

Bull's Island Natural Area

Management Plan

Adoption Date
May 4, 1992



New Jersey Department of Environmental Protection and Energy
Division of Parks and Forestry
Office of Natural Lands Management
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This management plan was prepared by Cynthia L. Coritz of the Office of Natural Lands Management and adopted by Commissioner Scott A. Weiner on May 4, 1992.

The author wishes to thank Paul Stern, Superintendent of the Delaware and Raritan Canal State Park, for his assistance and cooperation in formulating this management plan.

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Table of Contents

List of Figures	ii
Introduction	1
Description and Management Concerns	4
Geology and Soils	4
Topography and Surface Hydrology	4
Biotic Communities	4
Endangered Plants and Plant Species of Concern	6
Endangered and Threatened Animals	7
Human Use	7
Other Features/Issues of Interest	8
Management Techniques	9
Natural Areas System Rules	9
Designation Objective And Classification	9
Boundaries	9
Endangered and Threatened Species	10
Other Features/Issues of Interest	10
Literature Cited	11
Appendix A	13
Appendix B	19

List of Figures

1.	General Location of Bull's Island Natural Area	2
2.	Boundaries and Man-made Features	3
3.	Biotic Communities	5

Introduction

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

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

Bull's Island Natural Area encompasses a portion of the Delaware and Raritan Canal State Park and is located within Delaware Township, Hunterdon County. It lies within the Piedmont Lowlands physiographic province of New Jersey. The natural area is located approximately three miles north of Stockton off Route 29. The natural area is bounded on the west by the Delaware River and on the east by the Delaware and Raritan Canal. Figure 1 shows the general location of the natural area. The boundaries of the natural area are indicated in Figure 2.

The property that has come to be known as Bull's Island Natural Area was acquired in two steps. In 1937 the title for the land owned by the Pennsylvania Railroad was transferred to the State. With this property came Block 50 Lot 1 which now constitutes a major portion of the natural area. In 1970 land owned by Ernest and Nellie Fogelman, known as Block 48 Lot 2, was purchased by the State with money generated by the 1961 Green Acres Bond Act. A portion of Lot 2 is now natural area. Block 50 Lot 1 consists of approximately 16 acres, and the subsequent purchase of Block 48 Lot 2 increased the acreage of the natural area to approximately 20 acres. In 1974 the Delaware and Raritan Canal State Park was established, and in 1978 Bull's Island Natural Area was designated.

The designation objective for this natural area under the Administrative Code includes "preservation of a northern floodplain habitat, and rare species habitat". The Administrative Code also mandates the preparation of this management plan.

The Division of Parks and Forestry, through the Delaware and Raritan Canal 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 Bull's Island Natural Area. The Delaware and Raritan Canal State Park shall implement the management policies necessary to achieve the designation objective of this plan.

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

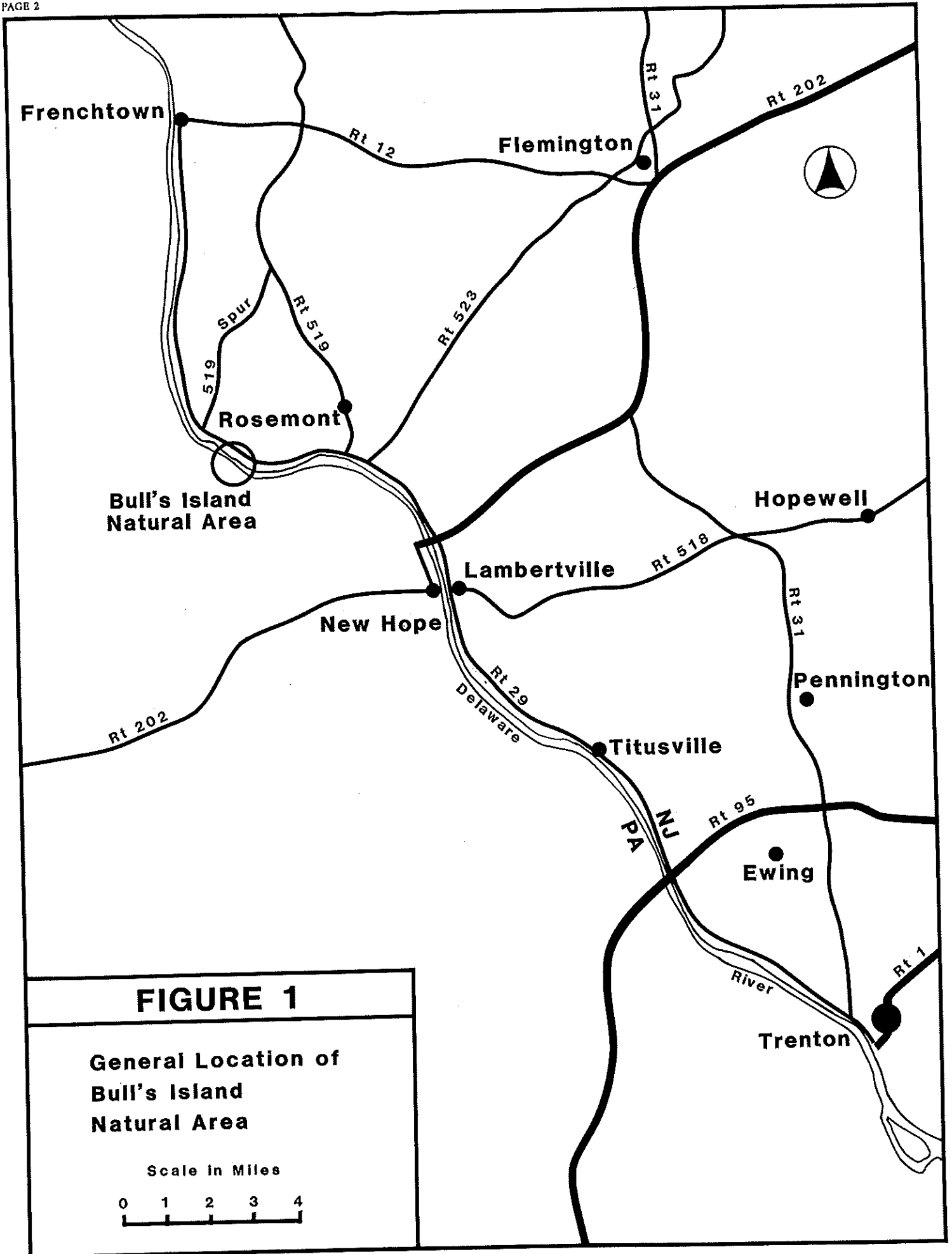
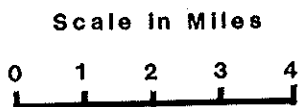
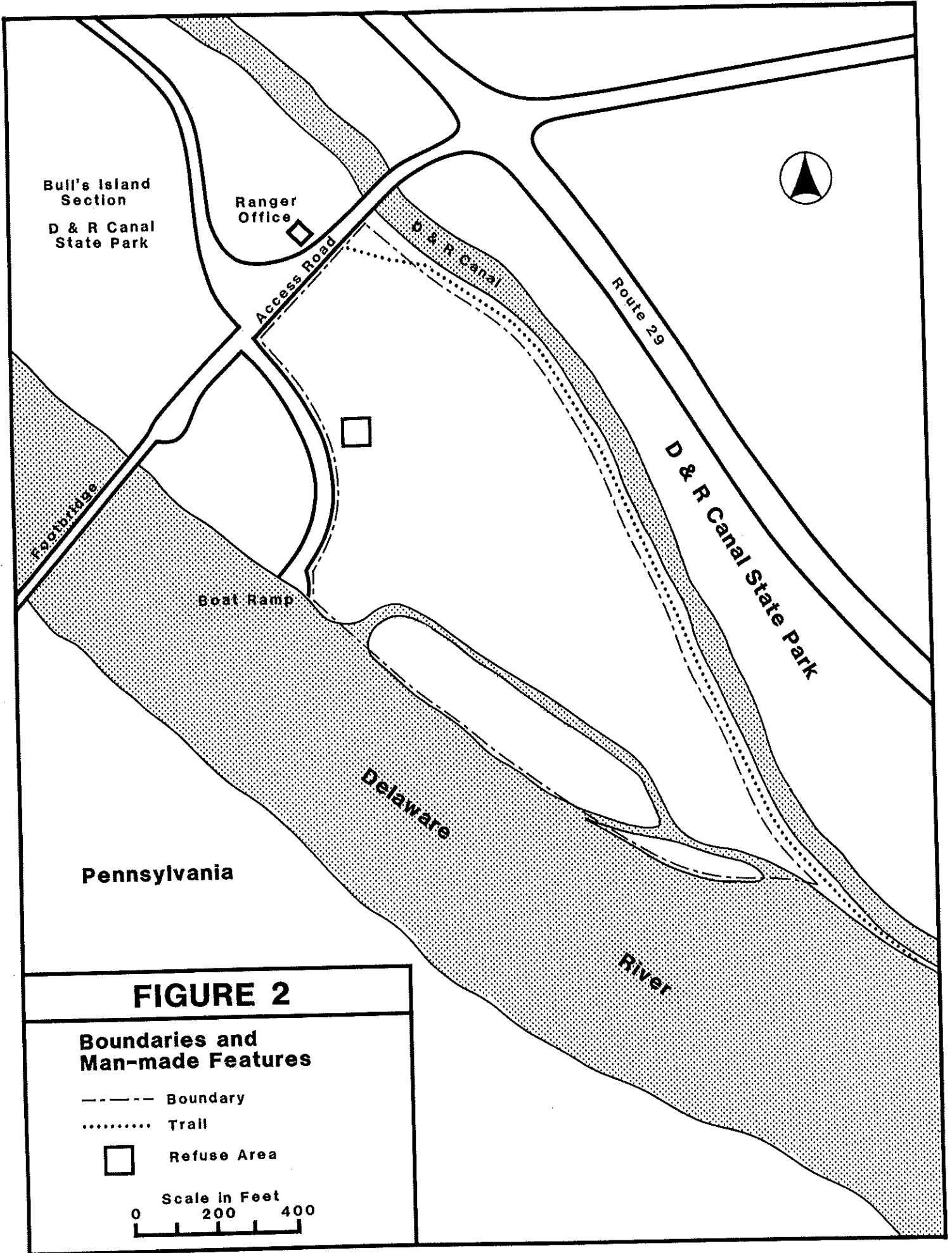


FIGURE 1

General Location of
Bull's Island
Natural Area





Description and Management Concerns

Geology and Soils

The Piedmont Lowlands area consists geologically of soft red shales, interbedded sandstones and siltstone, and resistant argillites and volcanic rocks. Specifically, the Hunterdon County Plateau, of which Bull's Island is a part, is underlain predominantly with resistant Lockatong argillites (Wolfe, 1977).

The predominant soil association is Rowland - Birdsboro - Raritan. The representative soil series is Pope fine sandy loam (U.S. Department of Agriculture, 1974).

Topography and Surface Hydrology

Bull's Island Natural Area lies within the Piedmont Lowlands physiographic province (Wolfe, 1977). The elevation ranges from 80 feet to 107 feet near the Park Office.

The natural area is part of the Delaware River Basin and is within the Lockatong Creek Watershed. Two bodies of water are associated with the natural area. The Delaware River borders the natural area to the west and the Delaware and Raritan Canal borders the natural area to the east. Water from the canal and the river often floods the natural area.

Biotic Communities

The community classifications and Figure 3 were derived from aerial photo analysis conducted by Brian A. Sayre, Office of Environmental Analysis, in June of 1987, information obtained from Breden (1989), and field examination by the author on April 5 and 17, 1991. Figure 3 indicates only general locations and approximate boundaries for the various community types. Representative animal species for the individual communities were derived from the DEPE's Natural Heritage Database based on the suitability of the habitat to support these species.

Floodplain Forest

This lowland community comprises a large portion of the natural area. The canopy is dominated by sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*) and tulip poplar (*Liriodendron tulipifera*). Trees in the understory include box-elder (*Acer negundo*), American elm (*Ulmus americana*) and black walnut (*Juglans nigra*). Spicebush (*Lindera benzoin*) dominates the shrub layer while stinging nettle (*Urtica dioica*), spotted touch-me-not (*Impatiens capensis*), poison ivy (*Rhus radicans*), spring beauty (*Claytonia virginica*) and Dutchman's breeches (*Dicentra cucullaria*) are found in the herbaceous layer. Scouring rush (*Equisetum hiemale*) forms a dense colony along on the western portion of the natural area bordering the Delaware River. Numerous ferns also colonize this embankment.

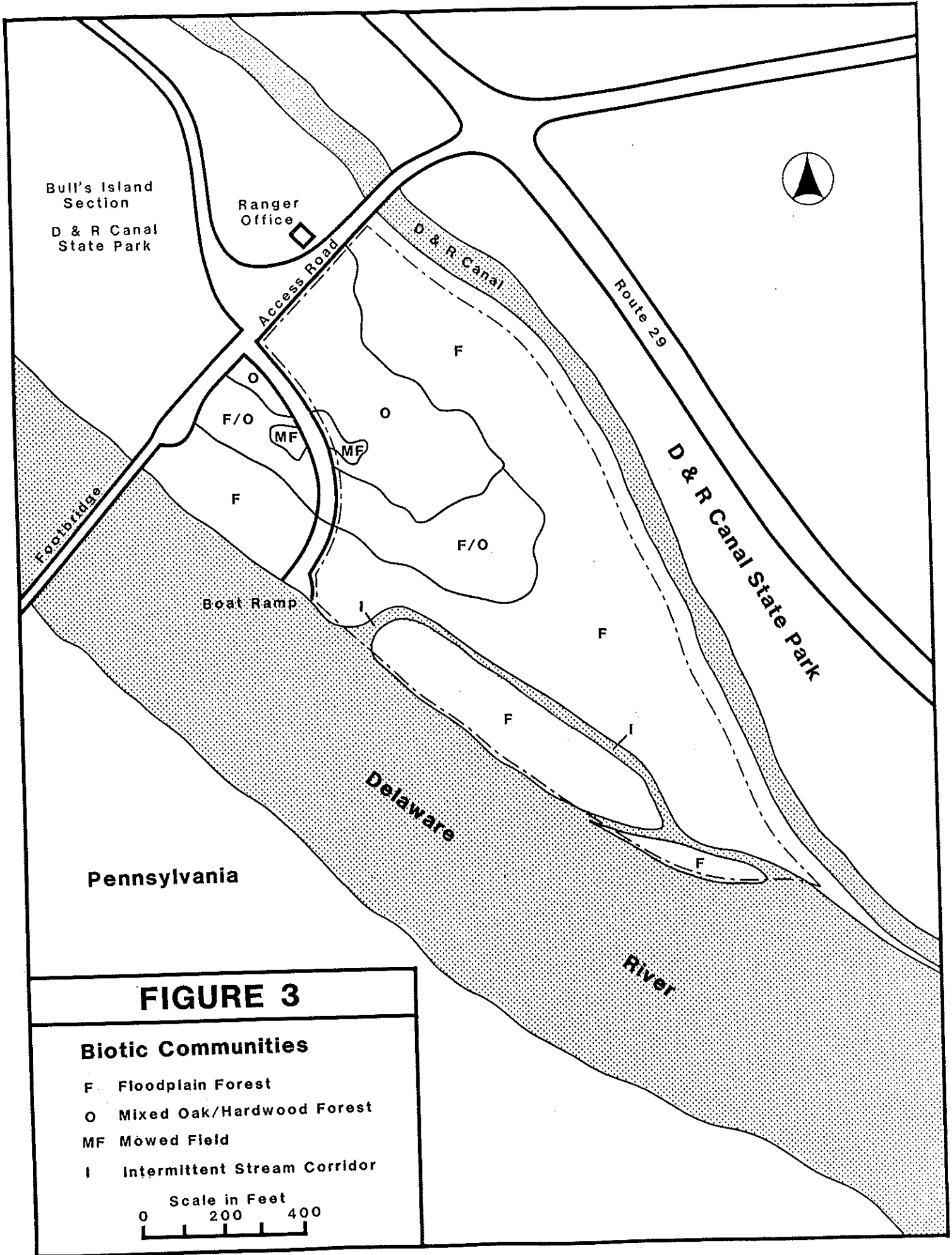


FIGURE 3

Biotic Communities

- F Floodplain Forest
- O Mixed Oak/Hardwood Forest
- MF Mowed Field
- I Intermittent Stream Corridor



The floodplain forest contains suitable habitat for a variety of mammals including star-nosed mole (*Condylura cristata*), white-footed mouse (*Peromyscus leucopus*), Virginia opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and white-tailed deer (*Odocoileus virginianus*). Possible amphibians and reptiles include spotted salamander (*Ambystoma maculatum*), longtail salamander (*Eurycea longicauda*), bog turtle (*Clemmys muhlenbergii*), five-lined skink (*Eumeces fasciatus*), and map turtle (*Graptemys geographica*). Avian species inhabiting the floodplain forest may include red-headed woodpecker (*Melanerpes erythrocephalus*), prothonotary warbler (*Protonotaria citrea*), Cooper's hawk (*Accipiter cooperii*) and bald eagle (*Haliaeetus leucocephalus*).

Mixed Oak-Hardwood Forest

This community occurs on the more upland portions of the natural area. Many of the same canopy trees present in the floodplain forest occur in the canopy of the mixed oak-hardwood forest. In addition, species occur which are more often associated with upland woods. These species include black oak (*Quercus velutina*) and red oak (*Quercus rubra*). The shrub layer is dominated by spicebush and black locust (*Robinia pseudoacacia*). Goldenrod (*Solidago sp.*), mayapple (*Podophyllum peltatum*) and many of the species found in the floodplain forest may be found in the herbaceous layer.

Mammals inhabiting the mixed oak-hardwood forest may include red bat (*Lasiurus borealis*), small-footed myotis (*Myotis leibii*) and Eastern pipistrelle (*Pipistrellus subflavus*). This forest can also support a variety of amphibians and reptiles including marbled salamander (*Ambystoma opacum*), red salamander (*Pseudotriton ruber*) and wood turtle (*Clemmys insculpta*). Possible bird species include long-eared owl (*Asio otus*), red-bellied woodpecker (*Melanerpes carolinus*), barred owl (*Strix varia*) and red-shouldered hawk (*Buteo lineatus*).

Mowed Field

Approximately one-half acre of the natural area, along the access road to the boat ramp, is maintained as mowed field. This open area is dominated by various grasses.

Endangered Plants and Plant Species of Concern

The Natural Heritage Database has verifiable documentation for the following species in the immediate vicinity (1/4 mile) of the natural area. These species are not currently known to exist within the natural area, but suitable habitat exists to support them. Endangered status refers to those species listed on New Jersey's official Endangered Plant Species List, adopted in June 1990. Plant Species of Concern includes species tracked by the Department's Natural Heritage Database, although not officially listed as endangered. Date that the species was last observed is also indicated.

broad-leaved waterleaf (*Hydrophyllum canadense*) (1982) - Endangered
low sand cherry (*Prunus depressa*) (4/26/1981) - Plant Species of Concern

The Natural Heritage Database also includes historic records for the following species. These records state the location as Bull's Island, but it is not known whether the plant was found within the natural area. Date that the species was last observed and status are indicated.

few-fruited sedge (*Carex oligocarpa*) (6/10/1902) - Endangered
Carolina whitlow-grass (*Draba reptans*) (4/21/1917) - Endangered
Virginia false gromwell (*Onosmodium virginianum*) (8/27/1906) - Endangered
narrow-leaved vervain (*Verbena simplex*) (7/2/1897) - Endangered

Endangered and Threatened Animals

The Natural Heritage Database has verifiable documentation for the following endangered and threatened species in the immediate vicinity (1/4 mile) of the natural area. Endangered and threatened wildlife includes those species officially listed by the Department as of its latest list revision in July 1987. Date that the species was last observed is also indicated.

cliff swallow (*Hirundo pyrrhonota*) (7/27/1983) - Endangered
wood turtle (*Clemmys insculpta*) (4/30/1985) - Threatened
longtail salamander (*Eurycea longicauda*) (7/8/1982) - Threatened

Although neither endangered nor threatened, the albilora race of the yellow-throated warbler (*Dendroica dominica*) frequents the island. Bull's Island supports the only persistent, viable population of this race of yellow-throated warbler in New Jersey (Kane, 1990). Bull's Island is also one of the few nesting sites in New Jersey for the Northern parula warbler (*Parula americana*) and the Cerulean warbler (*Dendroica cerulean*) (Janice Holms, pers. comm.).

In a letter to Janice Holms regarding the Lumberville wing dam repairs, Rich Kane, Director of Conservation for the New Jersey Audubon Society, indicates that Bull's Island is critical to migratory birds because it lies on an important migratory bird corridor, the Delaware River. Mr. Kane also points out that every effort must be made to find an alternative way to getting at the dam from Bull's Island. If access must be through Bull's Island the project should not be allowed to permanently scar or alter ecologically or aesthetically the campground and migratory bird habitat on the island (Kane, pers. comm.).

Human Use

Current public recreational uses include walking, fishing and bird watching. Human use is limited because of the small size and lack of full access to the area. A trail adjacent to the natural area lying on land leased to the New Jersey Water Supply Authority provides the main access to the southern portion of the island. A large portion of the natural area is floodplain and creating access through it would disturb the area and be very costly.

At points along the trail, an abundance of stinging nettle (*Urtica dioica*) and poison ivy (*Rhus radicans*) may cause the trail to be impassible and presents a minor hazard to visitors.

Other Features/Issues of Interest

In the northwest corner of the natural area adjacent to the boat launch access road is a gated area of approximately one acre that contains abundant debris resulting from years of park maintenance (Fig. 2). The refuse includes metal (guard rail, pipes, appliances), several dozen tires, furniture, assorted equipment, concrete and asphalt slabs, cinder blocks and bricks, wood in the form of pallets, logs, stacked cordwood, and piles of chips and other composting vegetation. The storage of cordwood and the compost appear to be active uses. In addition, a large pile of cut up logs and piles of gravel are located adjacent to the boat launch access road outside of the gated area. These materials are clearly visible not only from the boat launch access road but also from the trail along the canal.

The stabilized bank along the canal, which occurs just outside the eastern boundary of the natural area, provides access to the southern portion of the island (Fig. 2). The footpath appears to be in good condition, although some disturbance is noted below.

A 99-year lease, initiated in 1986, exists on that portion of Bull's Island which lies adjacent to the Delaware and Raritan Canal. This corridor is leased by the Department of Environmental Protection and Energy to the New Jersey Water Supply Authority in order to allow the Authority to responsibly maintain and operate this water body. The lands encompassed by the lease include the trail along the canal and, depending on slope conditions, up to 25 feet from the water's edge of the canal. This corridor is referred to in the lease as the Transmission Complex. Because land in the Natural Areas System cannot be leased to a public or private corporation, this corridor is not part of Bull's Island Natural Area; however, it still functions as the main access to the southern portion of the island and is used by visitors to the natural area. Maintenance and operation by the Authority includes removal of debris from the Canal and mowing of the trail path. A yearly tree removal plan must also be prepared by the Authority and the DEPE. Any damage to the leased lands or the adjacent D & R Canal State Park caused by the Water Authority or the DEPE must be remedied by the agency responsible for causing the damage.

Field inspection of the trail on two occasions revealed disturbance to the trail as a result of maintenance activities, presumably the removal of trees and branches overhanging the canal. The disturbance included bare soil from tractor work and piled logs. Although the physically disturbed area is outside of the natural area boundary, it presents a visual intrusion to visitors, and the increased erosion potential could impact both the canal and natural area.

Although outside the boundaries of the natural area, the Lumberville wing dam is located in the Delaware River approximately one half mile upstream. In March of 1990, a Draft Environmental Assessment was prepared by EBASCO environmental consultants for the New Jersey Water Supply Authority concerning rehabilitation of the dam. This project would entail using the access road to Bull's Island from Route 29 to get equipment to a

staging area in the campground at the north end of the island, and may involve the cutting of trees for the staging area. Currently the project is on hold and details of various aspects of the project are being discussed.

The section of Bull's Island north of the natural area is inspected at least once per year to assess gypsy moth suppression needs. Within the last 12 years the area has been sprayed twice for gypsy moth control due to the extensive use and high visibility of the area. The natural area is in little danger of gypsy moth defoliation because the forest composition is not highly susceptible to gypsy moth infestation (George Koeck, pers. comm.). According to Richard Kane (pers. comm.) aerial spraying of Bull's Island could impact use of this area by neotropical birds, since they feed on leaf-eating caterpillars.

Management Techniques

Natural Areas System Rules

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

Designation Objective And Classification

The designation objective for Bull's Island Natural Area is "preservation of a northern floodplain habitat and rare species habitat."

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

Throughout this section, administering agency refers to the Division of Parks and Forestry, through Delaware and Raritan Canal State Park.

Boundaries

1. The administering agency will post State Natural Area signs on signposts along

the roads at the northern boundary of the natural area and along the Canal trail at a maximum density of at least ten signs per mile by June 1, 1992.

2. The Office of Natural Lands Management (ONLM) will provide the administering agency with State Natural Area boundary signs as needed.

Endangered and Threatened Species

1. ONLM will provide the administering agency with a map indicating locations for endangered and threatened species, and plant species of concern by June 1, 1992.
2. If locations for species are not specifically known or the species are only historically known, ONLM should attempt to locate these species through field survey. The survey will be conducted between June 1, 1992 and December 31, 1993.
3. Should extant populations of endangered and threatened species or plant species of concern be found through field survey, their specific locations will be mapped by ONLM and provided to the administering agency by December 31, 1993. The administering agency shall regularly consult the species map to avoid any disturbance to populations.

Other Features/Issues of Interest

1. The administering agency will remove all surface refuse within and outside of the gated area in the northwestern section of the natural area by June 1, 1992. Use of this area for permanent or temporary storage or disposal of such materials shall be discontinued upon adoption of this plan.
2. The administering agency will discontinue mowing of the small field to allow it to revert to its natural state.
3. In accordance with the existing lease agreement, the New Jersey Water Supply Authority will notify the administering agency in advance of any maintenance activities to be conducted within the Transmission Complex adjacent to the natural area.
4. The administering agency will inspect the trail after each maintenance event by the Authority to determine if any damage has been caused to the Transmission Complex or natural area.
5. The administering agency will notify the New Jersey Water Supply Authority of any damage caused by their maintenance activities and, as specified in the lease agreement, with the approval of the D & R Canal Commission, repair and restore the damaged area in a timely manner. The administering agency shall also notify the ONLM of any damage to the Transmission Complex or natural area caused by the Authority.

6. As a safeguard against potential impacts to the natural area and its biota from off-site construction, the ONLM will obtain and comment on any proposed plans to rehabilitate the Lumberville wing dam.
7. The administering agency will receive all applications to conduct research or collect specimens, forward a copy to the Office of Natural Lands Management (ONLM), and provide a response within 30 days of application submittal. The Administering Agency shall coordinate response with ONLM.

Literature Cited

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Appendix A

INTERIM MANAGEMENT PRACTICES FOR NATURAL AREAS

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

7:5A-1.9 INTERIM MANAGEMENT PRACTICES

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

maximum density of ten signs per mile; entrance points shall be posted to indicate to users that they are entering a natural area; boundary signs shall be of a standard size and format as approved by the Commissioner and provided by the Division;

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

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

access and use as necessary to protect the natural area; the following are permissible public uses of natural areas:

- i. Hunting, trapping, and fishing are permitted in accordance with N.J.A.C. 7:25-5 and 7:25-6; except for the stocking of fish and game, habitats may not be manipulated for the purpose of enhancing hunting, trapping, or fishing;
 - ii. Occasional camping along trails, boating, and swimming may be permitted in specified locations of natural areas in accordance with N.J.A.C. 7:2-2, 7:2-5, 7:2-7, 7:2-8, and 7:25-2, and are further limited as follows:
 - (1) No permanent structures may be erected;
 - (2) No motorized methods of boating or camping are permitted;
 - (3) Trailside shelters of the type called lean-tos are permitted, but there may not be two such shelters within three miles of each other; and
 - iii. Existing trails may be maintained, but not enlarged in any manner, by the administering agency to allow public use and prevent erosion, trampling of vegetation beyond the trails, and other deterioration as follows:
 - (1) New trails or enlargement of existing trails for interpretive purposes may be initiated subsequent to review of a plan by the Council and approval of that plan by the Commissioner;
 - (2) Rare plants may not be removed for the purpose of maintaining existing or constructing new trails; and
 - (3) To the extent possible, natural materials shall be used on and along trails; and
 - iv. All pets shall be kept caged or leashed and under immediate control of the owner except that dogs used while legally hunting shall be exempt from the leashing requirement.
- (f) The following interim management practices, unless superseded by an adopted management plan, apply to the appropriate specified natural area classifications:
1. Location markers identifying interpretation points of interest may be installed except within ecological reserves;
 2. Trail blazes may be used within any natural area;
 3. Existing vehicular access lanes may not be enlarged in any manner within an ecological reserve;

4. New vehicular access lanes may be constructed only within buffer areas and upon approval by the Commissioner;
5. The alteration of natural processes or features for the purpose of enhancing public use of the natural area may be conducted by the administering agency only within buffer areas; and
6. The following management practices shall not be permitted within ecological reserves:
 - i. New, existing, or temporary firebreaks;
 - ii. Construction of new trails;
 - iii. Alteration or restoration of water levels;
 - iv. Prescribed burning;
 - v. Erosion control measures;
 - vi. Gypsy moth control activities; and
 - vii. Manipulation of vegetation and wildlife habitats.

Appendix B

NATURAL AREAS SYSTEM MANAGEMENT PLAN TASKS AND RESPONSIBILITIES

Natural Area: BULL'S ISLAND

Plan Adoption Date: May 4, 1992

Name:

Date:

	<u>Date Indicated in Plan</u>	<u>Proposed Accomp. Date</u>	<u>Date Accomp.</u>
I. Delaware and Raritan Canal SP Superintendent			
1. The administering agency will post State Natural Area signs on signposts along the roads at the northern boundary of the natural area and along the Canal trail at a maximum density of at least ten signs per mile by June 1, 1992.	6/1/92	_____	_____
2. The administering agency will remove all surface refuse within and outside the gated area by June 1, 1992. Use of this area for permanent or temporary storage of such materials shall be discontinued upon adoption of this management plan.	6/1/92	_____	_____
3. The administering agency will regularly consult the species map to avoid any disturbance to populations of endangered and threatened species or plant species of concern.	Ongoing	Ongoing	Ongoing
4. The administering agency will inspect the trail after each maintenance event by the Water Supply Authority to determine if any damage has been caused to the Transmission Complex or natural area.	As needed	As needed	As needed

- | | | | | |
|----|---|-----------|-----------|-----------|
| 5. | The administering agency will notify the New Jersey Water Supply Authority of any damage caused by their maintenance activities and, as specified in the lease agreement, with the approval of the D & R Canal Commission, repair and restore the damaged area in a timely manner. The administering agency will also notify the Office of Natural Lands Management (ONLM) of any damage to the Transmission Complex or natural area caused by the Authority. | As needed | As needed | As needed |
| 6. | The administering agency will discontinue mowing of the small field to allow it to revert to its natural state. | Ongoing | Ongoing | Ongoing |
| 7. | The administering agency will receive all applications to conduct research or collect specimens, forward a copy to the ONLM, and provide a response within 30 days of application submittal. The administering agency will coordinate response with ONLM. | As needed | As needed | As Needed |

II. NJ DEPE Office of Natural Lands Management

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|----|---|-----------|-----------|-----------|
| 1. | ONLM will provide the administering agency with State Natural Area boundary signs as needed. | As needed | As needed | As needed |
| 2. | ONLM will provide the administering agency with a map indicating locations for endangered and threatened species and plant species of concern by June 1, 1992. | 6/1/92 | _____ | _____ |
| 3. | ONLM will attempt to locate through field survey the specific locations for endangered and threatened species or plant species of concern whose locations are non-specific or only historically known. The survey will be conducted between June 1, 1992 and December 31, 1993. Mapped locations for all species found will be provided to the administering agency by December 31, 1993. | 12/31/93 | _____ | _____ |
| 4. | ONLM will obtain and comment on any proposed plans to rehabilitate the Lumberville wing dam as a safeguard against offsite construction impacts. | As needed | As needed | As needed |

III. NJ Water Supply Authority

1. The NJ Water Supply Authority will notify the administering agency in advance of any maintenance activities to be conducted within the Transmission Complex adjacent to the natural area. As needed As needed As needed