered three-toothed cinquefoil population. The plant is considered critically imperiled in New Jersey because of extreme rarity.

3. The ONLM will, within the limits of available staff and funding, perform surveys for historically known plant species.

   This technique is included to help ensure the preservation of these species and to ensure consideration of these species in future planning of the natural area.

4. The ONLM will, within the limits of available staff and funding, conduct Lepidoptera surveys with the assistance of qualified volunteers.

   This technique is included to assess the current status of this segment of the fauna and as an indicator of forest health in terms of past pesticide use.

5. Should a timber rattlesnake den be found to exist in the natural area where canopy cover at the site exceeds 75%, State Forestry Services may perform selective cutting to increase the amount of sunlight reaching the area. The cutting should take place during winter while the snakes are in hibernation. However, selective cutting should not take place if a gypsy moth infestation is imminent. The size of the cut will depend on the size of the population and will be determined in cooperation with the Division of Fish, Game and Wildlife. Cutting should begin at or near the den and radiate in the direction of the least public use to minimize human-snake conflicts. Care should be taken to avoid damage to standing trees, and slash may be removed or left around the perimeter of the cut to create habitat for prey species and other wildlife. The ONLM and the Division of Fish, Game and Wildlife will provide assistance in determining the optimum size and location of the cutting.

   This management technique is included to prevent natural succession from causing den sites to become unsuitable should a den be discovered in the natural area. This technique furthers the management objective of preserving rare species habitat.

6. The ONLM will provide the administering agency with a map indicating known and possible locations of all endangered and threatened species as well as the extent of their habitat, a written description of the species and, if possible, an illustration of the plant species by June 30, 1995. These materials will be updated by the ONLM should locations for any additional species be discovered.

   This management requirement is included so that the administering agency can more effectively manage the natural area for rare species and their habitats, and to ensure consideration of these species in future planning in the natural area.

Boundary

1. The boundary of the natural area is hereby revised as follows to include 169.7 acres in the southern section of the natural area and remove a total of 45.4 acres from the eastern and southern sections of the natural area. The resulting acreage of the Dryden Kuser Natural Area is 1,451 acres. See Figures 2 and 3 for guidance in determining the revised boundary: from the northwest corner of the natural area follow the State Park property line south and then northwest to Route 23, proceed south along Route 23 for approximately 1.5 miles, then east along the Steenykill Lake boat launch road approximately 1/5 mile to its terminus, continue east on the Steenykill Trail to the intersection with Monument Trail, south on the Monument Trail to the Nature Center driveway, east on Kuser Road, back on

Monument Trail to the High Point Monument, around the monument and associated parking lot and buildings, south along Monument Drive, south on Monument Trail/Long Path, east and then north along the Appalachian Trail, west and then north along the State Park property line and then west along the New Jersey-New York state line to the starting point. If a trail delineating the boundary of the natural area is relocated or closed, it will continue to be maintained so that the boundary is identifiable in the field.

Changing the natural area boundary as described conforms with the Natural Areas System Rules at N.J.A.C. 7:5A-1.12 by creating a boundary that better conforms with physical features identifiable in the field and would also further the management objective by adding habitat that may be suitable for rare species such as the timber rattlesnake (DeGraaf and Rudis 1987) and possibly the short-tailed shrew (FitzGerald 1991, DeGraaf and Rudis 1987). In accordance with N.J.A.C. 7:5A-1.12, revisions to the boundary of a natural area that result in a net change of not more than 25 percent of the total acreage of the natural area may be made, upon public notice, if the boundary change conforms with physical features identifiable in the field or the extent of State ownership and serves to protect the natural area or further its management objective. The revision will make the boundary more distinct, thus, more enforceable and will further the management objective by increasing protection of suitable habitat for State endangered and threatened species documented at High Point State Park. The net increase of 125 acres equates to a 10% net increase in size of the natural area.

2. 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, 1995. These signs will be replaced as needed. The ONLM will provide the administering agency with boundary signs 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. 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.

Public Use

1. Current uses of the natural area, which include picnicking in designated areas, hiking, nature interpretation, cross country skiing, snowshoeing, birdwatching and botanizing are 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 assess their effect on the natural features occurring in this area.

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

2. Picnic facilities may be maintained or expanded within the areas where these facilities currently exist, but clearing of undisturbed areas for such purpose is not permissible.

   Use of the picnic facilities does not have a negative impact on the natural area nor does it conflict with the management objective.

3. Horseback riding and bicycle riding are prohibited on natural area trails.

   Horseback riding is prohibited within the natural area by the Superintendent of High Point State Park due to incompatibility with other users. The Superintendent allows horseback riding and other non-passive recreation in the southern section of High Point State Park, south of Route 23, where there are fewer facilities and the density of users is less. The Superintendent has the authority to restrict such use in accordance with NJ State Park Rules and Regulations at N.J.A.C. 7:2-2.21. Bicycle riding is prohibited on natural area trails according to NJ State Park Service Rules and Regulations at N.J.A.C. 7:2-2.25(l).

4. Cross-country skiing may continue on natural area trails, however the following activities are prohibited in the natural area: mechanical grooming of trails, tracksetting on trails, removal of trees, creating snow and transporting natural or artificial snow onto the trails. Any modification of this policy must be presented for Natural Areas Council review and Commissioner approval.

   Although cross-country skiing is permitted in the natural area, actions to enhance this use will not be taken. It is believed that excessive use of these trails along with use of mechanized vehicles could negatively impact the natural area and its features.

5. Running sled dogs with sleds in season or sled dogs with wheeled sleds out of season on trails within the natural area will continue to be prohibited.

   This prohibition is included to eliminate possible conflict with other users on the trails and to prevent any additional damage to the trail system.

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 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 at N.J.A.C. 7:5A-1.10, and to ensure thorough review of all proposals.

Introduced Features

1. The Park Superintendent is responsible for trail maintenance, through Park staff, or others, of all trails. Maintenance includes marking trails using paint blazes, pruning bushes and trees necessary to clear the foot path and erosion-control work. No widening of existing trails is permitted. Trails are to be used during daylight hours. No camping or open campfires are allowed along the trails. Horseback riding or use of any wheeled vehicles shall at all times be prohibited.

   The use of these trails has no deleterious effect on the natural features within the natural area as long as there is no widening of the existing trails.

2. The administering agency may maintain existing scenic vistas around the High Point Monument and along the Monument Trail in the areas indicated in Figure 3. Precautions will be taken by the administering agency during clearing activity to avoid vehicular or other impacts to areas which support the three-toothed cinquefoil (*Potentilla tridentata*). Should the administering agency wish to create a new scenic vista, Natural Areas Council review and Commissioner approval of a proposal by the administering agency will be required.

   Scenic vistas are one of the main attractions to visitors of High Point State Park. Maintenance of existing scenic vistas provides visitors with an uninterrupted view of the surrounding landscape from the highest natural elevation in New Jersey. Continuation of this activity will not significantly impact the features of the management objective, including nearby colonies of the three-toothed cinquefoil, and may benefit timber rattlesnake.

3. Should creation of a new trail or enlargement of an existing trail be proposed in the area of High Point Monument, the administering agency will submit a plan for Natural Areas Council review and Commissioner approval.

   The State endangered three-toothed cinquefoil exists in several locations at the High Point Monument. This requirement is included to help ensure the preservation of the species and is in accordance with N.J.A.C. 7:5A-1.9(e)16iii(1), which states that creation of 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. It is possible that in the future trail access for the disabled may be required.

4. The Appalachian Trail (AT) Management Committee will forward to the ONLM any proposal to relocate, widen, or create a new side trail within the natural area for Natural Areas Council review and Commissioner approval.

   This requirement is included to ensure proper review of actions that could affect rare plant species as well as other natural features within the natural area.

5. According to a signed Memorandum of Understanding, the administering agency will forward proposals for management activities within the primary and/or

secondary management zone(s) of the AT to the AT Management Committee for review.

This requirement is included to ensure that all organizations represented by the AT Management Committee have input on management activities that affect the Appalachian Trail corridor and its users.

6. The proposed location of a new nature center at the gravel parking area on the east side of the paved access road immediately south of the gate is acceptable as long as no new clearing of the adjacent forest occurs and approval is received from the Historic Preservation Office.

   The Commissioner hereby approves of location of a new nature center at the location indicated 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.

7. The administering agency will forward any plans that include ground disturbance or any activity 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 based on the history of the area.

8. The construction of communication, transmission or any other type of tower is prohibited in the natural area.

   This prohibition is 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. The construction of any type of transmission tower will not contribute to the management objective.

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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:Dryden Kuser

Plan Adoption Date:

Name:

Date:

		Date Indicated in Plan	Proposed Accomp. Date	Date Accomp.
I.	**High Point State Park Superintendent**			
1.	No specific techniques are proposed to control the hemlock woolly adelgid. Should a control technique be developed, woolly adelgid control methods will be allowed upon Natural Areas Council review and Commissioner approval.	N/A	N/A	N/A
2.	The administering agency will remove the binocular stand, binocular base and wooden benches on the rocky outcrop near the High Point Monument by December 31, 1995.	12/31/95	_____	_____
3.	The boundary of the natural area is hereby revised as follows to include 169.7 acres in the southern section of the natural area and remove a total of 45.4 acres from the eastern and southern sections of the natural area. The resulting acreage of the Dryden Kuser Natural Area is 1,451 acres. See Figures 2 and 3 for guidance in determining the revised boundary: from the northwest corner of the natural area follow the State Park property line south and then northwest to Route 23, proceed south along Route 23 for approximately 1.5 miles, then east along the Steenykill Lake boat launch road	N/A	N/A	N/A

	approximately 1/5 mile to its terminus, continue east on the Steenykill Trail to the intersection with Monument Trail, south on the Monument Trail to the Nature Center driveway, east on Kuser Road, back on Monument Trail to the High Point Monument, around the monument and associated parking lot and buildings, south along Monument Drive, south on Monument Trail/Long Path, east and then north along the Appalachian Trail, west and then north along the State Park property line and then west along the New Jersey-New York state line to the starting point. If a trail delineating the boundary of the natural area is relocated or closed, it will continue to be maintained so that the boundary is identifiable in the field.			
4.	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, 1995. These signs will be replaced as needed. The ONLM will provide the administering agency with boundary signs as needed.	12/31/95	_____	_____
5.	Current uses of the natural area, which include picnicking in designated areas, hiking, nature interpretation, cross country skiing, snowshoeing, birdwatching and botanizing are 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 assess their effect on the natural features occurring in this area.	N/A	N/A	NA
6.	Picnic facilities may be maintained or expanded within the areas where these facilities currently exist, but clearing of undisturbed areas for such purpose is not permissible.	As needed	As needed	As needed
7.	Horseback riding and bicycle riding are prohibited on natural area trails.	Ongoing	Ongoing	Ongoing

8.	Cross-country skiing may continue on natural area trails, however the following activities are prohibited in the natural area: mechanical grooming of trails, tracksetting on trails, removal of trees, creating snow and transporting natural or artificial snow onto the trails. Any modification of this policy must be presented for Natural Areas Council review and Commissioner approval.	Ongoing	Ongoing	Ongoing
9.	Running sled dogs with sleds in season or sled dogs with wheeled sleds out of season on trails within the natural area will continue to be prohibited.	Ongoing	Ongoing	Ongoing
10.	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
11.	The Park Superintendent is responsible for trail maintenance, through Park staff, or others, of all trails. Maintenance includes marking trails using paint blazes, pruning bushes and trees necessary to clear the foot path and erosion-control work. No widening of existing trails is permitted. Trails are to be used during daylight hours. No camping or open campfires are allowed along the trails. Horseback riding or use of any wheeled vehicles shall at all times be prohibited.	As needed	As needed	As needed
12.	The administering agency may maintain existing scenic vistas around the High Point Monument and along the Monument Trail in the areas indicated in Figure 3. Precautions will be taken by the administering agency during clearing activity to avoid vehicular or other impacts to areas which support the three-toothed cinquefoil (*Potentilla tridentata*). Should the administering agency wish to create a new scenic vista, Natural Areas Council review and Commissioner approval of a proposal by the administering agency will be required.	As needed	As needed	As needed

13.	Should creation of a new trail or enlargement of an existing trail be proposed in the area of High Point Monument, the administering agency will submit a plan for Natural Areas Council review and Commissioner approval.	As needed	As needed	As needed
14.	According to a signed Memorandum of Understanding, the administering agency will forward proposals for management activities within the primary and/or secondary management zone(s) of the AT to the AT Management Committee for review.	As needed	As needed	As needed
15.	The proposed location of a new nature center at the gravel parking area on the east side of the paved access road immediately south of the gate is acceptable as long as no new clearing of the adjacent forest occurs and approval is received from the Historic Preservation Office.	N/A	N/A	N/A
16.	The administering agency will forward any plans that include ground disturbance or any activity that may disturb historical features of the natural area to the New Jersey Historic Preservation Office for review.	As needed	As needed	As needed
17.	The construction of communication, transmission or any other type of tower is prohibited in the natural area.	N/A	N/A	N/A
II.	**NJDEP Office of Natural Lands Management**			
1.	The Office of Natural Lands Management (ONLM), in cooperation with the Bureau of Forest Management and the administering agency, will gather baseline data on forest composition, distribution and age within the Atlantic white cedar swamp in order to assess the potential for forest regeneration without human intervention. If, as suspected from casual observation, the potential for cedar regeneration is found to be low, a strategy for cedar regeneration within the swamp will be developed and implemented. Techniques that may be used to preserve this forest community include	N/A	N/A	N/A

	deer management (exclosures, contraceptives, hunting, repellents) and silvicultural techniques such as hardwood control/removal.			
2.	The ONLM will survey/monitor the three-toothed cinquefoil population on a periodic basis and assess future management needs. Special attention will be paid to monitoring any impacts of succession, trampling and browsing by deer on this species. 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.	Ongoing	Ongoing	Ongoing
3.	The ONLM will, within the limits of available staff and funding, perform surveys for historically known plant species.	Ongoing	Ongoing	Ongoing
4.	The ONLM will, within the limits of available staff and funding, conduct Lepidoptera surveys with the assistance of qualified volunteers.	Ongoing	Ongoing	Ongoing
5.	The ONLM will provide the administering agency with a map indicating known and possible locations of all endangered and threatened species as well as the extent of their habitat, a written description of the species and, if possible, an illustration of the plant species by June 30, 1995. These materials will be updated by the ONLM should locations for any additional species be discovered.	6/30/95	_____	_____
III.	**NJ Division of Parks and Forestry**			
1.	The Division of Parks and Forestry may perform gypsy moth control activities in the natural area if the following three criteria are met: counts of at least 400 egg masses/acre are recorded; the previous year defoliation occurred during or immediately preceded a severe drought; and a significant amount of tree mortality (not defoliation) will be expected if control activities are not performed. If these criteria are met, the	As needed	As needed	As needed

	Division should submit a gypsy moth control plan, including a spraying program environmental impact statement (EIS), with data that substantiates the above criteria, to the ONLM. The EIS should contain methods to avoid impacts on lepidoptera, rare and endangered species and other non-target species. If spraying is conducted, the following spraying guidelines must be followed: one application of B.t. is permitted per year; spraying will be conducted from mid to late May; and the pitch pine-scrub oak, hemlock, and Atlantic white cedar communities will be considered no spray zones. Should a more environmentally sound method of gypsy moth control become available in the future, this new gypsy moth control method will be allowed upon Natural Areas Council review and Commissioner approval.			
2.	Should a timber rattlesnake den be found to exist in the natural area where canopy cover at the site exceeds 75%, State Forestry Services may perform selective cutting to increase the amount of sunlight reaching the area. The cutting should take place during winter while the snakes are in hibernation. However, selective cutting should not take place if a gypsy moth infestation is imminent. The size of the cut will depend on the size of the population and will be determined in cooperation with the Division of Fish, Game and Wildlife. Cutting should begin at or near the den and radiate in the direction of the least public use to minimize human-snake conflicts. Care should be taken to avoid damage to standing trees, and slash may be removed or left around the perimeter of the cut to create habitat for prey species and other wildlife. The ONLM and the Division of Fish, Game and Wildlife will provide assistance in determining the optimum size and location of the cutting.	As needed	As needed	As needed

IV. Appalachian Trail Management Committee

1.	The Appalachian Trail (AT) Management Committee will forward to the ONLM any proposal to relocate, widen, or create a new side trail within the natural area for Natural Areas Council review and Commissioner approval.	As needed	As needed	As needed

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PUBLIC NOTICE

ENVIRONMENTAL PROTECTION
DIVISION OF PARKS AND FORESTRY

27 N.J.R. 4014(a)

NATURAL AREAS SYSTEM

NOTICE OF AMENDMENT TO THE DRYDEN KUSER NATURAL AREA MANAGEMENT PLAN

Authority: N.J.S.A. 13:1B-3; 13:1B-15.4 et seq.; 13:1B-15.12a et seq.; and 13:1D-9; and N.J.A.C. 7:5A.

Take notice that in accordance with N.J.A.C. 7:5A-1.8, and the recommendation of the Natural Areas Council (Council), Robert C. Shinn, Jr., Commissioner, Department of Environmental Protection (Department), has amended the management plan for the Dryden Kuser Natural Area, adopted on January 17, 1995.

The Dryden Kuser Natural Area is a 1,451-acre tract located within High Point State Park in Wantage and Montague Townships, Sussex County. The tract is characterized primarily by Atlantic white cedar swamp, pitch pine-scrub oak forest, silicaceous rock outcrops, and chestnut-mixed oak forest communities and is administered by the Division of Parks and Forestry through High Point State Park (hereinafter referred to as the administering agency). The Dryden Kuser Natural Area was designated to the Natural Areas System in 1978. 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. These statutes give the Department the responsibility of acquiring, maintaining and preserving natural areas as examples of the State's natural heritage and as places of scientific study. Currently the System contains 42 areas totalling nearly 31,000 acres.

The rules governing the Natural Areas System provide guidelines for the preparation and amendment of management plans at N.J.A.C. 7:5A-1.8. The primary purposes of a natural area management plan are to describe the natural features of the area and prescribe specific long- and short-term management techniques and public uses to ensure preservation of the area in accordance with its management objective (see N.J.A.C. 7:5A-1.8). The management plan for the Dryden Kuser Natural Area was adopted through public notice effective January 17, 1995. At a meeting held on August 1, 1995, the Council considered a recommendation to amend the adopted management plan in order to allow limited mechanical grooming of cross-country ski trails in the natural area. The former prohibition on this activity was based on concern that mechanical trail grooming may be detrimental to barred owls, a state threatened

species, that are believed but not documented to use the natural area. Based on literature review, recent field survey and professional consultation by the staff of the Office of Natural Lands Management (ONLM), which is responsible for preparation and revision of management plans, it was determined that mechanical trail setting in the natural area prior to March 1 is not likely to disturb nesting barred owls. Amendment of the management plan to allow for limited trail setting is supported by the Superintendent of High Point State Park, who is responsible for administration of the natural area.

The Dryden Kuser Natural Area Management Plan has been revised to include the following. Cross-country skiing may continue on natural areas trails. Trail grooming for cross-country skiing using mechanized trail setting equipment may be performed along Cedar Swamp Road and the trails encircling the cedar swamp once following each snowfall prior to March 1 of each year. Widening of trails, tree removal, and creating snow and/or transporting natural or artificial snow onto the trails for this purpose is prohibited. The concessionaire responsible for trail grooming will provide an annual report to the ONLM summarizing the trail grooming activities during the preceding season.

This notice is published as a matter of public information.

ENVIRONMENTAL PROTECTION

STATE PARKS, FORESTS & HISTORIC SITES

Natural Areas System

Notice of Amendment to the Dryden Kuser Natural Area Management Plan

Authority: N.J.S.A. 13:1B-3; 13:1B-15.4 et seq.; 13:1B-15.12a et seq.; and 13:1D-9; and N.J.A.C. 7:5A.

Take notice, pursuant to the Natural Areas Act at N.J.S.A. 13:1B-15.4 et seq. and the Natural Areas System Act at 13:1B-15.12a et seq., and rules governing Natural Areas and the Natural Areas System at N.J.A.C. 7:5A-1.8(i), and the recommendation of the Natural Areas Council (Council), Shawn LaTourette, Commissioner, Department of Environmental Protection (Department), has amended the Dryden Kuser Natural Area Management Plan, adopted on January 17, 1995, and last amended on October 16, 1995.

The Dryden Kuser Natural Area encompasses approximately 1,451 acres in Montague and Wantage townships, Sussex County, and is located within and administered by High Point State Park. The Natural Areas System consists of lands designated as natural areas pursuant to the rules governing Natural Areas and the Natural Areas System at N.J.A.C. 7:5A. These lands serve as habitat for rare plant or animal species, or both, or ecological communities representative of the State or the nation.

The rules governing the Natural Areas System provide guidelines for the preparation and amendment of management plans at N.J.A.C. 7:5A-1.8. The primary purposes of a natural area management plan are to describe the natural features of the area and prescribe specific long- and short-term management techniques and public uses to ensure preservation of the area in

accordance with its management objective. The management objective of the Dryden Kuser Natural Area is preservation of an inland high elevation Atlantic white cedar swamp, chestnut oak forest and associated forest communities, and rare species habitat (N.J.A.C. 7:5A-1.13(a)14ii). The management plan for the Dryden Kuser Natural Area was adopted through public notice effective January 17, 1995. The Commissioner of the Department of Environmental Protection last amended the Dryden Kuser Natural Area Management Plan in October of 1995 to allow limited mechanical grooming of cross-country ski trails in the natural area. 27 N.J.R. 4014(a) (October 16, 1995).

At a meeting held on August 24, 2023, the Council voted unanimously in favor of a proposal by the NJ State Park Service to amend the Dryden Kuser Natural Area Management Plan to allow for artificial snowmaking within the existing footprint of the Cedar Swamp Picnic Area only (6.02 acres) from December to February annually as temperature and conditions permit and at times when there is not adequate natural snow. The Cedar Swamp Picnic Area is maintained by the NJ State Park Service and allows the public use of cross-country skiing in a manner that does not impair natural features. By allowing artificial snowmaking in the Cedar Swamp Picnic Area the NJ State Park Service provides an opportunity for enhanced public cross-country skiing use in this location, as well within other portions of the natural area that are used by skiers. There are no known occurrences of endangered or rare plant species within the Cedar Swamp Picnic Area.

The amount of water needed for the snowmaking activities at Dryden Kuser Natural Area is less than 100,000 gallons per day and therefore falls under the regulatory threshold of the Water Supply Management Act, N.J.S.A. 58:1A. However, as the facility has the capacity to divert more than the threshold, a water use registration is necessary. On December 19, 2019, a registration was issued by the Department providing for the diversion of up to 3.1 million gallons

per month at a maximum rate of 300 gallons per minute from Marcia Lake under Water Use Registration No. 11475W for the purposes of snowmaking. To date no water has been diverted and the registrant is in compliance with all conditions of the registration.

Amendment of the Dryden Kuser Natural Area Management Plan to allow for artificial snowmaking is supported by the Superintendent of High Point State Park, who is responsible for administration of the natural area.

The Dryden Kuser Natural Area Management Plan has been revised to include the following: artificial snowmaking within the existing footprint of the Cedar Swamp Picnic Area only (6.02 acres) from December to February annually as temperature and conditions permit and at times when there is not adequate natural snow.

This notice is published as a matter of public information.