

**Planning Level Survey Report
for Fauna, Flora, Vegetative Communities,
and Threatened and Endangered Species
Fort Monmouth, New Jersey**



Prepared for

Fort Monmouth, New Jersey

by

**U.S. Army Corps of Engineers
Mobile District**

with Technical Assistance from

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Executive Summary

Introduction

Tetra Tech, Inc., of Fairfax, Virginia, was contracted by the U.S. Army Corps of Engineers (USACE), Mobile District, to conduct planning level surveys (PLSs) for flora, fauna, vegetative communities, and threatened and endangered species (TES) at Fort Monmouth, New Jersey. The surveys were requested to develop information needed by the installation to consider the protection of natural resources in all activities related to the conduct of the military mission. The Under Secretary of Defense has directed that ecosystem management be the tool that military installations use to achieve the goal of effective natural resources management. The USACE, Mobile District therefore undertook the surveys to provide information that will enable installation natural resources managers to better plan for the implementation of a natural resources management plan based on ecosystem management principles.

The PLSs were required to meet the following specific objectives:

- Assist Fort Monmouth in:
 - Meeting military mission requirements.
 - Complying with the requirements of Army Regulation 200-3, Natural Resources—Land, Forest and Wildlife Management
 - Meeting natural resources management goals.
 - Meeting legal and policy requirements consistent with current national natural resources management philosophies, including compliance with the Department of Defense ecosystem management policy.
- Provide the information on vegetative communities, flora, and fauna that Fort Monmouth needs to consider in all activities related to the conduct of the installation's military mission to ensure protection of identified natural resources.
- Provide the information on TES that Fort Monmouth needs to consider in all activities related to the conduct of the installation's military mission to ensure protection of identified federally listed TES and habitats used by such species.
- Provide the baseline data required to prepare subsequent Endangered Species Management Plans for inclusion to the Integrated Natural Resources Management Plan, if warranted.

The vegetative community and flora PLSs were limited to the forested portions of the Charles Wood Subpost that had not been inventoried during the wetlands delineation, i.e., those portions which lie west of Hope Road (approximately 50 acres or less).

The fauna PLS included the fish, reptiles, and amphibians of the brooks on the installation (i.e., Mill, Wampum, and Husky brooks), Husky Brook Lake, and the ponds on the golf course, as well as the fauna of the upland forested areas that were surveyed for flora and vegetative communities.

The TES PLSs were limited to two species, swamp pink (*Helonias bullata*) and northern bog turtle (*Clemmys muhlenbergi*). The swamp pink survey was conducted on only the Main Post, as a previous survey had been conducted on the Charles Wood Subpost. All potential habitats for the species on the Main Post were investigated. The bog turtle survey was conducted on both the Charles Wood Subpost and the Main Post, and was limited to determining the presence or absence of suitable habitat for the species.

Methods

Fauna Survey

The fauna survey involved conducting field surveys from April 4, 2000, to September 4, 2000. The salinity of water bodies was determined using a refractometer. In saline waters, aquatic species were collected in killi traps and other traps. Stream pots were used where physical conditions (riprap stream banks) required their use. A seine net measuring 20 feet by 6 feet (3/8-inch nylon mesh) was used where possible, including in Husky Brook, Husky Brook Lake, Wampum Brook, and the ponds on the golf course. The investigator had previously conducted fish sampling in Wampum Brook using electroshocking, and that data supplemented the data collected during the fauna survey. In addition, persons encountered during the survey were queried regarding animals they had seen or caught.

Forested areas on the Charles Wood Subpost were examined using existing trails and openings in the forest. Ecotones, or interfaces between wooded and open areas, were thoroughly examined on foot because of the extensive habitat they provide for a variety of species.

Flora and Vegetative Community Surveys

The flora and vegetative community surveys for this PLS involved investigating the wooded areas on the Charles Wood Subpost from late February to March 2000. The whole area investigated was limited to that bounded by Pearl Harbor Avenue, the Conrail tracks, Laboratory Road, and Hope Road. A planimeter was used to determine the total acreage of the area to be surveyed. For sampling purposes, the area was subdivided into three areas. Area 1, between Building 2704 and Building 2705, was the westernmost. Area 2, between Building 2704 and the road from Building T-2535 and Building 2504, was the central area. Area 3, the easternmost, included the remaining area to Hope Road. Because of the size of Area 3, it was subdivided into six subposts for sampling purposes.

Before the field studies, the investigator studied maps of the area to determine soil types and the locations of wetlands, roads, buildings, and other features. Soil survey maps, wetland maps, aerial photographs, U.S. Geological Survey quadrangle maps, survey plans, and photographs of the area to be surveyed were reviewed.

The investigator conducted field studies by setting up and walking transects through the wooded areas. Flora encountered were recorded, photographs were taken, specimens were collected for later identification as necessary, and information on soils was collected. Where wetland areas were encountered, only dominant vegetation was investigated and recorded. Field data were tape recorded.

Threatened and Endangered Species Surveys

Survey for Swamp Pink. The investigator reviewed maps of the installation to determine soil types and the locations of wetlands. The U.S. Fish and Wildlife Service (USFWS) was contacted for guidance on conducting surveys for swamp pink. USFWS provided Tetra Tech, Inc. with published guidelines for conducting surveys for the species. A wetland delineation report for the installation was also reviewed to determine potential habitat for the species. Wetland sites were investigated thoroughly on February 26, 2000, to determine whether habitat suitable for swamp pink was present. The flora of the sites investigated was determined and recorded. Some specimens were collected for later identification. The investigator tape recorded field data and took photographs of the sites.

Survey for Northern Bog Turtle Habitat. A biologist and crew performed the bog turtle habitat survey between August 2000 and November 2000. Literature on bog turtles was examined to determine habitat

requirements. USFWS was contacted for guidance on conducting bog turtle surveys. USFWS provided Tetra Tech, Inc. with its guidelines for conducting surveys for northern bog turtles and their habitats. All water bodies on both the Main Post and Charles Wood Subpost were examined for salinity, and all waters with a salinity above 2 parts per thousand were eliminated from further consideration. The biologist examined nine potential habitat sites on the Main Post, and 12 potential habitat sites were examined on the Charles Wood Subpost. All sites were photographed, and details of the habitat, including soil type, vegetation, and hydrology, were recorded. Where any doubt existed, several bog turtle experts were consulted for their expert opinions on the findings.

Summary of Findings

Mammals observed on the Main Post included eastern cottontail rabbit (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), and muskrat (*Ondatra zibethica*) (active den observed). Mammals observed on the Charles Wood Subpost included eastern gray squirrel (*Sciurus carolinensis*) (sign observed), white-tailed deer (*Odocoileus virginianus*) (sign observed), woodchuck, and muskrat.

Birds observed on the Main Post included American crow (*Corvus brachyrhynchos*), little blue heron (*Florida caerulea*), great egret (*Casmerodius albus*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), song sparrow (*Melospiza melodia*), Canada goose (*Branta canadensis*), herring gull (*Larus argentatus*), American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), mourning dove (*Zenaidura macroura*), and American goldfinch (*Carduelis tristis*). Open areas surrounding and east of Husky Brook Lake often had high concentrations of birds, including robin, starling, brown-headed cowbird, crow, common grackle, and song sparrow. No owls were heard. Birds observed on the Charles Wood Subpost included mourning dove, robin, crow, and common nighthawk (*Chordeiles minor*) (feathers observed). No owls were heard, nor were any pellets observed.

Reptiles observed on the Main Post along Lafetra Branch included diamondback terrapin (*Malaclemmys terrapin*), snapping turtle (*Chelydra serpentina*), and painted turtle (*Chrysemys picta*). Reptiles observed on the Charles Wood Subpost included snapping turtle. Tadpoles (*Rana* sp.) were collected on the Charles Wood Subpost.

Fish collected on the Main Post included banded killifish (*Fundulus diaphanus*), killifish (*Fundulus heteroclitus*), shortnose dace (*Rhinichthys atratulus*), pumpkinseed sunfish (*Lepomis gibbosus*), young-of-the-year largemouth bass (*Micropterus salmoides*), largemouth bass, silverside (*Menidia menidia*), American eel (*Anguilla rostrata*), bluegill (*Lepomis macrochirus*), and bluefish (*Pomatomus saltatrix*). Carp (*Cyprinus carpio*) and brown bullhead (*Ictalurus nebulosus*) (catfish) had been reported to be present but were not collected. Fish collected on the Charles Wood Subpost included pumpkinseed sunfish, bluegill, largemouth bass, and mosquito fish (*Gambusia affinis*). Previous sampling in Wampum Brook using electroshocking had produced brown bullhead, carp, pumpkinseed sunfish, and largemouth bass.

Aquatic invertebrates collected on the Main Post included mud crabs (*Neopanope* sp.), blue claw crabs (*Callinectes sapidus*), and sand shrimp (*Crangon septemspinosa*). No aquatic invertebrates were collected on the Charles Wood Subpost.

The dominant vegetation of the survey area on the Charles Wood Subpost was found to be a Mesic Coastal Plain Mixed Oak Forest community, which is characteristic of the inner Coastal Plain physiographic province of New Jersey. A Sweetgum (*Liquidambar styraciflua*)/Red Maple (*Acer rubrum*) Forest community approximately 3 acres in size was found in one area off Laboratory Road.

The vegetation of the survey area on the Charles Wood Subpost was dominated by oaks (*Quercus* sp.), American holly (*Ilex opaca*), black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*). Dominant shrubs included coastal sweet pepperbush (*Clethra alnifolia*), southern arrowwood (*Viburnum dentatum*), highbush blueberry (*Vaccinium corymbosum*), and mountain laurel (*Kalmia latifolia*). The Sweetgum/Red Maple forest contained these two dominant species, as well as northern white oak (*Quercus alba*), tree-of-heaven (*Ailanthus altissima*), black tupelo (*Nyssa sylvatica*), southern arrowwood, and northern spicebush (*Lindera benzoin*). The wetland area in Areas 1 was dominated by sweetgum, red maple, northern spicebush, skunk cabbage (*Symplocarpus foetidus*), and cinnamon fern (*Osmunda cinnamomea*), and that in Area 3 was dominated by sweetgum and red maple.

No specimens of swamp pink were observed. A single area on the Main Post adjacent to Husky Brook Lake was found to be suitable for swamp pink, though the habitat would be considered poor.

No northern bog turtles were observed during the survey. Two sites on the Main Post were ranked as providing poor/marginal habitat for the northern bog turtle. One site on the Charles Wood Subpost was ranked as good/excellent bog turtle habitat, one site was ranked as fair habitat, and four sites were ranked as poor/marginal habitat.

1.0 Introduction

Tetra Tech, Inc., of Fairfax, Virginia, was contracted by the U.S. Army Corps of Engineers, Mobile District, to conduct planning level surveys (PLSs) for flora, fauna, vegetative communities, and threatened and endangered species (TES) at Fort Monmouth, New Jersey. The surveys were requested to develop information needed by the installation to consider the protection of natural resources in all activities related to the conduct of the military mission. The Under Secretary of Defense has directed that ecosystem management be the tool that military installations use to achieve the goal of effective natural resources management. The USACE, Mobile District therefore undertook the surveys to provide information that will enable installation natural resources managers to better plan for the implementation of a natural resources management plan based on ecosystem management principles.

Previously conducted studies on natural resources at Fort Monmouth included a 1998 wetland delineation study (Versar, 1998) on both the Main Post and Charles Wood Subpost and a 1996 report on the TES of the Evans Area of the installation (Earth Tech, 1996). The wetland delineation report contains information on mammals and birds seen during the delineation, but no specific effort was made during the field work to inventory fauna. The Evans Area is no longer Army property, but the property is located close to the current installation. The proximity of the area to Fort Monmouth gives the information from that report relevance to the state of the natural resources at the installation.

Lacking from the knowledge base on the natural resources of the installation was information on upland communities, terrestrial and aquatic fauna, and the status of TES that could reasonably be expected to occur on the installation. The purpose of conducting the surveys on Fort Monmouth was to fill these gaps in the knowledge base and thereby provide the installation with more complete information, which would be necessary to implement an ecosystem-based natural resources management plan. An Integrated Natural Resources Management Plan (INRMP) for the installation has been developed (U.S. Army Corps of Engineers, Mobile District, 1999), and information from the PLSs will be incorporated into it when it is revised.

The PLSs were required to meet the following specific objectives:

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 - Meeting natural resources management goals.
 - Meeting legal and policy requirements consistent with current national natural resources management philosophies, including compliance with the Department of Defense ecosystem management policy.
- Provide the information on vegetative communities, flora, and fauna that Fort Monmouth needs to consider in all activities related to the conduct of the installation's military mission to ensure protection of identified natural resources.
- Provide the information on TES that Fort Monmouth needs to consider in all activities related to the conduct of the installation's military mission to ensure protection of identified federally listed TES and habitats used by such species.
- Provide the baseline data required to prepare subsequent Endangered Species Management Plans for inclusion to the INRMP, if warranted.

The level of detail agreed upon for each of the PLSs to meet these objectives is outlined below:

- The vegetative community and flora PLSs were limited to the forested portions of the Charles Wood Subpost that were not inventoried during the wetlands delineation, i.e., those which lie west of Hope Road (approximately 50 acres or less). Approximately 5 acres were intensively surveyed for this effort, using a combination of transects and plots or a point-quarter sampling technique.
- The fauna PLS included the fish, reptiles, and amphibians of the brooks on the installation (i.e., Mill, Wampum, and Husky brooks), Husky Brook Lake, and ponds on the golf course; and the fauna of the upland forested areas that were surveyed for flora and vegetative communities. A survey for birds was limited to noting any species seen or heard during the vegetative community and flora surveys, a day of surveying specifically for birds, and an evening of surveying, by calls, for owls in the forested portions of the Charles Wood Subpost. Any nocturnal mammals or other fauna encountered during this survey night were noted as well. Representative sections of brooks were intensively sampled for fish, reptiles, and amphibians; and fish were sampled in the lake and ponds using nets. Some portions of brooks unsuitable for sampling in short sections were walked. Approximately 10% of the total length of brooks on the installation were sampled.
- The only flora TES for which suitable habitat was thought to occur on the installation was swamp pink (*Helonias bullata*), and all potential habitat was surveyed during the 1998 wetlands delineation work. No specimens of the species were found. The U.S. Fish and Wildlife Service (USFWS), however, has expressed interest in a survey at the installation specifically focused on swamp pink. The flora portion of the TES PLS, therefore, was limited to surveying wetland areas for swamp pink and its habitat.

Swamp pink is a federally threatened, state endangered species that occurs in Monmouth County. Numerous species that swamp pink tends to be associated with occur on Fort Monmouth, including red maple (*Acer rubrum*), coastal sweet pepperbush (*Clethra alnifolia*), mountain laurel (*Kalmia latifolia*), northern spicebush (*Lindera benzoin*), sweet bay (*Magnolia virginiana*), black tupelo (*Nyssa sylvatica*), cinnamon fern (*Osmunda cinnamomea*), eastern white pine (*Pinus strobus*), skunk cabbage (*Symplocarpus foetidus*), and highbush blueberry (*Vaccinium corymbosum*). The purpose of the survey was to determine whether the species or habitat suitable for the species exists on the installation.

- The fauna portion of the TES PLS was limited to determining presence or absence of suitable habitat for the northern bog turtle (*Clemmys muhlenbergii*). All previous work and knowledgeable representatives of the installation indicated that no turtles or other endangered species would be found. During the wetlands delineation work at the installation, however, plant species known to be associated with the northern bog turtle were identified at a number of sites (USFWS, 1997; Versar, 1998). The TES survey for the northern bog turtle, therefore, was designed to determine whether the areas where these plant species are located constitute suitable habitat for the turtle. Data sheets from the wetlands delineation work were used to determine the locations to be investigated.

The northern bog turtle is a federally threatened, state endangered species of reptile. The survey for northern bog turtle habitat was undertaken due to the presence of the species in Monmouth County and to determine whether habitat suitable for the species exists on the installation. Since it was not expected that the species would be found on the installation, the survey was limited to determining whether suitable habitat exists, and no attempts were made to find or trap the turtles themselves.

2.0 Site Description

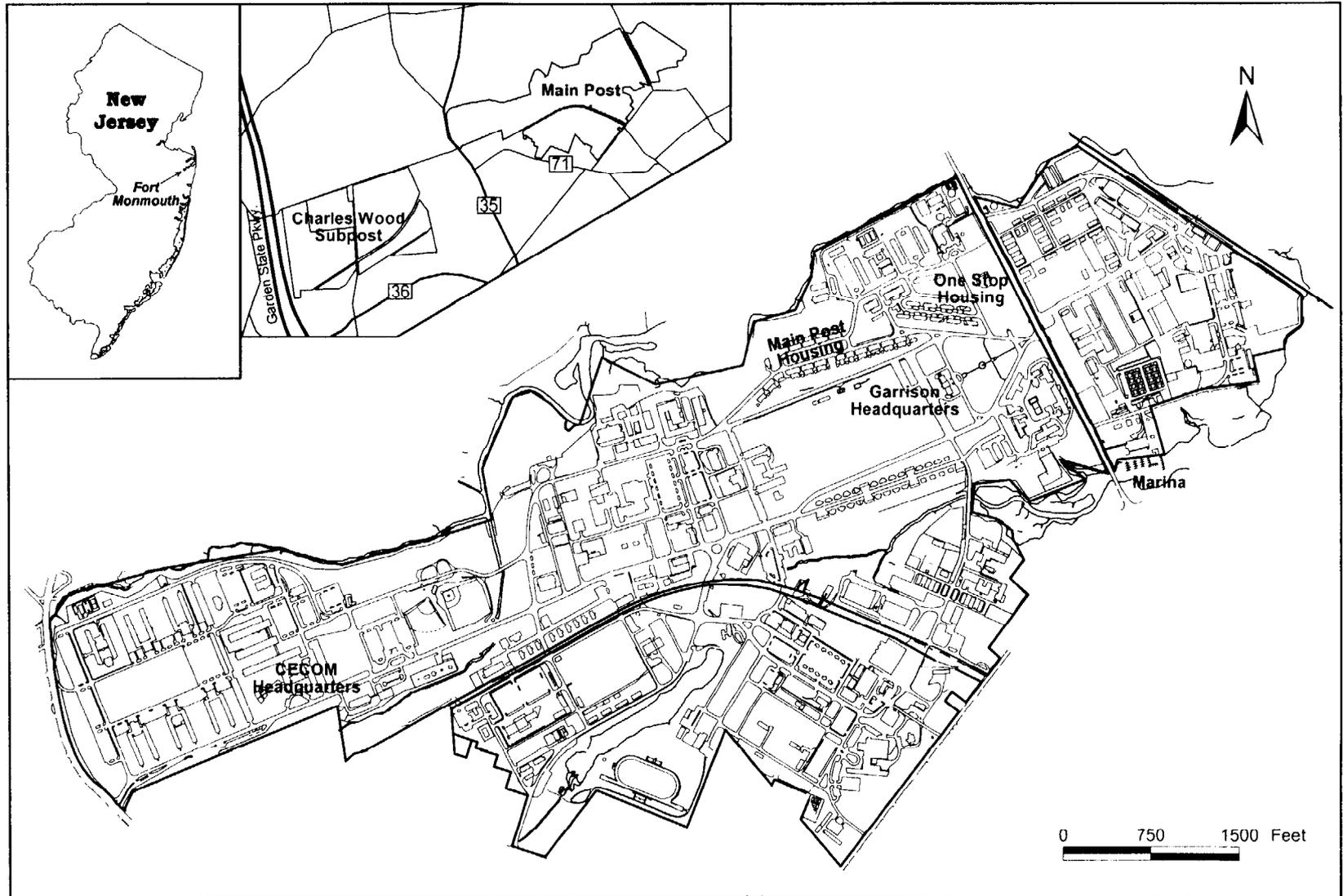
2.1 Environmental Setting

Fort Monmouth, New Jersey, is located in Monmouth County near the urban centers of Red Bank, Long Branch, and Asbury Park, and is within commuting distance of the New York metropolitan area (Figures 1 and 2). The installation is the home of Headquarters, Communications Electronics Command (CECOM) Research Development and Engineering Center (RDEC). The Space and Terrestrial Communications Directorate, one of the directorates that make up the RDEC, develops and exploits space-dependent and terrestrial communications technologies to satisfy the Army's communication-electronics need in the short-, medium-, and long-term. The Directorate is also the focal point for technology activities related to exploitation of space-dependent or space-based C3IEW systems and associated equipment. The Directorate provides required technical support to Program Executive Officers, Project Managers, and other Army organizations, and to other services and government agencies, in the development, procurement, and fielding of space-dependent and terrestrial communications systems.

2.2 Historic and Current Land Use

Monmouth County, New Jersey, was predominately rural and agricultural before a major period of development in the 20th Century (Trierweiler et al., 1996). The area now occupied by Fort Monmouth was agricultural and rural residential. A racetrack was constructed on 128 acres on the site in 1870, and with the onset of World War I, a Signal Corps camp was established on the site in 1917. The racetrack was transformed into a flying field and later a parade ground. Military activity associated with the war greatly affected the surrounding area. Transportation improvements were made and suburbanization increased. The installation was made permanent in 1925, and between World War I and World War II, numerous research and administrative facilities, barracks, and other facilities were constructed. Several parcels of land were added to the installation before World War II, including the Charles Wood Area, which had been a golf course. Barracks, administrative buildings, school buildings, and other structures were built on the Charles Wood Area during an intensification of military preparedness activities prior to World War II. Civilian and military personnel at Fort Monmouth numbered 9,705 in 1947 and 17,358 in 1953. The installation remained active in the years between World War II and the Korean War, when much construction of residences and laboratories occurred. Recently, Base Realignment and Closure activities have resulted in the decommissioning of land parcels of the installation purchased before World War II (for instance, the Evans Area) and in the installation's receiving additional activities from decommissioned sites.

Fort Monmouth currently covers 1,110 acres. The installation is divided into two parts, the Main Post (636 acres) and the Charles Wood Subpost (464 acres) (Figure 1). Both the Main Post and the Charles Wood Subpost could be characterized as developed with pockets of natural areas. The Main Post is composed of approximately 486 acres of developed land (76 percent), 100 acres of forested land (16 percent), and 50 acres of tidal marsh (8 percent) (Versar, 1998). The Main Post contains a total of 397 buildings and structures, a supporting road network, and utility systems. No training ranges or airfields are located on the Main Post. Two brooks (Mill Brook and Husky Brook) cross portions of the Main Post, one of which (Husky Brook) has been dammed to create a small lake (Husky Brook Lake) for a portion of its length. The forested land on the Main Post is primarily associated with these brooks and Lafetra Brook, which forms the northern boundary of the Main Post along with Parker's Creek. Tidal creeks (Parker's Creek and Oceanport Creek) form the northern and southern boundaries, respectively, of the Main Post at its eastern extent.



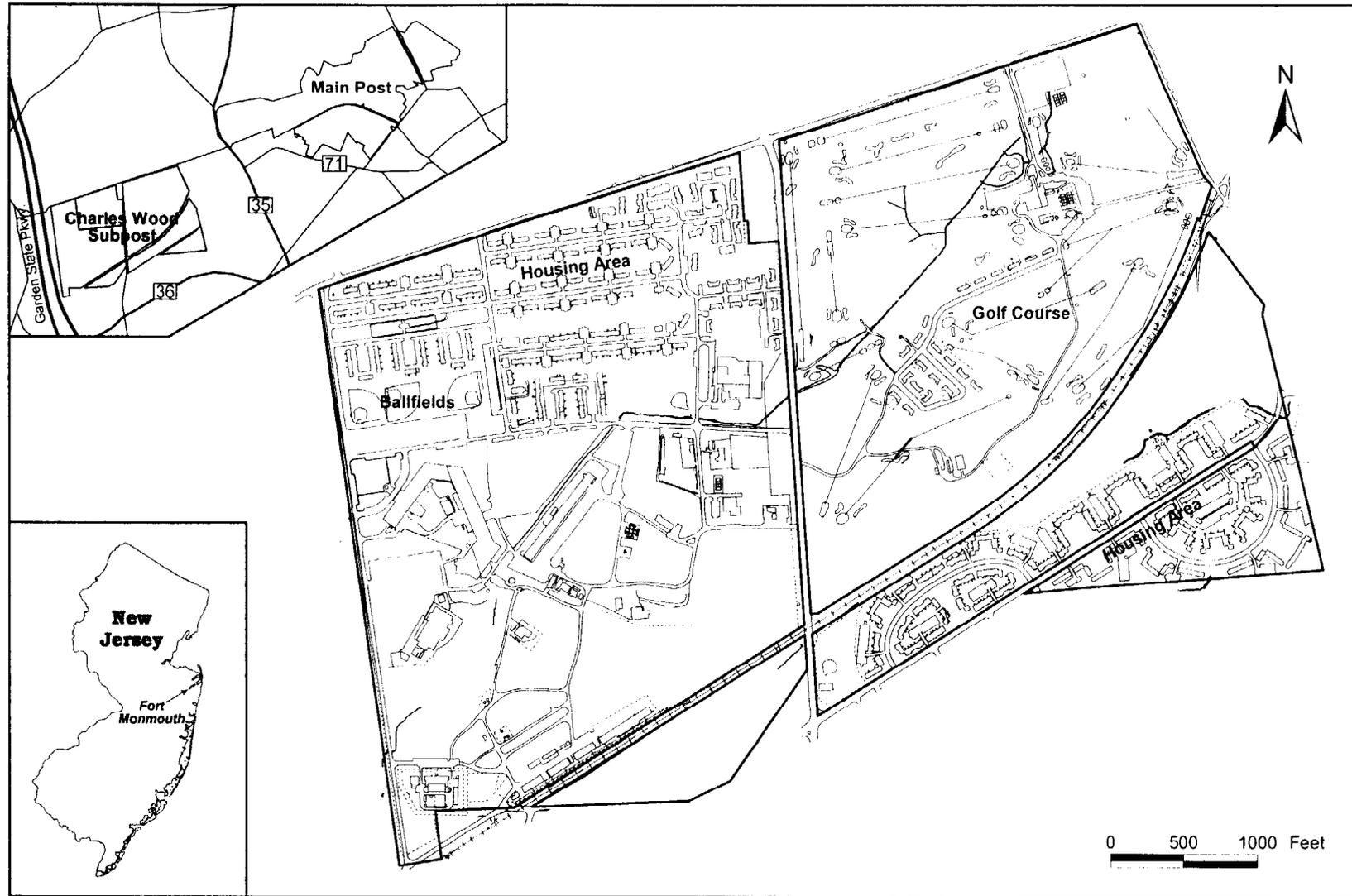
LEGEND

- Building
- - - Fence
- Installation Boundary
- Road
- Stream

Source: Fort Monmouth, 1999.

Main Post Site Map

Figure 1



LEGEND

-  Building
-  Fence
-  Installation Boundary
-  Railroad
-  Road
-  Stream

Source: Fort Monmouth, 1999.

Charles Wood Subpost Site Map

Figure 2

The Charles Wood Subpost is situated 2 miles west of the Main Post. It contains approximately 240 buildings and structures, a golf course, residential areas, administrative and maintenance facilities, a supporting road network, and utility systems. No training ranges or airfields are located on the Charles Wood Subpost. Developed land occupies 375 acres (81 percent) of the Charles Wood Subpost and 89 acres (19 percent) are forested (U.S. Army Corps of Engineers, Mobile District, 1999; Versar, 1998). Forested areas occur primarily on the southern part of the subpost, and those in the southeastern corner are associated with wetlands. Mill Brook passes from the western portion of the subpost through the golf course and, farther downstream, onto the Main Post. Wampum Brook roughly parallels the Conrail railroad tracks along the southern portion of the subpost and joins Mill Brook just beyond the eastern boundary of the subpost. Two ponds are located on the golf course.

3.0 Mammals

3.1 Methods

The investigator performed a site reconnaissance visit before the collection of any data. The site reconnaissance involved walking both the Main Post and the Charles Wood Subpost. Areas of the installation were categorized as housing, open developed, wetland, surface water, forest, and ecotone for planning purposes.

The investigator conducted field surveys from April 4, 2000, to September 4, 2000. The Main Post and Charles Wood Subpost were driven and walked to observe mammals and signs of their presence. Forested areas on the Charles Wood Subpost were examined using existing trails and openings in the forest. Ecotones, the interfaces between wooded and open areas, were thoroughly examined on foot because of the extensive habitat they provide for a variety of species. Persons encountered during the survey were queried regarding mammals they had seen or collected.

The following specific areas were investigated:

Main Post:

- Drove and walked the entire area east of Oceanport Avenue.
- Drove and walked the entire section between Oceanport Avenue and Route 35.
- Walked the area around Husky Brook Lake and connecting streams.

Charles Wood Subpost:

- Drove and walked the eastern portion east of Hope Road, including walking the perimeter of the golf course and all forested areas.
- Drove and walked the western portion of the area west of Hope Road.

3.2 Findings

Mammals observed on the Main Post included eastern cottontail rabbit (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), and muskrat (*Ondatra zibethica*) (active den observed). Mammals observed on the Charles Wood Subpost included eastern gray squirrel (*Sciurus carolinensis*) (sign observed), white-tailed deer (*Odocoileus virginianus*) (sign observed), woodchuck, and muskrat.

Mammals of the Monmouth County Area:

Mammal species beyond those observed during the fauna PLS (see Appendix A) are known to occur on the installation, and additional listings of species are referenced here to complete the picture of mammalian fauna that could reasonably be expected to occur on the installation. A record of mammals observed during a 1998 wetland delineation at Fort Monmouth lists 13 species, and that listing (Appendix B) contains the species observed during the fauna PLS as well as others. A listing of mammals of Monmouth County contains 35 species (see Appendix B), including the species observed during the fauna PLS and those observed during the wetland delineation work, as well as many other mammals that, because of their nocturnal and secretive nature, would be expected to be observed only with considerable effort.

4.0 Birds

4.1 Methods

A site reconnaissance visit was performed before the collection of any data. Investigators walked both the Main Post and the Charles Wood Subpost. Areas of the installation were categorized as housing, open developed, wetland, surface water, forest, and ecotone for planning purposes.

The investigator conducted field surveys from April 4, 2000, to September 4, 2000. Forested areas on the Charles Wood Subpost were examined using existing trails and openings in the forest. Ecotones were thoroughly examined on foot due to the extensive habitat they provide for a variety of species. One evening was spent near forested areas surveying for owls. Persons encountered during the survey were queried regarding birds they had observed.

The following specific areas were investigated:

Main Post:

- Drove and walked the entire area east of Oceanport Avenue.
- Drove and walked the entire section between Oceanport Avenue and Route 35.
- Walked the area around Husky Brook Lake and connecting streams.

Charles Wood Subpost:

- Drove and walked the eastern portion east of Hope Road, including walking the perimeter of the golf course and all forested areas.
- Drove and walked the western portion of the area west of Hope Road.

4.2 Findings

Birds observed on the Main Post included American crow (*Corvus brachyrhynchos*), little blue heron (*Florida caerulea*), great egret (*Casmerodius albus*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), song sparrow (*Melospiza melodia*), Canada goose (*Branta canadensis*), herring gull (*Larus argentatus*), American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), mourning dove (*Zenaida macroura*), and American goldfinch (*Carduelis tristis*). Open areas surrounding and east of Husky Brook Lake often had high concentrations of birds, including robin, starling, brown-headed cowbird, crow, common grackle, and song sparrow. No owls were heard. Birds observed on the Charles

Wood Subpost included mourning dove, robin, crow, and common nighthawk (*Chordeiles minor*) (feathers observed). No owls were heard, nor were any pellets observed.

Birds of the Monmouth County Area:

Bird species beyond those observed during the fauna PLS (see Appendix A) are known to occur on the installation, and additional listings of species are referenced here to complete the picture of avian fauna that could reasonably be expected to occur on the installation. A record of birds observed during a 1998 wetland delineation at Fort Monmouth lists 51 species, and that listing (see Appendix B) contains the species observed during the fauna PLS, as well as many others.

A complete listing of birds of Fort Monmouth would be difficult to compile because of the transitory nature of many species and the seasonal occurrence of many others. The avian fauna of the area can be determined to a great extent by examining listings of species observed in the region at different times of the year. Appendix B contains two listings of bird species observed in the area—one from the Audubon Society Christmas Bird Counts and another from the North American Breeding Bird Survey, an effort coordinated by the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center and the Canadian Wildlife Service. These listings could reasonably be considered to contain all species expected to occur at some time during the year on Fort Monmouth.

5.0 Amphibians and Reptiles

5.1 Methods

A site reconnaissance visit was performed before the collection of any data. The site reconnaissance involved walking both the Main Post and the Charles Wood Subpost. Areas of the installation were categorized as housing, open developed, wetland, surface water, forest, and ecotone for planning purposes.

Field surveys were conducted from April 4, 2000, to September 4, 2000. Forested areas on the Charles Wood Subpost were examined using existing trails and openings in the forest. Ecotones were thoroughly examined on foot due to the extensive habitat they provide for a variety of species. Persons encountered during the survey were queried regarding amphibians and reptiles they had seen or caught.

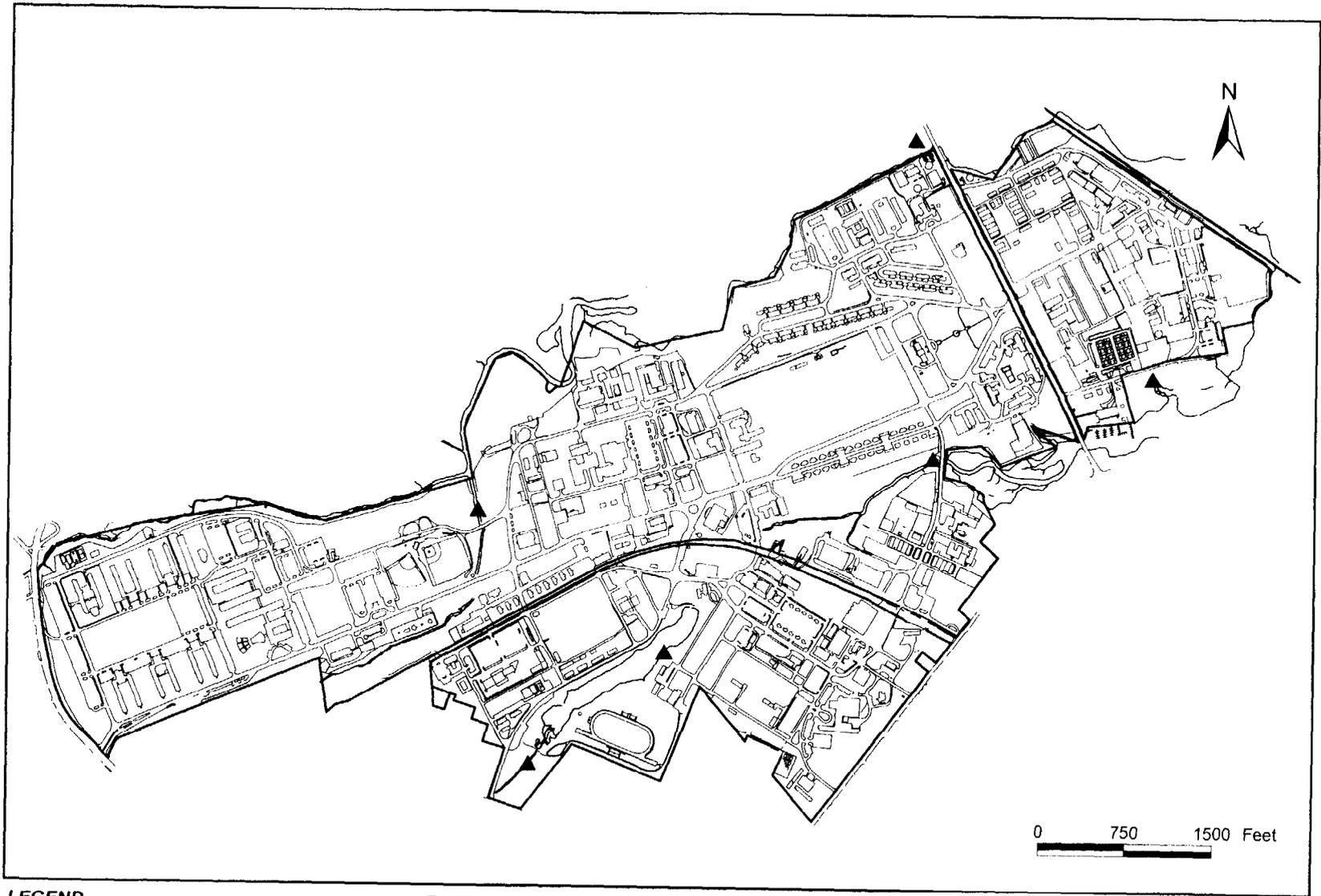
The following specific areas were investigated:

Main Post:

- Drove and walked the entire area east of Oceanport Avenue. Seined along Oceanport Creek off Riverside Drive.
- Drove and walked the entire section between Oceanport Avenue and Route 35.
- Walked the area around Husky Brook Lake and connecting streams.
- Seined Husky Brook Lake, Husky Brook, Wampum Brook north of Avenue of Memories, and Parkers Creek (Figure 3).

Charles Wood Subpost:

- Drove and walked the eastern portion east of Hope Road, including walking the perimeter of the golf course and all forested areas.
- Drove and walked the western portion of the area west of Hope Road.



LEGEND

- ▲ Aquatic Fauna Sampling Point
- Building
- Installation Boundary
- Road
- Stream

Aquatic Fauna Sampling Points, Main Post

Source: Fort Monmouth, 1999.

Figure 3

- Seined the water hazard on the 10th hole, the stream that passes under Lowther Drive above and below the lagoon, the stream near the green for the 17th hole, and Mill Brook near the Child Development Center (Figure 4).

5.2 Findings

Reptiles observed on the Main Post along Lafetra Branch included diamondback terrapin (*Malaclemmys terrapin*), snapping turtle (*Chelydra serpentina*), and painted turtle (*Chrysemys picta*). Reptiles observed on the Charles Wood Subpost included snapping turtle. Tadpoles (*Rana* sp.) were collected on the Charles Wood Subpost.

Amphibians and Reptiles of the Monmouth County Area:

Amphibian and reptilian species beyond those observed during the fauna PLS (see Appendix A) could be expected to occur on the installation, and an additional listing of species is referenced here to complete the picture of the amphibian and reptilian fauna that could reasonably be expected to occur on the installation. A listing of amphibians and reptiles of Monmouth County contains 26 species of amphibians and 34 species of reptiles (see Appendix B), including the species observed during the fauna PLS.

6.0 Fish

6.1 Methods

A site reconnaissance visit was performed before the collection of any data. Investigators walked both the Main Post and the Charles Wood Subpost. Areas of the installation were categorized as housing, open developed, wetland, surface water, forest, and ecotone for planning purposes.

Field surveys were conducted from April 4, 2000, to September 4, 2000. Investigators determined the salinity of water bodies using a refractometer. In saline waters, fish were collected in killi traps and other traps. Stream pots were used where physical conditions (riprap stream banks) required their use. A seine net measuring 20 feet by 6 feet (3/8-inch nylon mesh) was used where possible, including in Husky Brook, Husky Brook Lake, Wampum Brook, and the ponds on the golf course. An investigator had previously conducted fish sampling in Wampum Brook using electroshocking, and this data supplemented the data collected during the fauna survey. Persons encountered during the survey were queried regarding fish they had seen or caught.

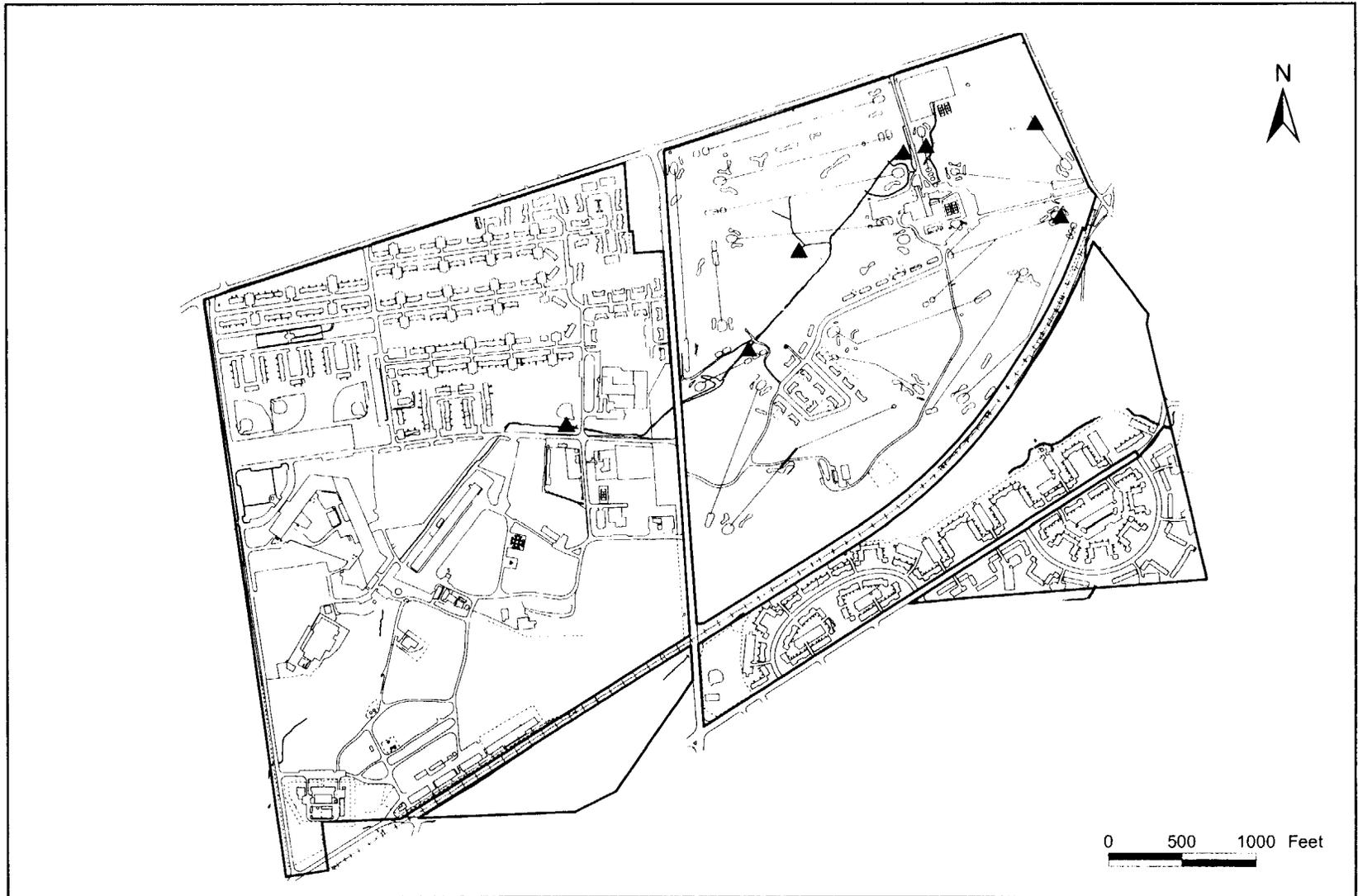
The following specific areas were investigated:

Main Post:

- Seined along Oceanport Creek off Riverside Drive.
- Walked the area around Husky Brook Lake and connecting streams.
- Seined Husky Brook Lake, Husky Brook, Wampum Brook north of Avenue of Memories, and Parkers Creek (see Figure 3).

Charles Wood Subpost:

- Seined the water hazard on the 10th hole, the stream that passes under Lowther Drive above and below the lagoon, the stream near the green for the 17th hole, and Mill Brook near the Child Development Center (see Figure 4).



LEGEND

- Building
- ▲ Aquatic Fauna Sampling Point
- Installation Boundary
- Road
- Stream

Aquatic Fauna Sampling Points, Charles Wood Subpost

Source: Fort Monmouth, 1999.

Figure 4

6.2 Findings

A listing of fish species found during the fauna PLS (see Appendix A) is presented here by location sampled to preserve the information contained within the site references. The ichthyofauna of the installation's waters can be expected to be more specific to the installation than avian, mammalian, or herpetilian fauna because of the site-specificity of water quality and aquatic habitat conditions and the restrictions imposed on ichthyofauna by these conditions. Salinity readings are provided to reflect that many species depend on this water quality condition and to emphasize that the installation is located such that its network of surface waters connect freshwater areas to saltwater areas. Salinity is a strong influence on the distribution and occurrence of fish species on the installation.

Main Post findings:

- Salinity readings:
 - Husky Brook near Oceanport Creek: usually freshwater with occasional readings of salinity (less than 3 parts per thousand (ppt))
 - Parkers Creek east of Oceanport Avenue: 13-16 ppt
 - Lafetra Branch: 0 ppt
 - Wampum Brook north of Avenue of Memories: 0 ppt, occasionally 1 ppt
- Fish collected included:
 - Husky Brook above Husky Brook Lake: banded killifish (*Fundulus diaphanus*), shortnose dace (*Rhinichthys atratulus*)
 - Husky Brook near Oceanport Creek: pumpkinseed sunfish (*Lepomis gibbosus*)
 - Husky Brook Lake: young-of-the-year largemouth bass (*Micropterus salmoides*); carp (*Cyprinus carpio*) and brown bullhead (*Ictalurus nebulosus*) (catfish) reported to be present but not collected
 - Parkers Creek east of Oceanport Avenue: killifish (*Fundulus heteroclitus*), silverside (*Menidia menidia*) (a.k.a. spearing), American eel (*Anguilla rostrata*)
 - Wampum Brook north of Avenue of Memories: largemouth bass, pumpkinseed sunfish, bluegill (*Lepomis macrochirus*)
 - Oceanport Creek: bluefish (*Pomatomus saltatrix*), killifish, silverside

Charles Wood Subpost findings:

- Fish collected included:
 - Pond on 10th hole: pumpkinseed sunfish, bluegill, largemouth bass
 - Lagoon east of Lowther Drive: largemouth bass, pumpkinseed sunfish
 - Stream east of lagoon: pumpkinseed sunfish
 - Streams near 17th hole: mosquito fish (*Gambusia affinis*), pumpkinseed sunfish
 - Wampum Brook (offsite, from previous sampling using electroshocking): brown bullhead, carp, pumpkinseed sunfish, largemouth bass

7.0 Invertebrates

7.1 Methods

Investigators performed a site reconnaissance visit before the collection of any data. Site reconnaissance involved walking both the Main Post and the Charles Wood Subpost. Areas of the installation were categorized as housing, open developed, wetland, surface water, forest, and ecotone for planning purposes.

Field surveys were conducted from April 4, 2000, to September 4, 2000. Sampling for invertebrates was limited to aquatic species. The salinity of water bodies was determined using a refractometer. In saline waters, aquatic species were collected in killi traps and other traps. Stream pots were used where physical conditions (riprap stream banks) required their use. A seine net measuring 20 feet by 6 feet (3/8-inch nylon mesh) was used where possible, including in Husky Brook, Husky Brook Lake, Wampum Brook, and the ponds on the golf course. Persons encountered during the survey were queried regarding invertebrates they had seen or caught.

The following specific areas were investigated:

Main Post:

- Seined along Oceanport Creek off Riverside Drive (see Figure 3).
- Seined Husky Brook Lake, Husky Brook, Wampum Brook north of Avenue of Memories, and Parkers Creek.

Charles Wood Subpost:

- Seined the water hazard on the 10th hole, the stream that passes under Lowther Drive above and below the lagoon, the stream near the green for the 17th hole, and Mill Brook near the Child Development Center (see Figure 4).

7.2 Findings

Aquatic invertebrates collected on the Main Post included:

- Husky Brook near Oceanport Creek: mud crabs (*Neopanope* sp.), blue claw crabs (*Callinectes sapidus*), sand shrimp (*Crangon septemspinosus*)
- Parkers Creek east of Oceanport Avenue: mud crabs, blue claw crabs, sand shrimp

No aquatic invertebrates were collected on the Charles Wood Subpost.

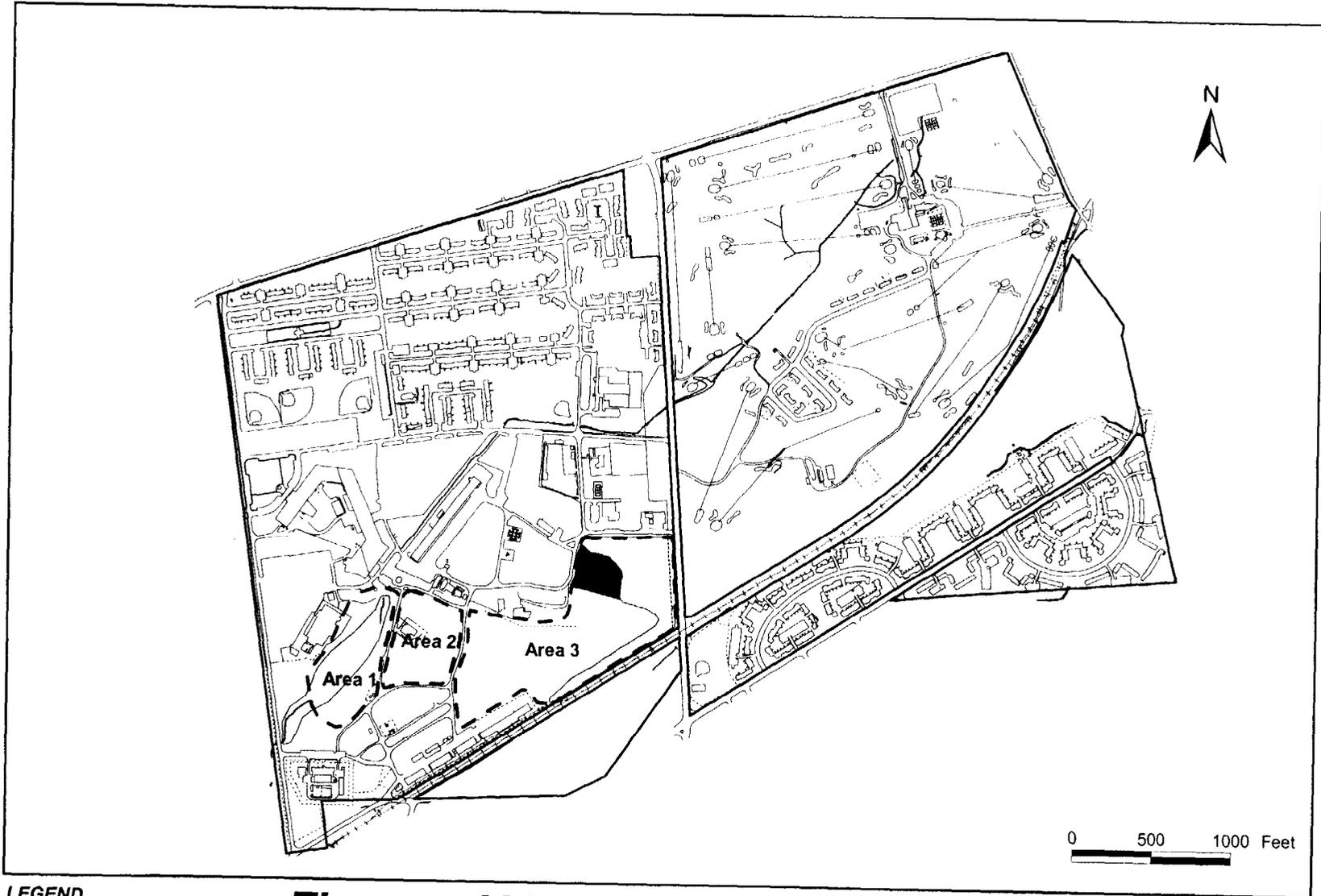
8.0 Flora

8.1 Methods

Wooded areas on the Charles Wood Subpost were investigated from late February to March 2000 for this PLS. The whole area investigated was limited to that bounded by Pearl Harbor Avenue, the Conrail tracks, Laboratory Road, and Hope Road (Figure 5). A planimeter was used to determine the total acreage of the area to be surveyed. For sampling purposes, the area was subdivided into three areas. Area 1, between Building 2704 and Building 2705, was the westernmost. Area 2, between Building 2704 and the road from Building T-2535 and Building 2504, was the central area. Area 3, the easternmost, included the remaining area to Hope Road. Because of the size of Area 3, it was subdivided into six subposts for sampling purposes.

Before the field studies, the investigator studied maps of the area to determine soil types and the locations of wetlands, roads, buildings, and other features. Soil survey maps, wetland maps, aerial photographs, USGS quadrangle maps, survey plans, and photographs of the area to be surveyed were reviewed.

Field studies were conducted by setting up and walking transects through the wooded areas. Flora encountered were recorded, photographs were taken, specimens were collected for later identification as necessary, and information on soils was collected. Where wetland areas were encountered, only dominant vegetation was investigated and recorded. Field data were tape recorded.



LEGEND

- Wetland
- Sweetgum/Maple Community
- - - Flora and Vegetative Community Survey Area
- Road
- Installation Boundary
- ~ Stream

Source: Fort Monmouth, 1999.

Flora and Vegetative Communities Survey Areas

Figure 5

8.2 Findings

The total acreage surveyed was estimated to be 50 acres. Wetland areas of approximately 5 acres and 10.5 acres were found in Areas 1 and 3, respectively (see Figure 5). These wetlands were exclusive of those surveyed during a 1995 wetland investigation on the installation.

The vegetation of the survey area was dominated by oaks (*Quercus* sp.), American holly (*Ilex opaca*), black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*). Dominant shrubs included coastal sweet pepperbush, southern arrowwood (*Viburnum dentatum*), highbush blueberry, and mountain laurel. A Sweet Gum (*Liquidambar styraciflua*)/Red Maple Forest community of approximately 3 acres was found in one area off Laboratory Road (see Figure 5). Other common species in this area included northern white oak (*Quercus alba*), tree-of-heaven (*Ailanthus altissima*), black tupelo, southern arrowwood, and northern spicebush. A listing of vegetation encountered is contained in Appendix A.

The wetland areas in Area 1 were dominated by sweetgum, red maple, northern spicebush, skunk cabbage, and cinnamon fern; wetlands in Area 3 were dominated by sweetgum and red maple.

9.0 Vegetative Communities

9.1 Methods

Refer to the discussion for the flora survey.

9.2 Findings

The total acreage surveyed was estimated to be 50 acres. Wetland areas of approximately 5 acres and 10.5 acres were found in Areas 1 and 3, respectively (see Figure 5). These wetlands were exclusive of those surveyed during a 1995 wetland investigation on the installation.

The dominant vegetation of the survey area was found to be a Mesic Coastal Plain Mixed Oak Forest community, which is characteristic of the inner Coastal Plain physiographic province of New Jersey. A Sweetgum/Red Maple Forest community of approximately 3 acres was found in one area off Laboratory Road (see Figure 5).

10.0 Threatened and Endangered Species

10.1 Methods

Survey for Swamp Pink

The investigator reviewed maps of the installation to determine soil types and the locations of wetlands. USFWS was contacted for guidance on conducting surveys for swamp pink. USFWS provided Tetra Tech, Inc. with published guidelines for conducting surveys for the species. A wetland delineation report for the installation was also reviewed to determine potential habitat for the species. Wetland sites were investigated thoroughly on February 26, 2000, to determine whether habitat suitable for swamp pink was present. The flora of the sites investigated was determined and recorded. Some specimens were collected for later identification. The investigator tape recorded field data and took photographs of the sites.

Survey for Northern Bog Turtle Habitat

A biologist and crew performed the bog turtle habitat survey between August 2000 and November 2000. Literature on bog turtles was examined to determine habitat requirements. USFWS was contacted for guidance on conducting bog turtle surveys. USFWS provided Tetra Tech, Inc. with its guidelines for conducting surveys for northern bog turtles and their habitats. All water bodies on both the Main Post and Charles Wood Subpost were examined for salinity, and all waters with a salinity above 2 ppt were eliminated from further consideration. The biologist examined nine potential habitat sites on the Main Post, and 12 potential habitat sites were examined on the Charles Wood Subpost. All sites were photographed, and details of the habitat, including soil type, vegetation, and hydrology, were recorded. Where any doubt existed, several bog turtle experts were consulted for their expert opinions on the findings.

10.2 Findings

Swamp Pink Survey

No specimens of swamp pink were observed. A single area on the Main Post adjacent to Husky Brook Lake was found to be suitable for swamp pink, though the habitat would be considered poor. The area measured approximately 10 feet by 30 feet and was located between the walking bridge over the inlet to the lake and the gazebo, where a small seep flows into the lake (Figure 6 and photographs Q and R in Appendix E). Swamp pink requires habitat that is perennially saturated and rarely, if ever, inundated where the water table is near the surface. The observed seep exhibited evidence of being only seasonally wet. Also, swamp pink grows on hummocks that prevent its roots from submersion, and no hummocks were observed. These observed habitat characteristics account for the poor rating of the habitat.

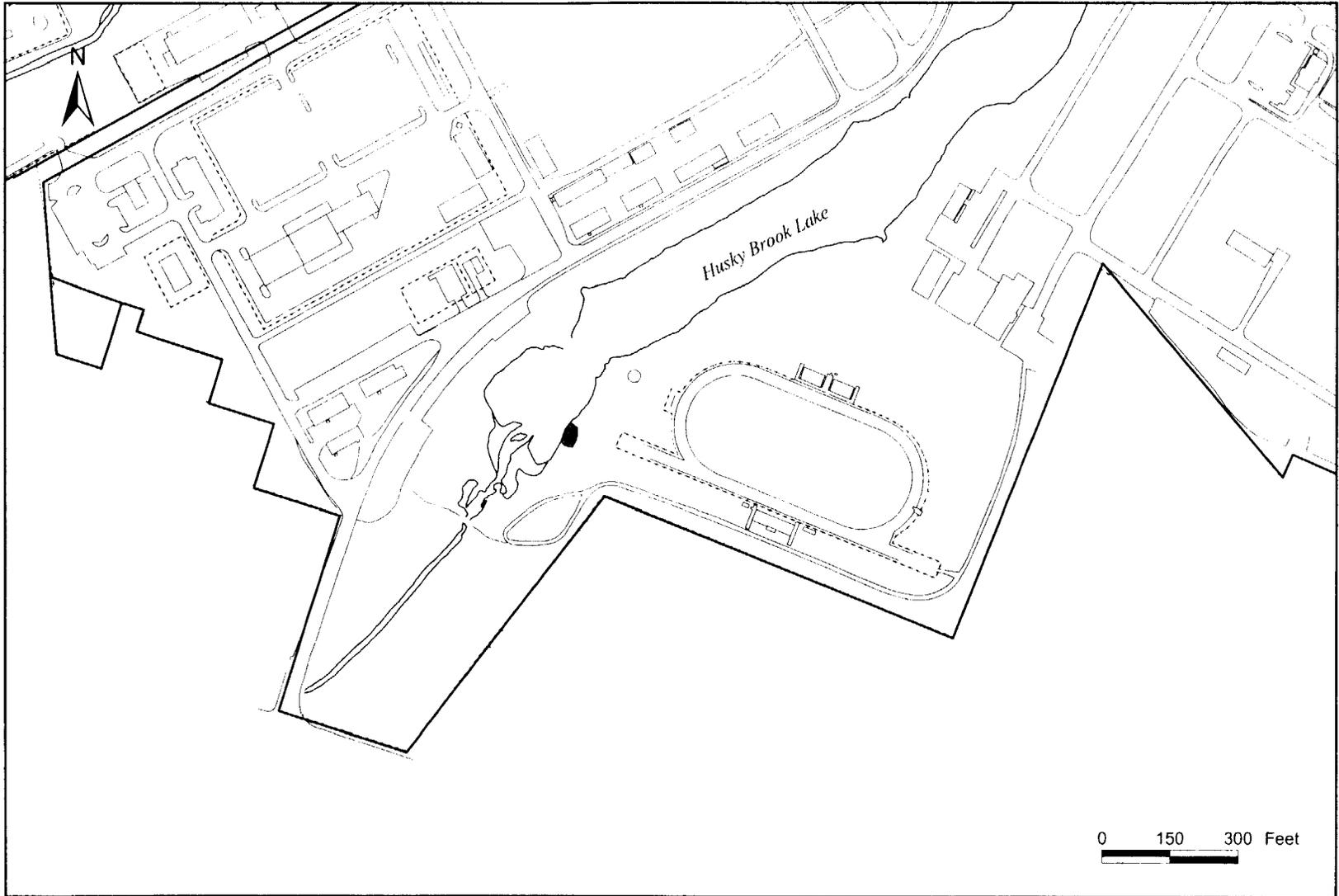
Survey for Northern Bog Turtle Habitat

No specimens of northern bog turtle were observed. Two sites on the Main Post were ranked as providing poor/marginal habitat for the northern bog turtle (Figure 7). These sites were located on Husky Brook upstream from Husky Brook Lake and east of Building 551 in the stream leading to Oceanport Creek. Habitat characteristics of the sites are provided in Appendix C.

One site on the Charles Wood Subpost was ranked as good/excellent bog turtle habitat, one site was ranked as fair habitat, and four sites were ranked as poor/marginal habitat (Figure 8). The site ranked as good/excellent occurs in the stream off Guam Lane that passes Hope Road south of Corregidor Road, east of Building 2568. The site ranked as fair habitat was located on Mill Brook north of Corregidor Road and east of Guam Lane. The sites ranked as poor/marginal were located on Mill Brook near the green for the 2nd hole on the golf course, on Mill Brook north of the tees for the 17th hole, in a roadside ditch off the 10th green, and in Mill Brook southeast of Building 2705.

Rare, Threatened, and Endangered Species of the Monmouth County Area

Numerous federally and state-listed rare, threatened, and endangered species occur in Monmouth County (see Appendix B). The habitats and occurrences of these species are quite limited, and the PLSSs conducted for this effort and previous surveys of nearby areas and Fort Monmouth indicate that none of these species currently occur on the installation.



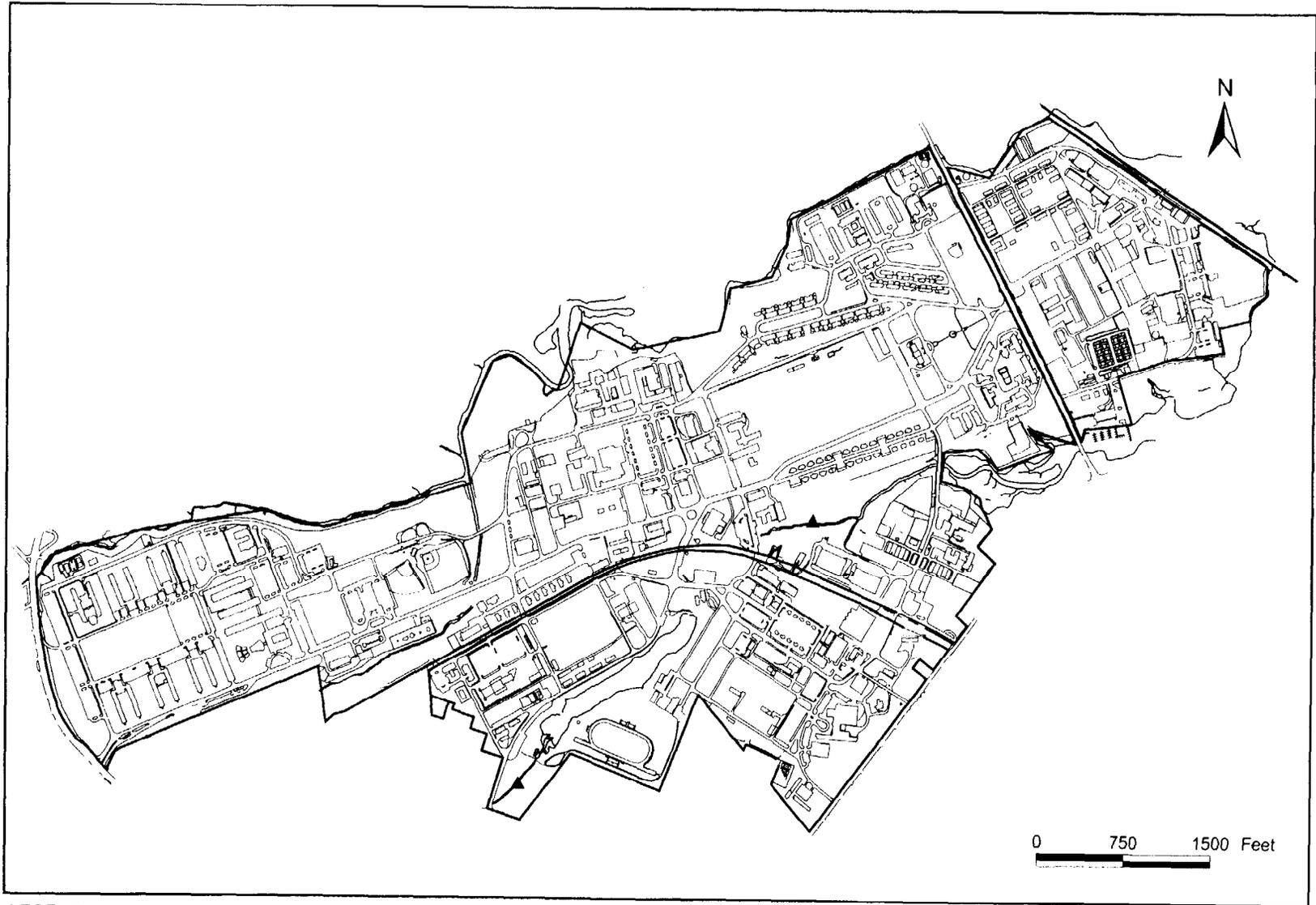
LEGEND

- Swamp Pink Habitat (Poor/Marginal Quality)
- Building
- Installation Boundary
- Road
- Stream/Shoreline

Source: Fort Monmouth, 1999.

Swamp Pink Habitat

Figure 6



LEGEND

Bog Turtle Habitat Quality

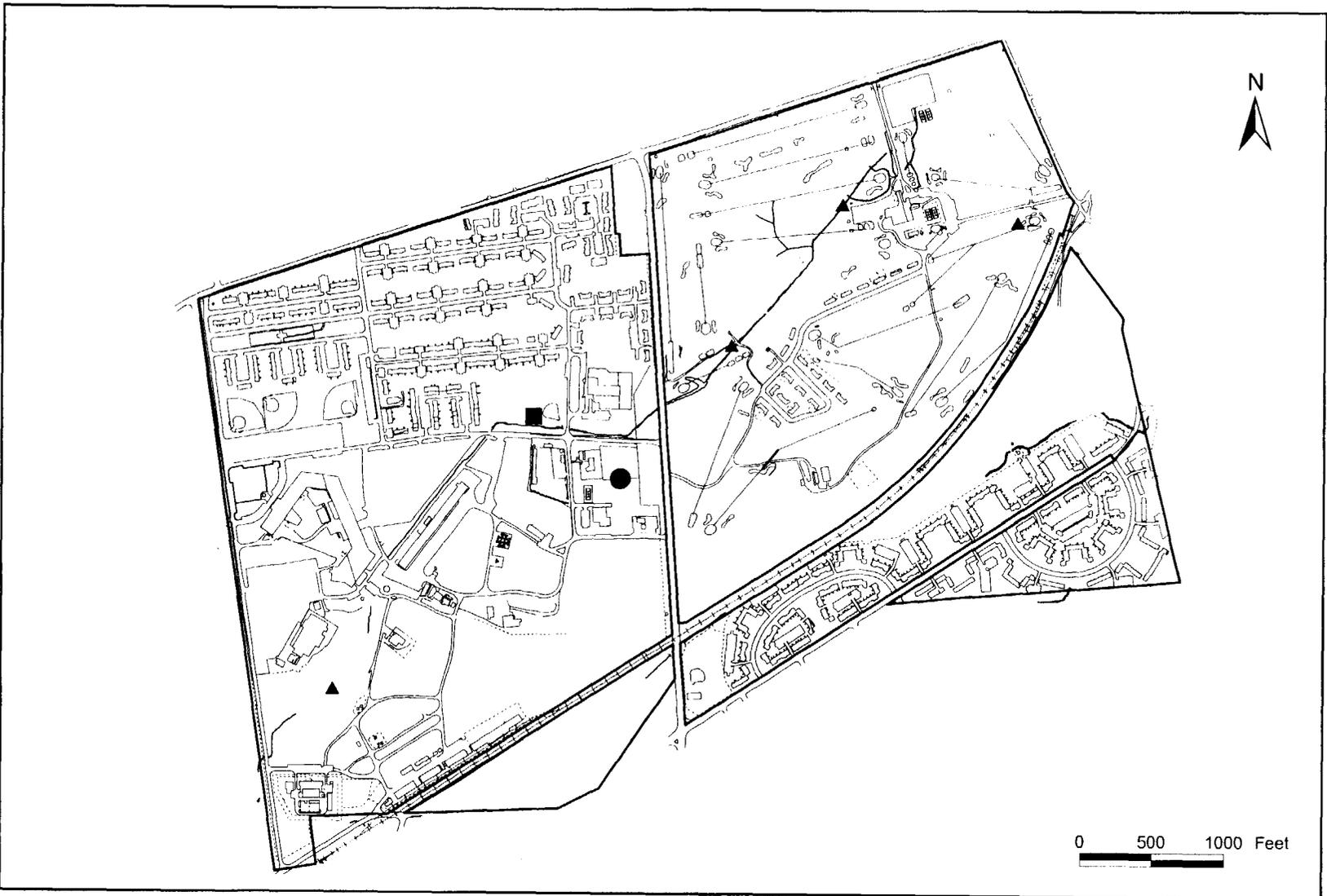
- Good/Excellent Habitat
- Fair Habitat
- ▲ Poor/Marginal Habitat

- Building
- Installation Boundary
- Road
- Stream

Bog Turtle Habitat, Main Post

Source: Fort Monmouth, 1999.

Figure 7



LEGEND

Bog Turtle Habitat Quality

- Good/Excellent Habitat
- Fair Habitat
- ▲ Poor/Marginal Habitat

- Building
- Installation Boundary
- Road
- Stream

Bog Turtle Habitat, Charles Wood Subpost

Source: Fort Monmouth, 1999.

Figure 8

11.0 Summary of Findings and Recommendations

11.1 Summary of Findings

Mammals observed on the Main Post included rabbit, woodchuck, and muskrat (active den observed). Mammals observed on the Charles Wood Subpost included squirrels (sign observed), white-tailed deer (sign observed), woodchuck, and muskrat.

Birds observed on the Main Post included crow, little blue heron, great egret, robin, starling, brown-headed cowbird, common grackle, song sparrow, Canada goose, herring gull, black duck, mallard, mourning dove, and American goldfinch. Open areas surrounding and east of Husky Brook Lake often had high concentrations of birds, including robin, starling, brown-headed cowbird, crow, common grackle, and song sparrow. No owls were heard. Birds observed on the Charles Wood Subpost included mourning dove, robin, crow, and nighthawk (feathers observed). No owls were heard, nor were any pellets observed.

Reptiles observed on the Main Post along Lafetra Branch included diamondback terrapin, snapping turtle, and painted turtle. Reptiles observed on the Charles Wood Subpost included snapping turtle. Tadpoles were collected on the Charles Wood Subpost.

Fish collected on the Main Post included banded killifish, shortnose dace, pumpkinseed sunfish, young-of-the-year largemouth bass, largemouth bass, silverside, American eel, bluegill, and bluefish. Carp and brown bullhead (catfish) had been reported to be present but were not collected. Fish collected on the Charles Wood Subpost included pumpkinseed sunfish, bluegill, largemouth bass, and mosquito fish. Previous sampling in Wampum Brook using electroshocking produced brown bullhead, carp, pumpkinseed sunfish, and largemouth bass.

Aquatic invertebrates collected on the Main Post included mud crabs, blue claw crabs, and sand shrimp. No aquatic invertebrates were collected on the Charles Wood Subpost.

The dominant vegetation of the survey area on the Charles Wood Subpost was found to be a Mesic Coastal Plain Mixed Oak Forest community, which is characteristic of the inner Coastal Plain physiographic province of New Jersey. A Sweetgum/Red Maple Forest community of approximately 3 acres was found in one area off Laboratory Road.

The vegetation of the survey area on the Charles Wood Subpost was dominated by oaks, American holly, black cherry, and sassafras. Dominant shrubs included coastal sweet pepperbush, southern arrowwood, highbush blueberry, and mountain laurel. The Sweetgum/Red Maple Forest community contained these two dominant species, as well as northern white oak, tree-of-heaven, black tupelo, southern arrowwood, and northern spicebush. The wetland area in Area 1 was dominated by sweetgum, red maple, northern spicebush, skunk cabbage, and cinnamon fern, and that in Area 3 was dominated by sweetgum and red maple.

No specimens of swamp pink were observed. A single area on the Main Post adjacent to Husky Brook Lake was found to be suitable for swamp pink, though the habitat would be considered poor.

Two sites on the Main Post were ranked as providing poor/marginal habitat for the northern bog turtle. One site on the Charles Wood Subpost was ranked as good/excellent bog turtle habitat, one site was ranked as fair habitat, and four sites were ranked as poor/marginal habitat.

11.2 Recommendations

The communities and species encountered in the vegetative community and flora surveys are typical of the inner Coastal Plain physiographic province of New Jersey, and the fauna encountered in the fauna survey is typical of more developed areas of the province and water bodies that have been affected by urban runoff and development. A survey of the forested areas of the Charles Wood Subpost for birds during the spring breeding season, roughly May to June, could be conducted by installation personnel and volunteers familiar with bird identification to more accurately determine the species using the areas. The listing in Appendix B from the North American Breeding Bird Survey could be used as a checklist for such a survey.

Management of the remaining natural areas on the installation could include protecting them from further disturbance and fragmentation; establishing buffer areas around forested areas to protect them from further invasions of exotic species; protecting streams, brooks, lakes, and ponds by using soil erosion prevention methods to prevent sedimentation to streams and water bodies, minimizing use of fertilizers and pesticides, preventing direct applications of lawn care chemicals to surface waters, and establishing naturally vegetated zones near all surface waters.

Swamp pink habitat is virtually nonexistent on the installation, and good swamp pink habitat is unlikely to be found on the installation now or in the future. No further surveys for the species are recommended. The information obtained from this effort will be coordinated by the installation with the State of New Jersey and the USFWS.

One area of potentially good northern bog turtle habitat was found. This determination was made based on a single visit during the year. Bog turtles require specific habitat conditions year-round, however, so this area should be investigated during a critical time of the year (e.g., a dry period of summer) to determine whether the habitat conditions noted are present at all times during the year. Until a determination is made that the area is not suitable for bog turtles, if such a determination is made, any potentially disruptive activities in this area should be thoroughly reviewed and coordinated with the USFWS and the State of New Jersey prior to habitat disturbance. The information obtained from this effort will be coordinated by the installation with the State of New Jersey and the USFWS.

12.0 Acknowledgements

The following persons conducted the field work and presented the findings of the surveys conducted under this effort:

- Fauna Survey:
Donald Dorfman, Ph.D., Professor, Biology Department, Monmouth University, West Long Branch, New Jersey
- Flora Survey:
William Olson, Field Botanist/Wetland Ecologist, Howell, New Jersey
- Vegetative Communities Survey:
William Olson, Field Botanist/Wetland Ecologist, Howell, New Jersey
- Northern Bog Turtle Habitat Survey:
Donald Dorfman, Ph.D., Professor, Biology Department, Monmouth University, West Long Branch, New Jersey
- Swamp Pink Survey:
William Olson, Field Botanist/Wetland Ecologist, Howell, New Jersey

Robert Melascaglia and Dinker Desai of Fort Monmouth provided valuable background information necessary for completion of the surveys and reports, as well as coordination with the surveyors that enabled smooth and timely completion of all work involved.

The draft and final reports for Fort Monmouth were prepared by Sam Pett, Tetra Tech, Inc.

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APPENDIX A
FAUNA AND FLORA SPECIES OBSERVED DURING THE PLANNING LEVEL SURVEYS

VEGETATION

<u>Common Name</u>	<u>Scientific Name</u>	<u>Occurrence</u> ¹
<i>Trees</i>		
American beech	<i>Fagus grandifolia</i>	
American chestnut	<i>Castanea dentata</i>	
American holly	<i>Ilex opaca</i>	1
black cherry	<i>Prunus serotina</i>	1
black oak	<i>Quercus velutina</i>	1,3
chestnut oak	<i>Quercus prinus</i>	1,2,3
eastern red cedar	<i>Juniperus virginiana</i>	
eastern white pine	<i>Pinus strobus</i>	
gray birch	<i>Betula populifolia</i>	3
mockernut hickory	<i>Carya alba</i>	
northern red oak	<i>Quercus rubra</i>	1,2,3
northern white oak	<i>Quercus alba</i>	1,2,3,S/R
big-tooth aspen	<i>Populus grandidentata</i>	
pitch pine	<i>Pinus rigida</i>	
red maple	<i>Acer rubrum</i>	3,S/R
sassafras	<i>Sassafras albidum</i>	1
short-leaf pine	<i>Pinus echinata</i>	
sweet bay	<i>Magnolia virginiana</i>	
sweet gum	<i>Liquidambar styraciflua</i>	1,3,S/R
tree-of-heaven	<i>Ailanthus altissima</i>	S/R
tuliptree	<i>Liriodendron tulipifera</i>	
<i>Shrubs</i>		
blue huckleberry	<i>Gaylussacia frondosa</i>	2,3
clammy azalea	<i>Rhododendron viscosum</i>	
coastal sweet pepperbush	<i>Clethra alnifolia</i>	1
early lowbush blueberry	<i>Vaccinium pallidum</i>	
highbush blueberry	<i>Vaccinium corymbosum</i>	1,2
Japanese barberry	<i>Berberis thunbergii</i>	
late lowbush blueberry	<i>Vaccinium angustifolium</i>	
mountain laurel	<i>Kalmia latifolia</i>	1,2,3
northern spicebush	<i>Lindera benzoin</i>	S/R
pink azalea	<i>Rhododendron periclymenoides</i>	
sheep laurel	<i>Kalmia angustifolia</i>	
smooth sumac	<i>Rhus glabra</i>	
southern arrowwood	<i>Viburnum dentatum</i>	1,S/R
swamp doghobble	<i>Leucothoe racemosa</i>	
<i>Vines</i>		
Asian bittersweet	<i>Celastrus orbiculata</i>	
black raspberry	<i>Rubus occidentalis</i>	
eastern poison ivy	<i>Toxicodendron radicans</i>	
horsebrier	<i>Smilax rotundifolia</i>	1,S/R
Japanese honeysuckle	<i>Lonicera japonica</i>	1
rambler rose	<i>Rosa multiflora</i>	
sawbrier	<i>Smilax glauca</i>	
wine raspberry	<i>Rubus phoenicolasius</i>	

VEGETATION (cont.)

Common Name

Scientific Name

Herbaceous Plants

black tupelo	<i>Nyssa sylvatica</i>	3,S/R
Canadian goldenrod	<i>Solidago canadensis</i>	
cinnamon fern	<i>Osmunda cinnamomea</i>	
common reed	<i>Phragmites australis</i>	
crow garlic	<i>Allium vineale</i>	
curly dock	<i>Rumex crispus</i>	
cut-leaf grape fern	<i>Botrychium dissectum</i>	
dwarf cinquefoil	<i>Potentilla canadensis</i>	
eastern hay-scented fern	<i>Dennstaedtia punctilobula</i>	
English plantain	<i>Plantago lanceolata</i>	
flat-top goldentop	<i>Euthamia graminifolia</i>	
garden yellow rocket	<i>Barbarea vulgaris</i>	
garlic mustard	<i>Alliaria petiolata</i>	
green mullein	<i>Verbascum thapsus</i>	
ground ivy	<i>Glechoma hederacea</i>	
hairy bittercress	<i>Cardamine hirsuta</i>	
Indian hemp	<i>Apocynum cannabinum</i>	
Japanese bristle grass	<i>Setaria faberi</i>	
Japanese knotweed	<i>Polygonum cuspidatum</i>	1
Japanese mountain spurge	<i>Pachysandra terminalis</i>	
kidney-leaf buttercup	<i>Ranunculus abortivus</i>	
lamp rush	<i>Juncus effusus</i>	
large barnyard grass	<i>Echinochloa crus-galli</i>	
little false bluestem	<i>Schizachyrium scoparium</i>	
netted chain fern	<i>Woodwardia areolata</i>	
New York fern	<i>Thelypteris noveboracensis</i>	
Nuttall's reed grass	<i>Calamagrostis coarctata</i>	
orange day lily	<i>Hemerocallis fulva</i>	
orchard grass	<i>Dactylis glomerata</i>	
Pennsylvania sedge	<i>Carex pennsylvanica</i>	
poverty rush	<i>Juncus tenuis</i>	
princess pine	<i>Lycopodium obscurum</i>	
purple-leaf willowherb	<i>Epilobium coloratum</i>	
Queen Anne's lace	<i>Daucus carota</i>	
sensitive fern	<i>Onoclea sensibilis</i>	
skunk cabbage	<i>Symplocarpus foetidus</i>	
spinulose wood fern	<i>Dryopteris carthusiana</i>	
spotted knapweed	<i>Centaurea biebersteinii</i>	
striped prince's pine	<i>Chimaphila maculata</i>	1
tall reedtop	<i>Tridens flavus</i>	
upland bent	<i>Agrostis perennans</i>	1
wand panic grass	<i>Panicum virgatum</i>	
white snakeroot	<i>Ageratina altissima</i>	
wrinkle-leaf goldenrod	<i>Solidago rugosa</i>	

¹ 1 = dominant in Area 1; 2 = dominant in Area 2; 3 = dominant in Area 3; S/R = dominant in sweetgum/red maple community of Area 3; no indication in this column = nondominant species recorded

FAUNA

Common Name

Scientific Name

Birds

American black duck
 American crow
 American goldfinch
 American robin
 brown-headed cowbird
 Canada goose
 common grackle
 common nighthawk
 European starling
 great egret
 herring gull
 little blue heron
 mallard
 mourning dove
 song sparrow

Anas rubripes
Corvus brachyrhynchos
Carduelis tristis
Turdus migratorius
Molothrus ater
Branta canadensis
Quiscalus quiscula
Chordeiles minor
Sturnus vulgaris
Casmerodius albus
Larus argentatus
Florida caerulea
Anas platyrhynchos
Zenaida macroura
Melospiza melodia

Mammals

eastern cottontail rabbit
 eastern gray squirrel
 muskrat
 white-tailed deer
 woodchuck

Sylvilagus floridanus
Sciurus carolinensis
Ondatra zibethica
Odocoileus virginianus
Marmota monax

Fish

American eel
 banded killifish
 bluefish
 bluegill sunfish
 brown bullhead
 carp
 killifish (mummichog)
 largemouth bass
 mosquito fish
 pumpkinseed
 shortnose (blacknose) dace
 silverside

Anguilla rostrata
Fundulus diaphanus
Pomatomus saltatrix
Lepomis macrochirus
Ictalurus nebulosus
Cyprinus carpio
Fundulus heteroclitus
Micropterus salmoides
Gambusia affinis
Lepomis gibbosus
Rhinichthys atratulus
Menidia menidia

Reptiles

diamondback terrapin
 painted turtle
 snapping turtle
 tadpoles

Malaclemmys terrapin
Chrysemys picta
Chelydra serpentina
Rana sp.

Invertebrates

blue claw crab
 mud crab
 sand shrimp

Callinectes sapidus
Neopanope sp.
Crangon septemspinosa

**APPENDIX B
RECORDS OF SPECIES FOR MONMOUTH COUNTY
AND THE MONMOUTH COUNTY REGION**

Mammals

Mammals Observed During a 1998 Wetland Delineation at Fort Monmouth

<u>Common Name</u>	<u>Scientific Name</u>
opossum	<i>Didelphis marsupialis</i>
eastern cottontail rabbit	<i>Sylvilagus floridanus</i>
eastern chipmunk	<i>Tamias striatus</i>
woodchuck	<i>Marmota monax</i>
gray squirrel	<i>Sciurus carolinensis</i>
white-footed mouse	<i>Peromyscus leucopus</i>
muskrat	<i>Ondatra zibethicus</i>
norway rat	<i>Rattus norvegicus</i>
house mouse	<i>Mus musculus</i>
red fox	<i>Vulpes vulpes</i>
raccoon	<i>Procyon lotor</i>
striped skunk	<i>Mephitis mephitis</i>
white-tailed deer	<i>Odocoileus virginianus</i>

Source: Versar, 1998

Additional Mammals Listed as Occurring in Monmouth County

<u>Common Name</u>	<u>Scientific Name</u>
red squirrel	<i>Tamiasciurus hudsonicus</i>
southern flying squirrel	<i>Glaucomys volans</i>
porcupine	<i>Erethizon dorsatum</i>
bats (several species)	<i>Myotis sp., Pipistrellus sp., Eptesicus sp., Lasiurus sp.</i>
longtail weasel	<i>Mustela frenata</i>
mink	<i>Mustela vison</i>
gray fox	<i>Urocyon cinereoargenteus</i>
least shrew	<i>Cryptotis parva</i>
masked shrew	<i>Sorex cinereus</i>
smokey shrew	<i>Sorex fumeus</i>
shorttail shrew	<i>Blarina brevicauda</i>
eastern mole	<i>Scalopus aquaticus</i>
starnose mole	<i>Condylura cristata</i>
meadow jumping mouse	<i>Zapus hudsonius</i>
meadow vole	<i>Microtus pennsylvanicus</i>
pine vole	<i>Pitymys pinetorum</i>
boreal redback vole	<i>Clethrionomys gapperi</i>
southern bog lemming	<i>Synaptomys cooperi</i>
river otter	<i>Lutra canadensis</i>
beaver	<i>Castor canadensis</i>

Source: Monmouth County Environmental Council, 1978

Birds

Birds Observed During a 1998 Wetland Delineation at Fort Monmouth

<u>Common Name</u>	<u>Scientific Name</u>
great blue heron	<i>Ardea herodias</i>
green heron	<i>Butorides striatus</i>
great egret	<i>Casmerodius albus</i>
snowy egret	<i>Egretta thula</i>
glossy ibis	<i>Plegadis falcinellus</i>
Canada goose	<i>Branta canadensis</i>
mallard	<i>Anas platyrhynchos</i>
turkey vulture	<i>Cathartes aura</i>
red-shouldered hawk	<i>Buteo lineatus</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
American kestrel	<i>Falco sparverius</i>
killdeer	<i>Charadrius vociferus</i>
mourning dove	<i>Zenaida macroura</i>
rock dove	<i>Columba livia</i>
chimney swift	<i>Chaetura pelagica</i>
belted kingfisher	<i>Ceryle alcyon</i>
red-bellied woodpecker	<i>Melanerpes carolinus</i>
downy woodpecker	<i>Picoides pubescens</i>
common flicker	<i>Colaptes auratus</i>
European starling	<i>Sturnus vulgaris</i>
red-eyed vireo	<i>Vireo olivaceus</i>
common yellowthroat	<i>Geothlypis trichas</i>
northern cardinal	<i>Cardinalis cardinalis</i>
indigo bunting	<i>Passerina cyanea</i>
song sparrow	<i>Melospiza melodia</i>
swamp sparrow	<i>Melospiza georgiana</i>
red-winged blackbird	<i>Agelaius phoeniceus</i>
common grackle	<i>Quiscalus quiscula</i>
brown-headed cowbird	<i>Molothrus ater</i>
house finch	<i>Carpodacus mexicanus</i>
American goldfinch	<i>Carduelis tristis</i>
house sparrow	<i>Passer domesticus</i>
eastern wood pewee	<i>Contopus virens</i>
eastern phoebe	<i>Sayornis phoebe</i>
great crested flycatcher	<i>Myiarchus crinitus</i>
eastern kingbird	<i>Tyrannus tyrannus</i>
barn swallow	<i>Hirundo rustica</i>
blue jay	<i>Cyanocitta cristata</i>
fish crow	<i>Corvus ossifragus</i>
American crow	<i>Corvus brachyrhynchos</i>
black-capped chickadee	<i>Parus atricapillus</i>
tufted titmouse	<i>Parus bicolor</i>
white-breasted nuthatch	<i>Sitta carolinensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
house wren	<i>Troglodytes aedon</i>

Birds (cont.)

Birds Observed During a 1998 Wetland Delineation at Fort Monmouth

Common Name

blue-gray gnatcatcher
eastern bluebird
American robin
gray catbird
northern mockingbird
cedar waxwing

Scientific Name

Polioptila caerulea
Sialia sialis
Turdus migratorius
Dumetella carolinensis
Mimus polyglottos
Bombycilla cedrorum

Source: Versar, 1998

Bird Listing, Audubon Society Christmas Bird Count, Long Branch, New Jersey

Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

The data below must be proofed by CBC compilers before it can be used in scientific studies. Data version is 5.09.

This output will print on one page if font is set to Times New Roman size 12 (Netscape) or Times New Roman medium font (MSIE)

Species	96	97	98	99	100
Individual and Generic Species					
Red-throated Loon	58	32	85	149	29
Pacific Loon	--	1	--	--	--
Common Loon	46	22	98	52	17
Pied-billed Grebe	16	12	35	15	38
Horned Grebe	10	15	4	14	1
Red-necked Grebe	1	1	1	--	--
Western Grebe	1	--	--	--	--
Northern Gannet	43	43	201	370	112
Great Cormorant	39	11	52	44	19
Double-crested Cormorant	7	28	45	42	63
American Bittern	--	--	1	--	--
Great Blue Heron (Blue form)	43	73	99	90	105
Black-crowned Night-Heron	3	2	1	--	3
Mute Swan	32	53	98	46	68
Snow Goose (form?)	205	10	29	86	24
Brant	5322	3296	1847	2792	3119
Canada Goose	9071	9474	14851	7200	10826
Canada Goose (small races)	--	--	1	--	--
Wood Duck	3	2	5	9	8
American Green-winged Teal	10	11	18	27	36
American Black Duck	570	1002	662	580	898
Mallard	1329	1366	1923	1792	1227
Northern Pintail	4	4	8	8	6
Blue-winged Teal	--	--	1	--	cw
Northern Shoveler	51	48	39	52	47
Gadwall	130	308	183	343	134

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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Species	96	97	98	99	100
Individual and Generic Species					
Eurasian Wigeon	2	1	--	--	1
American Wigeon	475	468	531	254	563
Canvasback	53	832	984	256	109
Redhead	--	1	1	1	--
Ring-necked Duck	108	63	102	45	60
Greater Scaup	216	210	3	20	54
Lesser Scaup	15	75	58	27	54
Common Eider	--	--	3	--	--
Harlequin Duck	--	--	--	1	--
Long-tailed Duck	31	14	42	16	12
Black Scoter	--	2	1	7	4
Surf Scoter	4	1	15	33	7
White-winged Scoter	10	4	4	5	2
Common Goldeneye	4	9	21	10	4
Bufflehead	491	579	734	331	1436
Hooded Merganser	190	269	518	519	585
Common Merganser	2	602	112	223	1200
Red-breasted Merganser	637	428	1216	1369	632
Ruddy Duck	570	495	1201	996	1305
Black Vulture	1	--	2	--	8
Turkey Vulture	124	142	203	144	103
Bald Eagle	--	--	1	1	3
Bald Eagle, Adults	--	--	--	--	1
Bald Eagle, Immatures	--	--	1	1	2
Bald Eagle, Unknowns	--	--	--	--	--
Northern Harrier	3	2	2	3	1

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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Species	96	97	98	99	100
Individual and Generic Species					
Sharp-shinned Hawk	16	15	10	8	18
Cooper's Hawk	5	4	5	5	5
Red-shouldered Hawk	2	2	--	2	--
Red-tailed Hawk	48	42	49	51	47
American Kestrel	3	2	7	1	5
Merlin	1	3	2	3	3
Peregrine Falcon	--	1	1	--	1
Northern Bobwhite	22	--	8	3	12
Clapper Rail	1	1	2	1	3
Virginia Rail	1	--	1	--	1
American Coot	128	396	258	160	350
Black-bellied Plover	43	120	28	31	20
Semipalmated Plover	--	--	--	--	1
Killdeer	7	24	62	32	58
Greater Yellowlegs	6	4	--	2	8
Ruddy Turnstone	1	--	--	--	--
Sanderling	119	109	111	65	104
Purple Sandpiper	1	128	2	9	15
Dunlin	48	141	34	32	90
Common Snipe	4	6	8	6	3
American Woodcock	--	1	--	1	1
Laughing Gull	--	4	1	--	--
Bonaparte's Gull	122	162	1141	46	173
Ring-billed Gull	4096	4673	3721	2165	1188
Herring Gull	29339	12332	7526	6305	3146
Iceland Gull	--	--	1	--	2

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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Species	96	97	98	99	100
Individual and Generic Species					
Lesser Black-backed Gull	4	5	2	2	4
Glaucous Gull	--	2	1	--	2
Great Black-backed Gull	2398	3767	3215	873	1691
Black-legged Kittiwake	--	3	6	--	1
Razorbill	1	--	--	1	3
Rock Dove	1054	1788	773	1147	977
Mourning Dove	447	801	1096	496	832
Eastern Screech-Owl	4	5	9	7	9
Great Horned Owl	5	5	8	5	6
Northern Saw-whet Owl	1	--	--	--	1
Belted Kingfisher	20	12	20	24	55
Red-bellied Woodpecker	36	38	45	42	59
Yellow-bellied Sapsucker	--	1	4	3	1
Downy Woodpecker	74	65	58	81	65
Hairy Woodpecker	13	8	6	10	12
Northern (Yellow-shafted) Flicker	30	28	42	49	43
Eastern Phoebe	--	2	1	1	--
Ash-throated Flycatcher	--	--	1	--	--
Horned Lark	--	53	1	60	26
Blue Jay	226	200	103	208	202
American Crow	2794	1568	2261	1562	1647
Fish Crow	72	130	397	16	854
Carolina Chickadee	206	333	271	221	269
chickadee sp.	--	--	1	--	--
Tufted Titmouse	218	225	151	168	208
Red-breasted Nuthatch	4	1	2	--	14

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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Species	96	97	98	99	100
Individual and Generic Species					
White-breasted Nuthatch	44	50	38	43	66
Brown Creeper	7	8	2	3	1
Carolina Wren	60	57	45	66	170
Winter Wren	9	8	3	8	6
Golden-crowned Kinglet	7	29	12	36	11
Ruby-crowned Kinglet	--	1	4	2	2
Eastern Bluebird	9	30	15	5	32
Hermit Thrush	32	7	8	27	20
American Robin	676	1107	598	964	700
Gray Catbird	14	16	8	13	19
Northern Mockingbird	190	94	97	147	185
Brown Thrasher	4	1	4	1	2
American Pipit	--	1	--	--	cw
Cedar Waxwing	204	191	11	63	47
Northern Shrike	2	--	--	--	--
European Starling	4789	5104	4028	3316	5125
Orange-crowned Warbler	--	--	--	--	3
Yellow-rumped (Myrtle) Warbler	17	70	55	259	56
Pine Warbler	1	--	--	--	--
Palm Warbler	--	--	--	1	2
Common Yellowthroat	1	--	2	2	1
Yellow-breasted Chat	--	1	--	--	--
Western Tanager	--	cw	--	--	--
Northern Cardinal	247	267	131	302	242
Dickcissel	--	1	--	--	1
Eastern Towhee	--	--	--	3	3

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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This output will print on one page if font is set to Times New Roman size 12 (Netscape) or Times New Roman medium font (MSIE)

Species	96	97	98	99	100
Individual and Generic Species					
American Tree Sparrow	77	22	61	185	216
Chipping Sparrow	--	1	--	--	1
Field Sparrow	46	22	20	125	95
Vesper Sparrow	--	--	--	1	--
Lark Sparrow	--	--	--	--	1
Savannah Sparrow (form?)	--	32	17	51	40
Grasshopper Sparrow	--	--	1	--	--
Saltmarsh Sharp-tailed Sparrow	--	3	2	--	--
sharp-tailed sparrow sp.	1	--	--	--	--
Seaside Sparrow	--	--	1	--	--
Fox Sparrow	1	7	3	25	36
Song Sparrow	189	349	312	523	329
Swamp Sparrow	13	13	27	25	17
White-throated Sparrow	557	660	759	1396	996
White-crowned Sparrow	13	34	37	34	36
Dark-eyed (Slate-colored) Junco	162	376	261	325	294
Snow Bunting	18	--	--	--	--
Red-winged Blackbird	704	832	995	609	271
Eastern Meadowlark	--	15	6	14	34
Rusty Blackbird	14	--	18	3	6
Common Grackle	17	22	245	9	10
Brown-headed Cowbird	60	158	100	19	63
blackbird sp.	--	--	163	--	--
Baltimore Oriole	--	2	2	--	--
Purple Finch	2	2	2	--	2
House Finch	402	421	364	208	200

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Species Counts for Long Branch, New Jersey (NJLB) for Counts 96-100 Count Day and Count Week (cw) Records

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Species	96	97	98	99	100
Individual and Generic Species					
Common Redpoll	4	--	--	--	--
Pine Siskin	1	--	--	--	--
American Goldfinch	95	123	162	135	212
House Sparrow	742	876	672	407	804
Common Black-headed Gull	1	--	--	--	--
Eastern Rufous-sided Towhee	2	2	--	--	--

162 listed forms seen for Long Branch, New Jersey, (NJLB) for Counts 96-100

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Bird Listing, North American Breeding Bird Survey, Keyport Route, New Jersey

North American Breeding Bird Survey Results

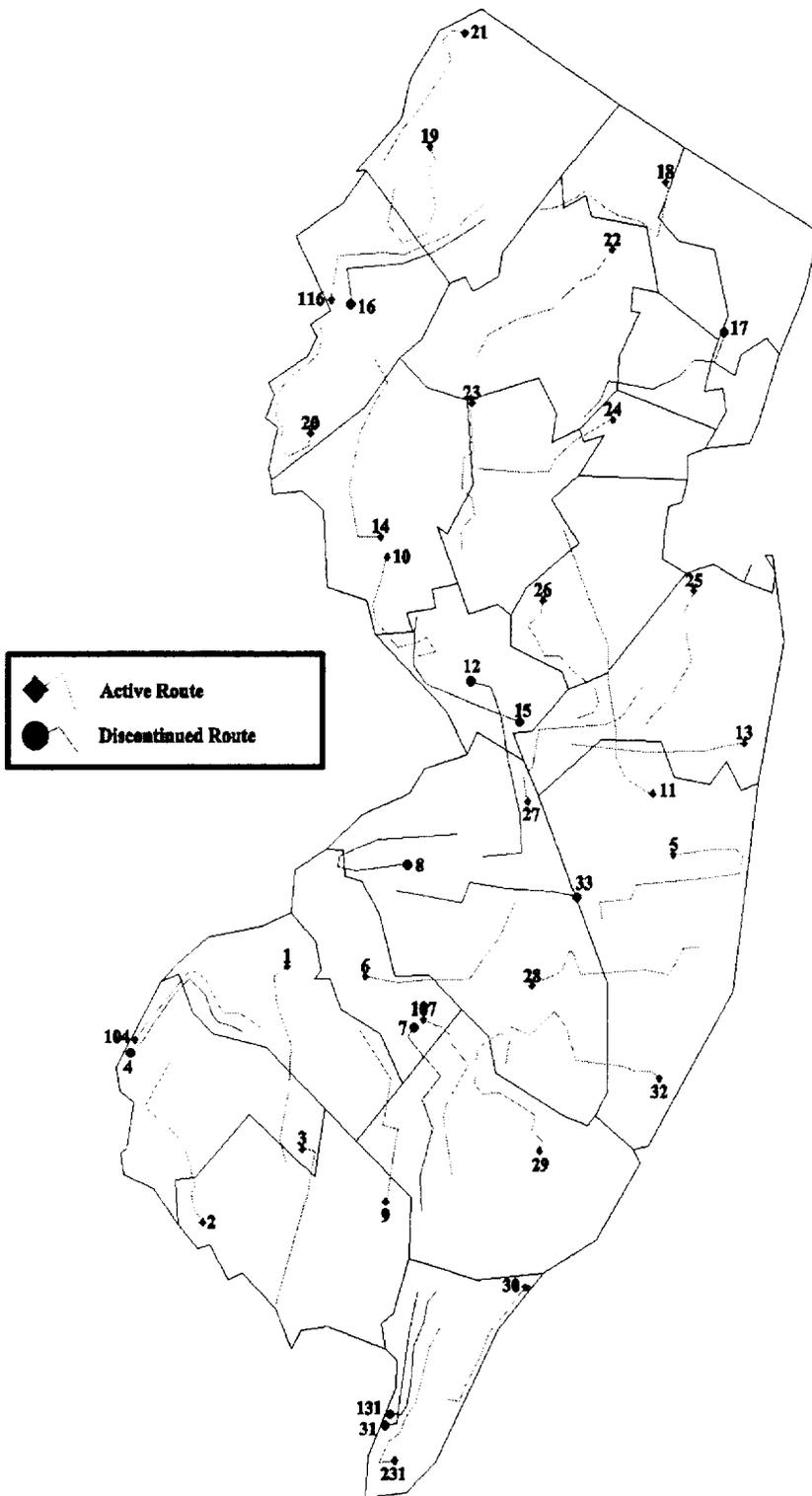
The North American Breeding Bird Survey (BBS) is a large-scale avian survey program to monitor the status and trends of breeding bird populations across North America. The BBS is jointly coordinated by the USGS Patuxent Wildlife Research Center and the Canadian Wildlife Service.

The BBS is a roadside survey program, with more than 4100 permanent active routes of which approximately 3000 are surveyed annually in early summer. Each route is 24.5 miles (39.4 km) long, with 3-minute point counts conducted at 0.5 mile (0.8 km) intervals for a total of 50 point count stops. All birds heard or seen within a 0.25 mile (0.4 km) radius of each stop are recorded. These surveys begin 30 minutes before sunrise and normally require 4 - 5 hours for completion. Sky condition, wind speed, and temperature are also recorded at the beginning and end of each survey. Over 2500 skilled amateur birders and professional biologists participate in the program each year.

List of Species for Route 59025 (Keyport) (see attached route map):

Double-crested Cormorant	Carolina Wren
Great Blue Heron	House Wren
Green Heron	Blue-gray Gnatcatcher
Turkey Vulture	Wood Thrush
Canada Goose	American Robin
Mallard	Gray Catbird
Red-tailed Hawk	Northern Mockingbird
Ring-necked Pheasant	Brown Thrasher
Northern Bobwhite	European Starling
Killdeer	Cedar Waxwing
Herring Gull	Blue-winged Warbler
Rock Dove	Yellow Warbler
Mourning Dove	Pine Warbler
Black-billed Cuckoo	American Redstart
Yellow-billed Cuckoo	Ovenbird
Chimney Swift	Kentucky Warbler
Ruby-throated Hummingbird	Common Yellowthroat
Belted Kingfisher	Scarlet Tanager
Red-bellied Woodpecker	Eastern Towhee
Downy Woodpecker	Chipping Sparrow
Hairy Woodpecker	Field Sparrow
Yellow-shafted Flicker	Savannah Sparrow
Eastern Wood-Pewee	Grasshopper Sparrow
Willow Flycatcher	Song Sparrow
Eastern Phoebe	Northern Cardinal
Great Crested Flycatcher	Rose-breasted Grosbeak
Eastern Kingbird	Blue Grosbeak
White-eyed Vireo	Indigo Bunting
Warbling Vireo	Red-winged Blackbird
Red-eyed Vireo	Eastern Meadowlark
Blue Jay	Common Grackle
American Crow	Brown-headed Cowbird
Fish Crow	Orchard Oriole
Purple Martin	Baltimore Oriole
Tree Swallow	House Finch
Northern Rough-winged Swallow	American Goldfinch
Bank Swallow	House Sparrow
Barn Swallow	
Carolina Chickadee	
Tufted Titmouse	
White-breasted Nuthatch	

59 -- New Jersey BREEDING BIRD SURVEY ROUTE LOCATIONS



NOTE: Survey routes are not drawn to scale and are intended only to provide approximate route locations.

Amphibians and Reptiles

Amphibians and Reptiles of Monmouth County

Common Name

Scientific Name

Amphibians

Jefferson salamander
 northern dusky salamander
 northern two-lined salamander
 northern red salamander
 spotted salamander
 marbled salamander
 silvery salamander
 four-toed salamander
 slimy salamander

Ambystoma jeffersonianum
Desmognathus fuscus fuscus
Eurycea bislineata
Pseudotriton ruber ruber
Ambystoma maculatum
Ambystoma opacum
Ambystoma platineum
Hemidactylum scutatum
Plethodon glutinosus

northern cricket frog
 American toad
 Fowler's toad
 pine barrens treefrog
 northern spring peeper
 northern gray treefrog
 upland chorus frog
 New Jersey chorus frog
 bullfrog
 green frog
 pickerel frog
 northern leopard frog
 southern leopard frog
 wood frog
 carpenter frog
 eastern spadefoot

Acris crepitans crepitans
Bufo americanus
Bufo woodhousii fowleri
Hyla andersonii
Pseudacris crucifer crucifer
Hyla versicolor and *H. chrysoscelis*
Pseudacris triseriata feriarum
Pseudacris triseriata kalmi
Rana catesbeiana
Rana clamitans melanota
Rana palustris
Rana pipiens
Rana utricularia
Rana sylvatica
Rana virgatipes
Scaphiopus holbrookii holbrookii

Reptiles

common snapping turtle
 eastern painted turtle
 spotted turtle
 wood turtle
 northern bog turtle
 eastern mud turtle
 northern diamondback terrapin
 redbelly turtle
 common musk turtle (stinkpot)
 eastern spiny softshell

Chelydra serpentina
Chrysemys picta picta
Clemmys guttata
Clemmys insculpta
Clemmys muhlenbergii
Kinosternon subrubrum subrubrum
Malaclemys terrapin terrapin
Pseudemys rubriventris
Sternotherus odoratus
Apalone spinifera spinifera

five-lined skink
 northern fence skink

Eumeces fasciatus
Cryptoblepharus virgatus

northern copperhead
 eastern worm snake
 northern scarlet snake

Agkistrodon contortrix mokasen
Carphophis amoenus amoenus
Cemophora coccinea copei

Amphibians and Reptiles (cont.)

Reptiles of Monmouth County

Common Name

northern black racer
timber rattlesnake
northern ringneck snake
southern ringneck snake
corn snake
black rat snake
eastern hognose snake
eastern earth snake
eastern kingsnake
eastern milk snake
queen snake
northern water snake
rough green snake
smooth green snake
northern pine snake
northern brown snake
northern redbelly snake
eastern ribbon snake
eastern garter snake

Scientific Name

Coluber constrictor constrictor
Crotalus horridus
Diadophis punctatus edwardsii
Diadophis punctatus punctatus
Elaphe guttata guttata
Elaphe obsoleta obsoleta
Heterodon playirrhinos
Virginia valeriae valeriae
Lampropeltis getula getula
Lampropeltis triangulum triangulum
Regina septemvittata
Nerodia sipedon sipedon
Opheodrys aestivus
Opheodrys vernalis
Pituophis melanoleucus melanoleucus
Storeria dekayi dekayi
Storeria occipitomaculata occipitomaculata
Thamnophis sauritus sauritus
Thamnophis sirtalis sirtalis

Source: Monmouth County Environmental Council, 1978

Rare, Threatened, and Endangered Species

Monmouth County Rare Species and Natural Communities Presently Recorded in the New Jersey Natural Heritage Database

1
28 JUL 1999

MONMOUTH COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
*** Vertebrates						
ACCIPITER COOPERII	COOPER'S HAWK		E		G5	S3B, S4N
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/T		G5	S2B
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1B
CHARADRIUS MELODUS	PIPING PLOVER	LT	E		G3	S1B
CLEMMYS INSCULPTA	WOOD TURTLE		T		G4	S3
CLEMMYS MUHLENBERGII	BOG TURTLE	LT	E		G3	S2
CROTALUS HORRIDUS HORRIDUS	TIMBER RATTLESNAKE		E		G4T4	S2
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2B
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		G4	S1B, S2N
HYLA ANDERSONII	PINE BARRENS TREEFROG		E		G4	S3
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T		G5	S2B, S2N
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON		T/T		G5	S2B
PANDION HALIAETUS	OSPREY		T/T		G5	S2B
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2B, S4N
PITUOPHIS MELANOLEUCUS	NORTHERN PINE SNAKE		T		G5T4	S3
MELANOLEUCUS						
PODILYMBUS PODICEPS	PIED-BILLED GREBE		E/S		G5	S1B, S3N
POECETES GRAMINEUS	VESPER SPARROW		E		G5	S1B, S2N
RYNCHOPS NIGER	BLACK SKIMMER		E		G5	S1B
STERNA ANTILLARUM	LEAST TERN		E		G4	S1B
STRIX VARIA	BARRED OWL		T/T		G5	S3B
*** Ecosystems						
COASTAL DUNE WOODLAND	COASTAL DUNE WOODLAND				G2G3	S1
FLOODPLAIN FOREST	FLOODPLAIN FOREST				G4	S3?
MARITIME FOREST	MARITIME FOREST				G3?	S1
*** Invertebrates						
APAMEA APAMIFORMIS	A NOCTUID MOTH				G4	S2S4

2
28 JUL 1999

MONMOUTH COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CHYTONIX SENSILIS	A NOCTUID MOTH				G4	S1S3
CICINDELA DORSALIS DORSALIS	NORTHEASTERN BEACH TIGER BEETLE	LT	E		G4T2	S1
ENALLAGMA RECURVATUM	PINE BARRENS BLUET				G3	S3
INCISALIA HENRICI	HENRY'S ELFIN				G5	S3S4
INCISALIA IRUS	FROSTED ELFIN				G3G4	S2S3
LJBFLLJULA AURIPENNIS	GOLDEN-WINGED SKIMMER				G5	S1S2
METARRANTHIS PILOSARIA	COASTAL SWAMP METARRANTHIS				G3G4	S3S4

NEONYMPHA AREOLATA	A SATYR			G5T3T4	S3
SEPTENTRIONALIS					
PAPAIPEMA NECOPINA	SUNFLOWER BORER MOTH			G4?	SH
PYGARCTIA ABDOMINALIS	YELLOW EDGED PYGARCTIA			G3G4	SH
SPEYERIA IDALIA	REGAL FRITILLARY			G3	SX
ZALE CUREMA	A NOCTUID MOTH			G3G4	SU
*** Other types					
MIGRATORY SHORFBIRD	MIGRATORY SHOREBIRD			G?	S?
CONCENTRATION SITE	CONCENTRATION SITE				
*** Vascular plants					
AGASTACHE NEPETOIDES	YELLOW GIANT HYSSOP			G5	S2
AMARANTHUS PUMILUS	SEA-BEACH PIGWEED	LT	E	G2	SH
ARTEMISIA CAMPESTRIS SSP CAUDATA	WILD WORMWOOD			G5T5	S2
ASCLEPIAS RUBRA	RED MILKWEED		LP	G4G5	S2
ASCLEPIAS VARIEGATA	WHITE MILKWEED			G5	S2
ASTER INFIRMUS	CORNEL-LEAVED ASTER			G5	S2
ASTER RADULA	LOW ROUGH ASTER		E	G5	S1
CACALIA ATRIPLICIFOLIA	PALE INDIAN PLANTAIN		E	G4G5	S1
CALAMAGROSTIS PICKERINGII	PICKERING'S REEDGRASS		E	G4	S1

3
28 JUL 1999

MONMOUTH COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CALAMOVILFA BREVIPILIS	PINE BARREN REEDGRASS			LP	G4	S4
CAREX BARRATTII	BARRATT'S SEDGE			LP	G3G4	S4
CAREX CUMULATA	CLUSTERED SEDGE		E		G4?	SH
CAREX POLYMORPHA	VARIABLE SEDGE		E		G2G3	S1
CERATOPHYLLUM ECHINATUM	SPINY COONTAIL		E		G4?	S1
CRATAEGUS CALPODENDRON	PEAR HAWTHORN		E		G5	S1
CRATAEGUS SUCCULENTA	FLESHY HAWTHORN		E		G5	S1
CYPERUS LANCASTRIENSIS	LANCASTER FLATSEEDGE				G5	S1
CYPERUS POLYSTACHYOS	COAST FLATSEEDGE		E		G5	S1
DESMODIUM HUMIFUSUM	TRAILING TICK-TREFOIL		E		G1G2Q	SH
DIODIA VIRGINIANA	LARGER BUTTONWEED		E		G5	S1
DIRCA PALUSTRIS	LEATHERWOOD				G4	S2
ERIOCAULON PARKERI	PARKER'S PIPEWORT				G3	S2
FRAXINUS PROFUNDA	PUMPKIN ASH		E		G4	S1
GENTIANA AUTUMNALIS	PINE BARREN GENTIAN			LP	G3	S3
GLAUX MARITIMA	SEA-BEACH MILKWORT		E		G5	SH
HELONIAS BULLATA	SWAMP-PINK	LT	E	LP	G3	S3
HYDROCOTYLE VERTICILLATA	WHORLED PENNYWORT				G5	S2
JUNCUS CAESARIENSIS	NEW JERSEY RUSH		E	LP	G2	S2
LJATRIS SCARIOA VAR NOVAE-ANGLIAE	NORTHERN BLAZING STAR		E		G5?T3	SH
LIMOSEILA SUBULATA	MUDWEED		E		G4?	S1
LINUM INTERCURSUM	SANDPLAIN FLAX		E		G4	S1
LISTERA AUSTRALIS	SOUTHERN TWAYBLADE			LP	G4	S2
LUZULA ACUMINATA	HAIRY WOODRUSH		E		G5	S1
LYGODIUM PALMATUM	CLIMBING FERN			LP	G4	S2
MYRIOPHYLLUM TENELLUM	SLENDER WATER-MILFOIL		E		G5	S1

ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL	E			G4	S1
PHORADENDRON SEROTINUM	MISTLETOE			LP	G5	S2
PLANTAGO MARITIMA	SEA-SIDE PLANTAIN				G5	S2

4
28 JUL 1999

MONMOUTH COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
PLANTAGO PUSILLA	SLENDER PLANTAIN		E		G5	SH
PLATANThERA PERAMOENA	PURPLE FRINGELESS ORCHID		E		G5	S1
POLYGONUM GLAUCUM	SEA-BEACH KNOTWEED		E		G3	S1
PYCNANTHEMUM TORREI	TORREY'S MOUNTAIN MINT		E		G2	S1
PYROLA CHLORANTHA	GREENISH-FLOWERED WINTERGREEN		E		G5	S1
RANUNCULUS CYMBALARIA	SEA-SIDE CROWFOOT		E		G5	SH
RHYNCHOSPORa GLOBULARIS	GRASS-LIKE BEAKED RUSH		E		G5	S1
RHYNCHOSPORa KNIESKERNII	KNIESKERN'S BEAKED RUSH	LT	E	LP	G1	S1
RHYNCHOSPORa PALLIDA	PALE BEAK RUSH				G3	S3
RUMEX HASTATULUS	HEART-WINGED SORRELL				G5	SX.1
SAGITTARIA AUSTRALIS	SOUTHERN ARROW HEAD		E		G5	S1
SALIX LUCIDA	SHINING WILLOW				G5	S2
SCIRPUS MARITIMUS	SALT MARSH BULRUSH		E		G5	SH
SCLERIA MINOR	SLENDER NUT RUSH			LP	G4	S4
TRIGLOCHIN MARITIMUM	SEA-SIDE ARROW-GRASS		E		G5	S1
UVULARIA PUBERULA VAR NITIDA	PINE BARREN BELLWORT		E		G5T3?	S2
VERBENA SIMPLEX	NARROW-LEAVED VERVAIN		E		G5	S1

92 Records Processed

**APPENDIX C
CHARACTERISTICS OF
POTENTIAL BOG TURTLE HABITAT SITES**

Main Post

Poor/marginal northern bog turtle habitat (refer to Figure 7):

- Site 3: Husky Brook, prior to confluence with stream leading to Oceanport Creek, off Murphy Drive. Steep banks; enters a heavily wooded area with poor light penetration; see Figure 8 in Appendix E.
- Site 4: Husky Brook above Husky Brook Lake. Open meadow; lawn mowed to stream; little in-stream plant growth; lack of shrub vegetation and sandy substrate; see Figure 11 in Appendix E.

Charles Wood Subpost

Good/excellent northern bog turtle habitat (refer to Figure 8):

- Site 19: Off Guam Lane. Shallow stream; banks not steep; hummocks of grass; open and shade areas for approximately 500 feet; stream then opens into a meadow for another 500 feet before it flows under Hope Road; not much of a stream flow; good variety of low vegetation growth; see Figure 33 in Appendix E.

Fair northern bog turtle habitat:

- Site 16: North of Corregidor Road. Ditch with slow water flow; ditch is approximately 9 feet wide and grassed; grassed section is approximately 1,000 feet long after it emerges from a culvert under Corregidor Road; stream goes under Guam Lane and finally widens about 400 feet west of Hope Road; some low bank vegetation; lawn maintained at least up to the banks on both sides of the stream; see Figure 23 in Appendix E.

Poor/marginal northern bog turtle habitat:

- Site 12: Off Lothar Drive, looking west. Shallow water; steep banks; may dry up on occasion; no in-stream vegetation; see Figure 19 in Appendix E.
- Site 13: Seventeenth hole. Steep banks; shallow water; some in-stream vegetation.
- Site 15: Roadside ditch off 10th hole. Steep sides; may become dry; some vegetation along banks; does contain a population of mosquito fish, so there are pockets of permanent water; see Figure 21 in Appendix E.
- Site 18: Shallow stream that meanders through a heavily wooded area. Sandy loam substrate; occasional light penetration; some steep banks; not much in-stream vegetation; see Figure 31 in Appendix E.

**APPENDIX D
FIELD NOTES**

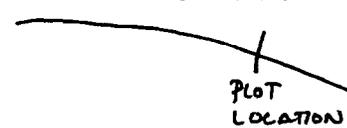
*Field Notes for Flora Survey
and Vegetative Communities Survey*

A. IDENTIFIERS / LOCATION (GENERAL EOR INFORMATION)

1. Community name (SNAME): MESIC COASTAL PLAIN MIXED OAK FOREST 2. GNAME: _____
 3. TNC site name: CHARLES WOOD SUPPORT 4. Survey site name: SAMPLE STATION 2
 5. Quad name(s): LONG BRANCH 6. Quad code(s): _____
 7. County name(s): MONMOUTH 8. County code(s): _____
 9. Town (LOCAL JURIS): EATONTOWN 10. Lat: N 40° 17' 31" 11. Long: W 74° 5' 4"
 12. Directions to this plot (how to find this plot in the site): SEE MAPS.

13. Sourcecode: _____ 14. Survey date: MARCH 18 2000
 15. Last obs (optional): _____ 16. First obs (optional): _____ 17. State: NEW JERSEY
 18. Surveyors: WILLIAM OLSON

I. ENVIRONMENTAL DESCRIPTION

<p>19. Transect/observation point # <u>Z</u></p>	<p>20. Image annotation # <u>K, L, M</u></p>	<p>21. Elevation: <u>45 FEET</u></p>
<p>22. Topographic position: <input type="checkbox"/> Interfluvial <input type="checkbox"/> Toeslope <input type="checkbox"/> High slope <input type="checkbox"/> Low level <input checked="" type="checkbox"/> High level <input type="checkbox"/> Channel wall <input type="checkbox"/> Midslope <input type="checkbox"/> Channel bed <input type="checkbox"/> Backslope <input type="checkbox"/> Basin floor <input type="checkbox"/> Step in slope <input type="checkbox"/> Other: <input type="checkbox"/> Lowslope</p>	<p>23. Topographic sketch (show where plot is located within surrounding topography):</p> 	<p>24. Slope degrees: <u>45°</u> 25. Slope aspect: <u>EAST FACING</u> 26. Parent material/bedrock: <u>UNCONSOLIDATED SAND, CLAY AND GRAVEL</u></p>
<p>27. Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)</p> <p>28. Organic horizon depth: <u>N/A</u></p>	<p>31. Soil moisture regime: <input type="checkbox"/> Extremely dry <input type="checkbox"/> Very dry <input type="checkbox"/> Dry <input checked="" type="checkbox"/> Well drained <input type="checkbox"/> Somewhat moist <input type="checkbox"/> Moist <input type="checkbox"/> Somewhat wet <input type="checkbox"/> Wet <input type="checkbox"/> Permanently inundated <input type="checkbox"/> Periodically inundated</p>	<p>32. Soil drainage: <input type="checkbox"/> Rapidly drained <input checked="" type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input type="checkbox"/> Very poorly drained</p>
<p>29. Organic horizon type: Mor: _____ Mull: _____</p> <p>30. Average pH of mineral soil: <u>5.1</u></p>	<p>33. Inundation: <input checked="" type="checkbox"/> Never inundated <input type="checkbox"/> Periodic inundation, frequency unknown <input type="checkbox"/> Infrequently inundated <input type="checkbox"/> Always submerged by shallow water < 30 cm <input type="checkbox"/> Regularly inundated <input type="checkbox"/> Always submerged by deep water > 30 cm <input type="checkbox"/> Frequently inundated for periods greater than 6 months</p>	<p>34. Stoniness: <input type="checkbox"/> Stone free < 0.1% <input checked="" type="checkbox"/> Moderately stony 0.1-1% <input type="checkbox"/> Stony 3-15% <input type="checkbox"/> Very stony 15-50% <input type="checkbox"/> Exceedingly stony 50-90% <input type="checkbox"/> Stone piles > 90%</p>
<p><u>2.5" - LEAF LITTER</u></p> <p><u>0-10" - 104R4/4</u> <u>BROWN SANDY LOAM</u></p> <p><u>10-24" 104R5/6</u> <u>YELLOWISH BROWN SANDY LOAM</u></p>	<p>36. Average organic soil texture: <input type="checkbox"/> muck <u>N/A</u> <input type="checkbox"/> peat</p> <p>Von Post scale of peat decomposition: _____ pH of peat: _____</p>	<p>35. Average mineral soil texture: <input type="checkbox"/> sand <input type="checkbox"/> loamy sand <input type="checkbox"/> loam <input checked="" type="checkbox"/> sandy loam <input type="checkbox"/> silt loam <input type="checkbox"/> sandy clay loam <input type="checkbox"/> clay loam <input type="checkbox"/> silty clay loam <input type="checkbox"/> silt <input type="checkbox"/> sandy clay <input type="checkbox"/> clay <input type="checkbox"/> silty clay</p> <p>37. Unvegetated surface: <input type="checkbox"/> % Bedrock <input type="checkbox"/> % Litter, duff <input type="checkbox"/> % Large rocks (>10cm) <input type="checkbox"/> % Wood >1cm <input type="checkbox"/> % Small rocks (0.2-10cm) <input type="checkbox"/> % Water <input checked="" type="checkbox"/> 100% Sand (0.1-2mm) <input type="checkbox"/> % Other: <input type="checkbox"/> % Bare soil</p>
<p>38. Environmental Comments: Note homogeneity of vegetation, evidence of erosion/sedimentation, further observations of inundation, etc. <u>NO EROSION OR SEDIMENTATION OTHER THAN ASSOCIATED WITH SAND ROADS INTO AREA. AREA AT EASTERN SECTION IS TRANSITIONAL TO WETLANDS</u></p>		
<p>39. Plot representativeness: <u>DOMINATION BY OAK IS REPRESENTATIVE OF UPLAND WOODS.</u></p>		

C. VEGETATION

40. System: Terrestrial Palustrine Estuarine

41. Plot number: 2

42. Plot dimensions: 2 acres

Community name: SIC HTM LAM
MIXED OAK FOREST

43. Leaf type:	44. Leaf phenology:	45. Physiognomic type:	46. Strata/life forms	% cover	height
<input checked="" type="checkbox"/> Broad-leaf	<input checked="" type="checkbox"/> Deciduous	<input type="checkbox"/> Forest	T1 Emergent tree (>5m)	7	~ 45 FEET
<input type="checkbox"/> Semi-broad-leaf	<input type="checkbox"/> Semi-deciduous	<input checked="" type="checkbox"/> Woodland	T2 Tree canopy (>5m)	100	~ 30 FEET
<input type="checkbox"/> Mixed broad-needle leaf	<input type="checkbox"/> Mixed deciduous-evergreen	<input type="checkbox"/> Sparse woodland	T3 Tree sub-canopy (>5m)	4	10 FEET
<input type="checkbox"/> Semi-needle-leaf	<input type="checkbox"/> Semi-evergreen	<input type="checkbox"/> Shrubland	S1 Tall shrub (2m - 5m)	40	6 FEET
<input type="checkbox"/> Needle-leaf	<input type="checkbox"/> Evergreen	<input type="checkbox"/> Sparse shrubland	S2 Short shrub (< 2m)	16	1.5 FEET
<input type="checkbox"/> Graminoid	<input type="checkbox"/> Perennial	<input type="checkbox"/> Dwarf shrubland	V Vine/liana	1	3 FEET
<input type="checkbox"/> Broad-leaf herbaceous	<input type="checkbox"/> Annual	<input type="checkbox"/> Sparse dwarf shrubland	H Herbaceous	5	0.5 FEET
<input type="checkbox"/> Pteridophyte		<input type="checkbox"/> Herbaceous	N Non-vascular	1	—
<input type="checkbox"/> Non-vascular		<input type="checkbox"/> Sparsely vegetated	E Epiphyte	—	—
			A1 Emergent aquatic	—	—
			A2 Floating-leaved aquatic	—	—
			A3 Submerged aquatic	—	—

47. Species/percent cover: starting with the uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list the DBH of all trees over 10 cm diameter on a separate line below each tree species. Separate the measurements with a comma and note whether in cm or inches.

T1	T2 (cont.)	T3
<i>Quercus rubra</i> 5%		<i>Sassafras albidum</i> 2%
56, 69, 58	<i>Quercus prinus</i> 10%	<i>Pinus strobus</i> 2%
	13, 13, 22.5, 15, 11, 14, 12, 16	
<i>Quercus alba</i> 2%	<i>Nyssa sylvatica</i> 5%	S1
56.5	9.5, 34, 11, 13.5, 12, 11	<i>Kalmia latifolia</i> 25%
		<i>Rhododendron periclymenoides</i> 5%
	<i>Acer rubrum</i> 5%	<i>Vaccinium corymbosum</i> 5%
	9.5, 14.5, 16.5, 11, 7, 14	<i>Clethra alatifolia</i> 5%
T2		
<i>Quercus rubra</i> 40%	<i>Betula populifolia</i> 5%	S2
44.5, 42, 37.5, 19.5, 35, 46, 34, 19, 18.5,	8.5, 8.5, 16.5, 11	<i>Gaylussacia frondosa</i> 7%
15.5, 17.5, 35, 28, 32, 16, 24, 31, 18, 18.5,	<i>Liquidambar styraciflua</i> 5%	<i>Vaccinium pallidum</i> 7%
37.5, 14.5, 15.5, 36, 16.5, 17, 27, 12, 17.5,	22.5, 34, 13.5, 16.5, 17.5, 12, 16	<i>Chimaphila maculata</i> 2%
27, 24, 27, 23, 29.5, 35, 18, 30.5, 38.5,		
21.5, 45, 18, 42, 29, 23, 26.5, 31.5, 21.5,	<i>Sassafras albidum</i> 2%	V
12.5, 23, 22.5, 40, 22.5, 18, 29, 35, 45, 29,	13, 12.5	<i>Smilax glauca</i> 1%
12.5		
<i>Quercus alba</i> 15%	<i>Fagus grandifolia</i> 2%	H
29, 31, 13.5, 30.5, 23, 43, 10.5, 25.5, 13, 29.5,	16.5	<i>Carex pensylvanica</i> 3%
13.5, 31.5, 30, 36.5, 22.5, 28.5, 12.5, 17, 23,	<i>Pinus echinata</i> 2%	<i>Glechoma hederacea</i> 1%
19.5, 9.5, 46, 16	33	<i>Juncus tenuis</i> 1%
<i>Quercus velutina</i> 10%		N
34, 33, 31, 22, 19.5, 27, 32.5, 36, 34.5		<i>Dicranum scoparium</i> 1%

A. IDENTIFIERS / LOCATION (GENERAL EOR INFORMATION)

1. Community name (SNAME): MESIC COASTAL PLAIN MIXED OAK FOREST 2. GNAME: ---
 3. ~~Site~~ site name: CHARLES WOOD SUB POST 4. Survey site name: SAMPLE STATION 1
 5. Quad name(s): LONG BRANCH 6. Quad code(s): ---
 7. County name(s): MONMOUTH 8. County code(s): ---
 9. Town (LOCAL JURIS): EATONTOWN 10. Lat: N 40° 17' 34" 11. Long: W 74° 5' 20"
 12. Directions to this plot (how to find this plot in the site): SEE MAPS.

13. Source code: --- 14. Survey date: MARCH 18, 2000
 15. Last obs (optional): --- 16. First obs (optional): --- 17. State: NEW JERSEY
 18. Surveyors: WILLIAM OLSON

ENVIRONMENTAL DESCRIPTION

19. Transect/observation point # <u>1</u>	20. Image annotation # <u>G, H, I & J</u>	21. Elevation: <u>50 FEET</u>
22. Topographic position: <input type="checkbox"/> Interfluvial <input type="checkbox"/> Toeslope <input type="checkbox"/> High slope <input type="checkbox"/> Low level <input type="checkbox"/> High level <input type="checkbox"/> Channel wall <input checked="" type="checkbox"/> Midslope <input type="checkbox"/> Channel bed <input type="checkbox"/> Backslope <input type="checkbox"/> Basin floor <input type="checkbox"/> Step in slope <input type="checkbox"/> Other: <input type="checkbox"/> Lowslope	23. Topographic sketch (show where plot is located within surrounding topography): 	24. Slope degrees: <u>< 5°</u> 25. Slope aspect: <u>N FACING</u> 26. Parent material/bedrock: <u>UNCONSOLIDATED SAND, CLAY AND GRAVEL</u>
27. Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)	31. Soil moisture regime: <input type="checkbox"/> Extremely dry <input type="checkbox"/> Very dry <input type="checkbox"/> Dry <input checked="" type="checkbox"/> Well drained <input type="checkbox"/> Somewhat moist <input type="checkbox"/> Moist <input type="checkbox"/> Somewhat wet <input type="checkbox"/> Wet <input type="checkbox"/> Permanently inundated <input type="checkbox"/> Periodically inundated	32. Soil drainage: <input type="checkbox"/> Rapidly drained <input checked="" type="checkbox"/> Well drained <input type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input type="checkbox"/> Very poorly drained
28. Organic horizon depth: <u>N/A</u>	33. Inundation: <input checked="" type="checkbox"/> Never inundated <input type="checkbox"/> Periodic inundation, frequency unknown <input type="checkbox"/> Infrequently inundated <input type="checkbox"/> Always submerged by shallow water < 30 cm <input type="checkbox"/> Regularly inundated <input type="checkbox"/> Always submerged by deep water > 30 cm <input type="checkbox"/> Frequently inundated for periods greater than 6 months	
29. Organic horizon type: Mor: <u>---</u> Mull: <u>---</u>	34. Stoniness: <input type="checkbox"/> Stone free < 0.1% <input checked="" type="checkbox"/> Moderately stony 0.1-1% <input type="checkbox"/> Stony 3-15% <input type="checkbox"/> Very stony 15-50% <input type="checkbox"/> Exceedingly stony 50-90% <input type="checkbox"/> Stone piles > 90%	
30. Average pH of mineral soil: <u>5.7</u>	35. Average mineral soil texture: <input type="checkbox"/> sand <input type="checkbox"/> loamy sand <input type="checkbox"/> loam <input checked="" type="checkbox"/> sandy loam <input type="checkbox"/> silt loam <input type="checkbox"/> sandy clay loam <input type="checkbox"/> clay loam <input type="checkbox"/> silty clay loam <input type="checkbox"/> silt <input type="checkbox"/> sandy clay <input type="checkbox"/> clay <input type="checkbox"/> silty clay	
<p>2" - LEAF LITTER</p> <p>0-8" 10YR 3/3 DARK BROWN SANDY LOAM</p> <p>8-18" 10YR 5/6 YELLOWISH BROWN SANDY LOAM</p> <p>18-30" 10YR 5/6 YELLOWISH BROWN SANDY CLAY LOAM</p>	36. Average organic soil texture: <input type="checkbox"/> muck <u>N/A</u> <input type="checkbox"/> peat Von Post scale of peat decomposition: <u>---</u> pH of peat: <u>---</u>	
37. Unvegetated surface: <input type="checkbox"/> % Bedrock <input type="checkbox"/> % Litter, duff <input type="checkbox"/> % Large rocks (> 10cm) <input type="checkbox"/> % Wood > 1cm <input type="checkbox"/> % Small rocks (0.2-10cm) <input type="checkbox"/> % Water <input checked="" type="checkbox"/> 100% Sand (0.1-2mm) <input type="checkbox"/> % Other: <input type="checkbox"/> % Bare soil		
38. Environmental Comments: Note homogeneity of vegetation, evidence of erosion/sedimentation, further observations of inundation, etc. <u>NO EROSION OR SEDIMENTATION OBSERVED. VEGETATION WITHIN PLOT IS FAIRLY HOMOGENEOUS.</u>		
39. Plot representativeness: <u>DOMINATION BY OAK SPECIES IS REPRESENTATIVE OF AREA OF VOLAND WOODS</u>		

C. VEGETATION

40. System: Terrestrial Palustrine Estuarine

41. Plot number: 1

42. Plot dimensions: 1.5 ACRES

ORNM name: 316 HSI
MIXED OAK FOREST

43. Leaf type: <input checked="" type="checkbox"/> Broad-leaf <input type="checkbox"/> Semi-broad-leaf <input type="checkbox"/> Mixed broad-needle leaf <input type="checkbox"/> Semi-needle-leaf <input type="checkbox"/> Needle-leaf <input type="checkbox"/> Graminoid <input type="checkbox"/> Broad-leaf herbaceous <input type="checkbox"/> Pteridophyte <input type="checkbox"/> Non-vascular	44. Leaf phenology: <input checked="" type="checkbox"/> Deciduous <input type="checkbox"/> Semi-deciduous <input type="checkbox"/> Mixed deciduous-evergreen <input type="checkbox"/> Semi-evergreen <input type="checkbox"/> Evergreen <input type="checkbox"/> Perennial <input type="checkbox"/> Annual	45. Physiognomic type: Forest <input checked="" type="checkbox"/> Woodland <input type="checkbox"/> Sparse woodland <input type="checkbox"/> Shrubland <input type="checkbox"/> Sparse shrubland <input type="checkbox"/> Dwarf shrubland <input type="checkbox"/> Sparse dwarf shrubland <input type="checkbox"/> Herbaceous <input type="checkbox"/> Sparsely vegetated	46. Strata/life forms	% cover	height
			T1 Emergent tree (>5m)	15	~ 40 FEET
			T2 Tree canopy (>5m)	100	~ 35 FEET
			T3 Tree sub-canopy (>5m)	20	10 FEET
			S1 Tall shrub (2m - 5m)	10	6 FEET
			S2 Short shrub (< 2m)	20	1-5 FEET
			V Vine/liana	—	—
			H Herbaceous	7	0.5 FEET
			N Non-vascular	5	—
			E Epiphyte	—	—
			A1 Emergent aquatic	—	—
			A2 Floating-leaved aquatic	—	—
			A3 Submerged aquatic	—	—

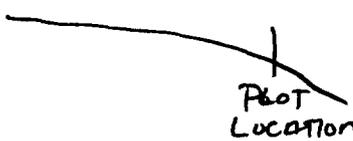
47. Species/percent cover: starting with the uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list the DBH of all trees over 10 cm diameter on a separate line below each tree species. Separate the measurements with a comma and note whether in cm or inches.

T1	T3 (cont.)	N (cont.)
<i>Quercus prinus</i> 65.5 (cm), 55, 51 15%	<i>Quercus rubra</i> 5%	<i>Parmelia rufecta</i> 1%
	<i>Quercus alba</i> 5%	
T2 <i>Quercus prinus</i> 24, 33.5, 43.5, 24.5, 9, 33.5, 8.5, 34, 37, 39, 9, 31, 22.5, 24.5, 41, 37.5, 35, 23.5, 37, 42, 41.5, 35 60%	<i>Pinus strobus</i> 5%	
<i>Quercus rubra</i> 27.5, 11, 7, 22.5, 10, 8, 37, 11.5, 34.5, 32.5, 40, 39 20%	S1 <i>Rhododendron periclymenoides</i> 5%	
<i>Quercus alba</i> 9, 21.5, 21.5, 7.5, 8.5, 8, 7, 16.5, 33, 33 15%	<i>Vaccinium corymbosum</i> 5%	
<i>Pinus strobus</i> 48, 28 5%	S2 <i>Vaccinium pallidum</i> 20%	
	H <i>Carex pennsylvanica</i> 7%	
T3 <i>Quercus prinus</i> 5%	N <i>Polytrichum commune</i> 2%	
	<i>Leucobryum glaucum</i> 2%	

A. IDENTIFIERS / LOCATION (GENERAL EOR INFORMATION)

1. Community name (SNAME): SWEETGUM/RED MAPLE WOODS 2. GNAME: ---
 3. PNC site name: CHARLES WOOD SUBPOST 4. Survey site name: SAMPLE STATION 3
 5. Quad name(s): LONG BRANCH 6. Quad code(s): ---
 7. County name(s): MONMOUTH 8. County code(s): ---
 9. Town (LOCAL JURIS): EATONTOWN 10. Lat: N 40° 17' 32" 11. Long: W 74° 5' 4"
 12. Directions to this plot (how to find this plot in the site): SEE MAPS
 13. Source code: --- 14. Survey date: MARCH 18 2000
 15. Last obs (optional): --- 16. First obs (optional): --- 17. State: NEW JERSEY
 18. Surveyors: WILLIAM OLSON

B. ENVIRONMENTAL DESCRIPTION

<p>19. Transect/observation point # <u>3</u></p>	<p>20. Image annotation # <u>S, T & U</u></p>	<p>21. Elevation: <u>39 FEET</u></p>
<p>22. Topographic position: <input type="checkbox"/> Interfluvial <input type="checkbox"/> Toeslope <input type="checkbox"/> High slope <input type="checkbox"/> Low level <input type="checkbox"/> High level <input type="checkbox"/> Channel wall <input checked="" type="checkbox"/> Midslope <input type="checkbox"/> Channel bed <input type="checkbox"/> Backslope <input type="checkbox"/> Basin floor <input type="checkbox"/> Step in slope <input type="checkbox"/> Other: <input type="checkbox"/> Low slope</p>	<p>23. Topographic sketch (show where plot is located within surrounding topography):</p> 	<p>24. Slope degrees: <u>< 5°</u> 25. Slope aspect: <u>EAST FACING</u> 26. Parent material/bedrock: <u>UNCONSOLIDATED SAND, CLAY AND GRAVEL</u></p>
<p>27. Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)</p> <p>28. Organic horizon depth: <u>N/A</u></p> <p>29. Organic horizon type: Mor: <u>---</u> Mull: <u>---</u></p> <p>30. Average pH of mineral soil: <u>5.1</u></p>	<p>31. Soil moisture regime: <input type="checkbox"/> Extremely dry <input type="checkbox"/> Very dry <input type="checkbox"/> Dry <input type="checkbox"/> Well drained <input checked="" type="checkbox"/> Somewhat moist <input type="checkbox"/> Moist <input type="checkbox"/> Somewhat wet <input type="checkbox"/> Wet <input type="checkbox"/> Permanently inundated <input type="checkbox"/> Periodically inundated</p>	<p>32. Soil drainage: <input type="checkbox"/> Rapidly drained <input type="checkbox"/> Well drained <input checked="" type="checkbox"/> Moderately well drained <input type="checkbox"/> Somewhat poorly drained <input type="checkbox"/> Poorly drained <input type="checkbox"/> Very poorly drained</p>
<p>2" - LEAF LITTER</p> <p>0-10" 10YR 4/3 BROWN SANDY LOAM</p>	<p>33. Inundation: <input checked="" type="checkbox"/> Never inundated <input type="checkbox"/> Periodic inundation, frequency unknown <input type="checkbox"/> Infrequently inundated <input type="checkbox"/> Always submerged by shallow water < 30 cm <input type="checkbox"/> Regularly inundated <input type="checkbox"/> Always submerged by deep water > 30 cm <input type="checkbox"/> Frequently inundated for periods greater than 6 months</p> <p>34. Stoniness: <input type="checkbox"/> Stone free < 0.1% <input checked="" type="checkbox"/> Moderately stony 0.1-1% <input type="checkbox"/> Stony 3-15% <input type="checkbox"/> Very stony 15-50% <input type="checkbox"/> Exceedingly stony 50-90% <input type="checkbox"/> Stone piles > 90%</p>	<p>35. Average mineral soil texture: <input type="checkbox"/> sand <input type="checkbox"/> loamy sand <input type="checkbox"/> loam <input type="checkbox"/> sandy loam <input type="checkbox"/> silt loam <input checked="" type="checkbox"/> sandy clay loam <input type="checkbox"/> clay loam <input type="checkbox"/> silty clay loam <input type="checkbox"/> silt <input type="checkbox"/> sandy clay <input type="checkbox"/> clay <input type="checkbox"/> silty clay</p>
<p>10-20" 10YR 5/4 SANDY CLAY LOAM</p>	<p>36. Average organic soil texture: <input type="checkbox"/> muck <input checked="" type="checkbox"/> N/A <input type="checkbox"/> peat</p> <p>Von Post scale of peat decomposition: <u>---</u> pH of peat: <u>---</u></p>	<p>37. Unvegetated surface: <input type="checkbox"/> % Bedrock <input type="checkbox"/> % Litter, duff <input type="checkbox"/> % Large rocks (>10cm) <input type="checkbox"/> % Wood >1cm <input type="checkbox"/> % Small rocks (0.2-10cm) <input type="checkbox"/> % Water <input checked="" type="checkbox"/> % Sand (0.1-2mm) <input type="checkbox"/> % Other: <input type="checkbox"/> % Bare soil</p>
<p>38. Environmental Comments: Note homogeneity of vegetation, evidence of erosion/sedimentation, further observations of inundation, etc. <u>A DITCH IS PRESENT IN SAMPLE STATION. THERE ARE SIGNS OF SEDIMENTATION AND EROSION. THE AREA IS DISTURBED. DEBRIS PRESENT.</u></p>		
<p>39. Plot representativeness: <u>PLOT IS PART OF A SMALL TRANSITIONAL WOODS BETWEEN LABORATORY ROAD AND WETLANDS NEAR HOPE ROAD</u></p>		

C. VEGETATION

40. System: Terrestrial Palustrine Estuarine

41. Plot number: 3

42. Plot dimensions: 1.5 acre

Common name: WOODS

<p>43. Leaf type:</p> <p><input checked="" type="checkbox"/> Broad-leaf</p> <p><input type="checkbox"/> Semi-broad-leaf</p> <p><input type="checkbox"/> Mixed broad-needle leaf</p> <p><input type="checkbox"/> Semi-needle-leaf</p> <p><input type="checkbox"/> Needle-leaf</p> <p><input type="checkbox"/> Graminoid</p> <p><input type="checkbox"/> Broad-leaf herbaceous</p> <p><input type="checkbox"/> Pteridophyte</p> <p><input type="checkbox"/> Non-vascular</p>	<p>44. Leaf phenology:</p> <p><input checked="" type="checkbox"/> Deciduous</p> <p><input type="checkbox"/> Semi-deciduous</p> <p><input type="checkbox"/> Mixed deciduous-evergreen</p> <p><input type="checkbox"/> Semi-evergreen</p> <p><input type="checkbox"/> Evergreen</p> <p><input type="checkbox"/> Perennial</p> <p><input type="checkbox"/> Annual</p>	<p>45. Physiognomic type:</p> <p><input type="checkbox"/> Forest</p> <p><input checked="" type="checkbox"/> Woodland</p> <p><input type="checkbox"/> Sparse woodland</p> <p><input type="checkbox"/> Shrubland</p> <p><input type="checkbox"/> Sparse shrubland</p> <p><input type="checkbox"/> Dwarf shrubland</p> <p><input type="checkbox"/> Sparse dwarf shrubland</p> <p><input type="checkbox"/> Herbaceous</p> <p><input type="checkbox"/> Sparsely vegetated</p>	<p>46. Strata/life forms</p> <table border="1"> <thead> <tr> <th></th> <th>% cover</th> <th>height</th> </tr> </thead> <tbody> <tr> <td>T1 Emergent tree (>5m)</td> <td>9</td> <td>~45 FEET</td> </tr> <tr> <td>T2 Tree canopy (>5m)</td> <td>100</td> <td>~35 FEET</td> </tr> <tr> <td>T3 Tree sub-canopy (>5m)</td> <td>—</td> <td>—</td> </tr> <tr> <td>S1 Tall shrub (2m - 5m)</td> <td>13</td> <td>6 FEET</td> </tr> <tr> <td>S2 Short shrub (< 2m)</td> <td>3</td> <td>0.5 FEET</td> </tr> <tr> <td>V Vine/liana</td> <td>4</td> <td>3 FEET</td> </tr> <tr> <td>H Herbaceous</td> <td>2</td> <td>0.5 FEET</td> </tr> <tr> <td>N Non-vascular</td> <td>—</td> <td>—</td> </tr> <tr> <td>E Epiphyte</td> <td>—</td> <td>—</td> </tr> <tr> <td>A1 Emergent aquatic</td> <td>—</td> <td>—</td> </tr> <tr> <td>A2 Floating-leaved aquatic</td> <td>—</td> <td>—</td> </tr> <tr> <td>A3 Submerged aquatic</td> <td>—</td> <td>—</td> </tr> </tbody> </table>		% cover	height	T1 Emergent tree (>5m)	9	~45 FEET	T2 Tree canopy (>5m)	100	~35 FEET	T3 Tree sub-canopy (>5m)	—	—	S1 Tall shrub (2m - 5m)	13	6 FEET	S2 Short shrub (< 2m)	3	0.5 FEET	V Vine/liana	4	3 FEET	H Herbaceous	2	0.5 FEET	N Non-vascular	—	—	E Epiphyte	—	—	A1 Emergent aquatic	—	—	A2 Floating-leaved aquatic	—	—	A3 Submerged aquatic	—	—
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47. Species/percent cover: starting with the uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list the DBH of all trees over 10 cm diameter on a separate line below each tree species. Separate the measurements with a comma and note whether in cm or inches.

Stratum	Species	% cover	DBH (cm)	
T1	<i>Liquidambar styraciflua</i>	5%	69.5, 60, 61, 90 (cm)	
	<i>Liriodendron tulipifera</i>	1%	56	
	<i>Acer rubrum</i>	1%	62	
	<i>Quercus alba</i>	2%	80, 63.5	
	T2			
	<i>Liquidambar styraciflua</i>	30%	23, 19.5, 34, 23, 22, 35, 15, 9, 39.5, 13.5, 15, 13.5, 17, 20.5, 12, 11.5, 8.5, 5.5, 30	
<i>Acer rubrum</i>	30%	10, 8.5, 18, 14, 13.5, 19, 9, 18.5, 15, 13.5, 13.5, 21, 16.5, 12, 13.5, 15.5, 23.5, 46		
<i>Quercus alba</i>	10%	51, 13, 30.5, 25, 52.5, 13.5, 14		
T2 (cont.)	<i>Ailanthus altissima</i>	10%	19.5, 30, 16.5, 16	
	<i>Nyssa sylvatica</i>	10%	13, 9, 9, 14, 25.5	
S1	<i>Quercus velutina</i>	5%	38, 47	
	<i>Carya tomentosa</i>	5%	25	
S1 (cont.)	<i>Rosa multiflora</i>	17%		
	<i>Pachysandra terminalis</i>	3%		
	<i>Smilax rotundifolia</i>	2%		
	<i>Lonicera japonica</i>	2%		
	<i>Allium vineale</i>	2%		
S2	<i>Viburnum dentatum</i>	5%		
	<i>Lindera benzoin</i>	2%		
	<i>Clethra alnifolia</i>	2%		
	<i>Vaccinium corymbosum</i>	2%		
H	<i>Berberis thunbergii</i>	1%		

Field Notes for Swamp Pink Survey

Oceanport Creek, Mill Creek, Husky Brook, Husky Brook Lake, Parker Creek and Lafetra Creek were visited during this investigation the main post on Fort Monmouth on February 26, 2000. No plants of Swamp-Pink (*Helonias bullata* L.) were observed on or adjacent to Fort Monmouth. The following is a description of the areas visited and the conditions found in the plant communities present.

Oceanport Creek leaves the base south of Murphy Drive. The section of Oceanport Creek north of Murphy Drive is disturbed. The creek is ripraped with little to no vegetation present. This section is also tidal. No wetland fringe was present. These conditions do not make this section of Oceanport Creek suitable for Swamp-Pink. There is no habitat for Swamp-Pink in this section. See photos A and B in Appendix B.

At Malterer Avenue, Oceanport Creek/Husky Brook has old wooden walls along the creek. Biologs have been installed and were observed along the creek in this section. No wetland fringe exists in this area. A number of disturbance species were observed along this section of the creek between Malterer Avenue and where the creek branches. No habitat was observed for Swamp-Pink in this section. See photos C through H in Appendix B. The plant species that were found in this section are as follows:

Nyssa sylvatica Marsh. Black Tupelo
Liquidambar styraciflua L. Sweet-Gum
Smilax glauca Walt. Sawbrier
Ageratina altissima (L.) King & H.E. Robins. White Snakeroot
Lonicera japonica Thunb. Japanese Honeysuckle
Toxicodendron radicans (L.) Kuntze Eastern Poison-Ivy
Allium vineale L. Crow Garlic
Rosa multiflora Thunb. Ex Murr. Rambler Rose
Sassafras albidum (Nutt.) Nees Sassafras
Prunus serotina Ehrh. Black Cherry
Smilax rotundifolia L. Horsebrier
Viburnum dentatum L. Southern Arrow-Wood
Robinia pseudoacacia L. Black Locust

The next area investigated was the end of the Oceanport Creek located behind Building 973 off Razor Avenue. The creek ended at the edge of the parking area and a ditch ran perpendicular to the parking area. This section of creek had steep eroded banks, a narrow wetland fringe and had abundant weed species present. No habitat for Swamp-Pink was observed in this section. The list of vegetation observed is as follows:

Rosa multiflora Thunb. Ex Murr. Rambler Rose
Prunus serotina Ehrh. Black Cherry
Polygonum cuspidatum Sieb. & Zucc. Japanese Knotweed
Ageratina altissima (L.) King & H.E. Robins. White Snakeroot
Robinia pseudoacacia L. Black Locust
Liquidambar styraciflua L. Sweet-Gum

No suitable habitat was observed in the Oceanport Creek or Husky Brook. See photos I and J in Appendix B.

The downstream side of Husky Brook Lake had no suitable habitat for Swamp-Pink. There was a narrow wetland fringe along the lake in this section. There were steep banks observed in this section of the lake. Soil erosion is evident in this area by the steep banks and bare soil conditions. Erosional channels caused by stormwater runoff were observed. No Swamp-Pink habitat was observed in this section. See photos K and L in Appendix B. Vegetation was sparse and consisted of:

Cornus amomum P. Mill. Silky Dogwood

Alnus serrulata (Ait.) Willd. Brookside Alder
Fagus grandifolia Ehrh. American Beech
Juncus effusus L. Lamp Rush
Lythrum salicaria L. Purple Loosestrife
Salix babylonica auct. Non L. p.p. Weeping Willow
Rubus allegheniensis Porter Allegheny Blackberry
Oenothera biennis L. King's-Cureall

The upstream section of Husky Brook Lake was investigated and a small area (10 feet wide by 30 feet long) between the walking bridge over the inlet of the lake and the gazebo had a small seep flowing into the lake. Although no Swamp-Pink plants were observed, the area can be considered poor habitat for Swamp-Pink. This is due to the seep, which is laterally coming from the bank of the lake. However, the seep exhibited characteristics of only being seasonal wet in nature. This is evident by the absence of plants such as Sphagnum moss, which usually inhabits seep that are more permanent. The canopy in this area was determined to be between 40 and 60 % closed, which is within the characteristics for Swamp-Pink. Some of the species that are found in Swamp-Pink habitat were present. However, Swamp-Pink is restricted to groundwater influenced seepage swamps which are perennially saturated and rarely, if ever, inundated by floodwaters. The water table must be at or near the surface, fluctuating only slightly during the spring and summer months. Swamp-Pink often grows on hummocks formed by trees, shrubs and sphagnum moss in forested wetlands. The hummocks keep the roots moist but not submerged in the standing water or buried in the hydric soil that is characteristic of the plant's habitat. No hummocks were observed in the area. Therefore, habitat for Swamp-Pink may be present at this location, but it must be considered poor habitat. See photos P through R in Appendix B. Plants seen in the wetlands were as follows:

Iris versicolor L. Harlequin Blueflag
Alnus serrulata (Ait.) Willd. Brookside Alder
Impatiens capensis Meerb. Spotted Touch-Me-Not
Sambucus nigra ssp. *canadensis* (L.) R. Bolli Common Elderberry
Cornus amomum P. Mill. Silky Dogwood
Acer rubrum L. Red Maple

The uplands contained the following species:

Prunus serotina Ehrh. Black Cherry
Rosa multiflora Thunb. Ex Murr. Rambler Rose
Allium vineale L. Crow Garlic
Robinia pseudoacacia L. Black Locust

In the central section of Husky Brook Lake, there was no habitat for Swamp-Pink. The banks of the lake were very steep and in places undercut. See photos M and N in Appendix B. The vegetation observed in this area included the following:

Robinia pseudoacacia L. Black Locust
Rubus allegheniensis Porter Allegheny Blackberry
Rubus occidentalis L. Black Raspberry
Lonicera japonica Thunb. Japanese Honeysuckle
Toxicodendron radicans (L.) Kuntze Eastern Poison-Ivy
Apocynum cannabinum L. Indian-Hemp
Alnus serrulata (Ait.) Willd. Brookside Alder
Alnus glutinosa (L.) Gaertn. European Alder
Liquidambar styraciflua L. Sweet-Gum

Husky Brook above the lake exhibited no habitat for Swamp-Pink. There was no cover in this area and the wetland fringe was narrow and steep. See photo O in Appendix B.

Mill Creek was investigated west of the intersection of Semaphore Avenue and Wilson Avenue. Concrete riprap was observed along the creek. In addition, biologs have been installed. The area is disturbed and does not exhibit characteristics of Swamp-Pink habitat. See photos S through W in Appendix B. The vegetation in this area consisted of the following:

Polygonum cuspidatum Sieb. & Zucc. Japanese Knotweed
Prunus serotina Ehrh. Black Cherry
Betula populifolia Marsh. Gray Birch
Acer saccharinum L. Silver Maple
Quercus alba L. Northern White Oak
Quercus rubra L. Northern Red Oak
Acer rubrum L. Red Maple
Toxicodendron radicans (L.) Kuntze Eastern Poison-Ivy
Rubus allegheniensis Porter Allegheny Blackberry
Tridens flavus (L.) A.S. Hitchc. Tall Redtop
Solidago rugosa P. Mill. Wrinkle-Leaf Goldenrod
Oenothera biennis L. King's-Cureall
Alliaria petiolata (Bieb.) Cavara & Grande Garlic-Mustard
Acer negundo L. Ash-Leaf Maple
Liquidambar styraciflua L. Sweet-Gum
Phragmites australis (Cav.) Trin. Ex Steud. Common Reed

Mill Creek is piped from Semaphore Avenue to Avenue of Memories. After Avenue of Memories to North Drive, the creek is channelized with riprap lining it. The banks of the creek are steep and the vegetation is disturbed. No Swamp-Pink habitat was observed in this section. See photos T, X and Y in Appendix B. The vegetation is as follows:

Salix babylonica auct. Non L. p.p. Weeping Willow
Rosa multiflora Thunb. Ex Murr. Rambler Rose
Lonicera japonica Thunb. Japanese Honeysuckle
Solidago rugosa P. Mill. Wrinkle-Leaf Goldenrod

Juncus effusus L. Lamp Rush
Phragmites australis (Cav.) Trin. Ex Steud. Common Reed
Hibiscus moscheutos L. Crimson-Eyed Rose-Mallow
Panicum virgatum L. Wand Panic Grass
Rhus typhina L. Stag-Horn Sumac
Cornus amomum P. Mill. Silky Dogwood

Mill Creek from North Drive to its junction with Parker Creek is also ripraped on both banks. Steep banks are also present. The area of the creek is tidal. See photo Z in Appendix B. No habitat was observed in this section. No vegetation was observed in this section.

Parker's Creek and Lafetra Creek are located adjacent to the base. No habitat for Swamp-Pink was observed. See photos AA and BB in Appendix B. They are tidal creeks whose banks are dominated by the following aggressive, weedy species:

Phragmites australis (Cav.) Trin. Ex Steud. Common Reed
Polygonum cuspidatum Sieb. & Zucc. Japanese Knotweed

Parker's Creek off Lockwood Avenue is also tidal and no habitat for Swamp-Pink was observed. See photos CC and DD in Appendix B. The vegetation was dominated by:

Spartina alterniflora Loisel. Saltwater Cord Grass
Phragmites australis (Cav.) Trin. Ex Steud. Common Reed.

Oceanport Creek along Oceanport Avenue is tidal and no Swamp-Pink habitat was observed in this area. See photos EE through JJ in Appendix B. The vegetation was dominated by:

Spartina alterniflora Loisel. Saltwater Cord Grass
Phragmites australis (Cav.) Trin. Ex Steud. Common Reed.

Field Notes for Fauna Survey

April 4, 2000

Parkers Creek-On the north side by the animal hospital

Salinity 18 ppt

Set pot. Very muddy substrate

I took a substrate sample and examined for worms. Found nothing.

Off North Drive

In rip rap channel

Salinity between 2.5 and 3.0

April 11, 2000
Parker's Creek Off Oceanport Ave.
Salinity = 18.0 ppt
Set killipot

North Drive
Rip rap stream
Salinity 2.5 ppt

April 12, 2000
Parker's Creek
Salinity 20 ppt
No fish
Reset pot
Examined mud sample in lab=no worms

North Drive
Salinity 0.0 ppt

April 12, 2000
Parker's Creek
Salinity 20 ppt
No fish
Reset pot
Examined mud sample in lab=no worms

North Drive
Salinity 0.0 ppt

April 14, 2000
Fort Monmouth Parker's Creek
Salinity 15 ppt
Crangon septemspinosum, several in pot

North Drive
Salinity 5.0 ppt
Set pot

Murphy Drive, near police station
Salinity 2.0 ppt

May 2, 2000

Fort MONMOUTH

Off Oceanport Ave.

By Vet office

Salinity 14 ppt

Caught F. hetero

Mud crab

Blueclaw crab

These were caught in killipot in the mudflats (covered by water)

North drive

Salinity=1.0 ppt

No fish

Set out 2nd trap

Murphy Drive, near police station

Salinity 3.0 ppt

This is a rip rap channel. Do not think it is good fish habitat

Nothing in pot. Setr a 2nd pot

May 6
Fort Monmouth
Site by Vets hospital, off Oceanport Ave.
In pot
Eel
Killifish (F. hetero) -15 fish
Blueclaw crab
Salinity 16 ppt

Off Wilson Ave and North Drive
Salinity 2.0 ppt
No fish in 2 pots

Murphy Drive, near police station
Salinity 3.5 ppt
Crangon septemspinosum in each of two pots

Camp Wood
By Gibbs Hall
Set two pots
Salinity in big pond= approximately 1.0 ppt. Do not know why I am getting a slight salinity reading.

May 25, 2000

Oceanport-off Oceanport-Called Parker's Creek

Salinity 11 ppt

Trap stolen (was a killipot suspended from the bridge)

Eels

Blueclaw crabs

Killies (F. hetero)

Spearing

Saw snapping turtles

Diamondback terrapins

Reported - occasional painted turtle

Many people fish from the bridge, mostly for Blueclaw crabs

Crow

North Drive, off Wilson Ave.

One pot empty

2nd pot = 2 mud crabs

Salinity 4.0 ppt

By police station = Murphy off Hildreth

Two pots empty

Salinity= 0.5 ppt

This was after several days of rain

Camp Wood

Near Gibbs Hall

Salinity=just above 0.0, but less than 0.5 ppt

3 pots=nothing

Seined-Collected sunfish (pumpkinseeds, Largemouth bass)

Reported-Carp

June 4, 2000

North Drive

Killifish=*F. heteroclitis*

Largemouth bass

Bluegills

Pumpkinseeds

(reported Smallmouth bass-this is anecdotal)

Salinity here is 0.0 ppt

Road by police station=Murphy Drive

Anguilla rostrata

Blueclaw crabs

Salinity here=0.0 ppt

Camp Wood-near Gibbs Hall

0.0 ppt

1.0 Saw snapping turtle

July 4, 2000

The purpose today was to photograph the various sites I have visited, including walks and fish collections.

Visited Fort Monmouth, saw a large group of Canada geese (*Branta canadensis*) entering Husky Brook (the feeder stream that enters Husky Brook comes underneath Broad Street in Eatontown).

At Camp Wood I observed a living muskrat and a woodchuck, both close to each other in the second pond off the stream to the left of the main entrance to Gibbs Hall as you face Gibbs Hall.

The 2nd pond is bordered by trees and small shrubs. This provides excellent habitat for small mammals. It is almost impenetrable, and has a permanent water (freshwater) supply.

July 9, 2000

Fort Monmouth

Husky Brook-main body of water

Collected by seining

Largemouth bass-many juveniles (i.e. zero year class)

Pumpkinseeds (sunfish)

Reported

Snapping turtles

Catfish

Carp

Largemouth bass

Camp Wood

Observed doves near the golf office

Seined at the 10th hole on the golf course (after receiving permission from persons in the golf shop

Bluegills (sunfish)

Pumpkinseeds (sunfish)

Largemouth bass

tadpoles

July 14, 2000
Heavy rainfall

To Fort Monmouth, to Riverside Avenue
Examined a small stream off Riverside Ave, leads to Oceanport Creek
Had a 0.0 salinity reading. Will seine this on next trip.
Several small birds, but too difficult to identify because of the rain

Several gulls over the creek. Believe that they are herring gulls

Walked the perimeter of Oceanport Creek. Good muskrat habitat.

Drove along Hazen Avenue to Oceanport Avenue. Dead muskrat in roadway.

Examined North Drive=0.0 ppt salinity. Hike around the woods perimeter (i.e.the marsh)

I visited with both Mr. Desai and Mr. Mascaglia. Mr Mascaglia indicated that he did contact the Fort police to let them know that I would be working both sites (i.e. Fort Monmouth and Camp Wood).

Drove and walked through Camp Wood. Saw a squirrel

July 16, 2000

Stopped at the police station on Fort Monmouth.

The Chief gave me a letter allowing me on base. He indicated that I did not have to report to the Fort Monmouth police each time I am on either site, but that I should keep the letter with me.

I returned to Riverside Avenue and examined the ditch that I viewed on Friday (July 14).

There was little water in this ditch. It is only a street drainage ditch. Salinity was 0.0 ppt.

I spoke with a private homeowner who lives off Riverside Avenue (Robert Hayden). He indicated that the birds he has observed in Oceanport Creek (his backyard) include scup, canvasback, broadbill, bufflehead, egret, and blackduck. He indicated that he catches snapper blues in the fall. He said that, on occasion, he has seen snapping turtles.

Returned to Fort Monmouth on the otherside of Oceanport Avenue (the main section).

Took a salinity sample off Murphy Avenue, down the road from the police station.

Salinity was 0.0 ppt. I replaced the pot in this part of the Creek. Saw a crow. While leaving the Fort Monmouth area I observed several sparrows (*Spizella passerina?*) on the marching field.

On Camp Wood I reported to the golf office that I would be seining in the stream alongside hole 9 on the golf course. An area of 15 by 100 was seined. Two fish species were collected, *Lepomis gibbosus* and *L. macrochirus*

July 22, 2000 Field Notes Camp Wood

I walked the inner edge of the Camp Wood golf course, and where possible, into the woods. The water courses were dry after the big rain, but not the strams coursing the golf course.

I saw five robins, several crows, four rabbits, one woodchuck
Other birds were in the vicinity, but I could not make an I.D.

July 23, 2000 Fort Monmouth Field Notes

Stream by the police station = 7.0 ppt

The pot was empty

Saw a Great Egret wading in this area

Rabbits (2) on the lawn by the stream

Went to the stream that feeds Husky Brook

Observed;

Woodchuck

Robins

Canada Geese (at least 60 individuals)

Mourning doves

Herring gull

American black ducks

I seined in the stream leading to Husky Brook. I collected several blacknose dace and several *Fundulus diaphanus*.

I next went to Oceanport Creek (opposite the Fort, by the animal hospital). I saw a single herring gull in the Creek. Several people were crabbing from the bridge over the Creek.

July 27, 2000

Camp Wood area

Drove and walked the area of Camp Wood between Hope Road and Pearl Harbor Road,

Mostly residential

Squirrels

Some water in the ditch running east-west through this section. Some part of the stream is capped, then runs through a heavily brushed area, then into and through a manicured (mown) field). Some water, though not much in this stream (ditch).

July 30, 2000

Camp Wood

Visited both sections of Camp Wood

Seined at the 17th hole on the golf course.

Collected *Gambusia affinis*

Lepomis gibbosus

Lepomis macrochirus

Tadpoles (*Rana* sp)

Saw Mourning dove

Robins

At the Electronic Command section (took pictures saw

Squirrels.

There was water in the ditch that runs through this section of Camp Wood, but not much

Fort Monmouth-August 6, 2000

Murphy Drive, near the police station

Salinity= 1.0 ppt On the road to Husky Brook. Lots of birds near the football field, by the Northeast District Veterinary Command, Building 876, birds include European Starling, Brownheaded cowbird, Crows, Grackles(?), Song Sparrow. Probably 200 birds altogether.

To riprap stream on North Drive. Salinity here is 0.0 ppt, then down the road to area across from the ball field, in the creek behind a fence, the salinity here is 1.0 ppt.

Camp Wood, August 6, 2000

To Camp Wood. Nothing in the area of the Electronic Command building, or in the surrounding area.

To Gibbs Hall area, and around to the housing area. Saw a few Robins.

Next week will make an evening tour to look for owls.

Field Notes

Sept.4, 2000

Walked part of the area behind the Myer building, the wooded area.

Observed deer tracks, and active woodchuck and muskrat dens.

Low water in the stream running through this wooded area.

Field Notes for Bog Turtle Habitat Survey

Field Notes

August 30, 2000

For Bog Turtle Study

Trip to Freehold, Nj to speak with soils conservation people.

Picked up soil conservation book

2.5 hours.

Field Notes

September 9, 2000

Bog Turtle Study

To Camp Charles Wood

Worked the wooded area behind the A.J. Myer Center. The purpose was to examine how extensive the water area (ditch) was and to examine the wetlands plants and to look for certain wetland plant species.

Worked this area with Rob Youhas (a student).

(spent a total of 6 man hours here (2 persons X 3 hours).

Field Notes

September 16, 2000

Professor Churchill and I worked the area behind the A.J. Myer building.

We identified plants. Looking for wetland plants, sphagnum (saw none).

The flood plain areas here are minimal. Fairly heavy overstory.

We spent a total of 8 hours here (two persons X 4 hours each).

Field Notes

September 23, 2000

Went to Fort Monmouth

To Murphy Drive. Walked upstream. Stream splits. Each branch eventually runs under roads and each is underground.

There is little floodplain. Sides are steep-sided. There is considerable rock rip-rap. Not bog turtle habitat for its length.

Went to North Drive, to the stream coming off Parkers Creek. Walked the length till it disappears into a culvert under a roadway. This section is also rip-rapped for much of its length. It is also steep-sided. There is little floodplain. This stretch is not suitable bog turtle habitat.

Went to stream that feeds Husky Brook. This is an open area. Some steeper sides, but no freshwater vegetation. No sphagnum. Husky Brook does not have much floodplain. Sides slope sharply into the Brook.

Spent 3.5 hours at these sites with Andrew Malanga (student).

Total time spent = $2 \times 3.5 = 7$ hours

Field Notes

October 1, 2000

Visited both sites (Fort Monmouth and Camp C. Wood).

Reexamined stream off Murphy Drive, then to Husky Brook feeder, essentially to look for low vegetation habitat. Saw little, if any. Went to Camp Charles Wood. Worked the area in back of Myer Center, off Guam Lane.

Checked the woods south of Guam Lane. There is a low area. Thought that there might be a stream that I overlooked.

There is a low area, but there was no water in the swale.

Field Notes

October 8, 2000

Went to Camp Charles Wood. Took some photos of the swale off Guam Road. I believe that this is habitat that is amenable for Bog turtles. / Looked at plants in the area of the swale. Examined the depth at the site. Also examined the meadow on the opposite side of the fence (off site?). This is a 500 foot section through which the water in this swale, between Laboratory Road and Corregidor Road runs. The stream, slow moving at best runs from Guam Lane towards Hope Road. So, the stream runs from Guam Lane for about 500 feet. At this point there is a fence. The stream then runs for about 500 more feet through a meadow, or an open grassed field. It then runs under Hope Road and emerges on the other side to a wooded area on the golf course. It is only a trickle of water,

I went west of Guam road. I wanted to look in the wooded area to the west of Guam road to see if there was standing water in this wooded area. There was none, only a muddy section. I went above this wooded area to an open field. There is water exiting a culvert. This is an area about 600 feet south of Corregidor Drive. The culvert water enters a low spot in the field with a rock rip rap. There was standing water. I seined the site with a net over a clear area. I caught tadpoles. The water was not flowing east into the forested area. It probably does so during heavy rain events.

I reexamined the stream on the north side of Corregidor Road to determine the extent of shrub vegetation. There was little. This area is mown along its banks. The stream itself consists of a channel with slow moving water, and the stream bed has a heavy grass growth, although the grass is not tall. There are fishes in the deeper waters at the culverts (*Gambusia affinis*).

The heavily vegetated stream with a wooden footbridge that leads from the parking area behind Myer Center to the back of building 2525 was examined. This whole stretch of water has steep banks and is heavily vegetated. Little light enters the bottom of the stream. Not good bog turtle habitat.

Field Notes

October 21, 2000

Three hours.

Visit to main camp for one hour, then visit to Chas Wood. To the golf course to examine ditches by tenth hole, then to seventh hole, then to Maxwell Place.

Habitat not amenable for Bog turtles.

Field Notes

October 28, 2000

To Camp Chas Wood. Look at Guam Lane swale. Water is present at about the same depth as before. Looked at the meadow on the other side of the fence (off site).
Wanted to confirm road names.
This site, off Guam Lane is, I believe, habitat for the bog turtle
Two hours in field.

Field Notes

November 1, 2000

2 hours

Went to Pine Brook Road.

Wanted to see the upper part of Wampum Brook. I believe that this is on the Camp Wood site. There is no access behind the apartments. The back yards of this complex are fenced for their entire distance. I did view the brook from the roadway, then walked in for some distance. The stream bed is about eight feet wide with a steep embankment. There was no water in the sections I viewed. There is no plant growth in this part of the brook. There is a relatively high upper story, but some light penetration. Not good bog turtle habitat.

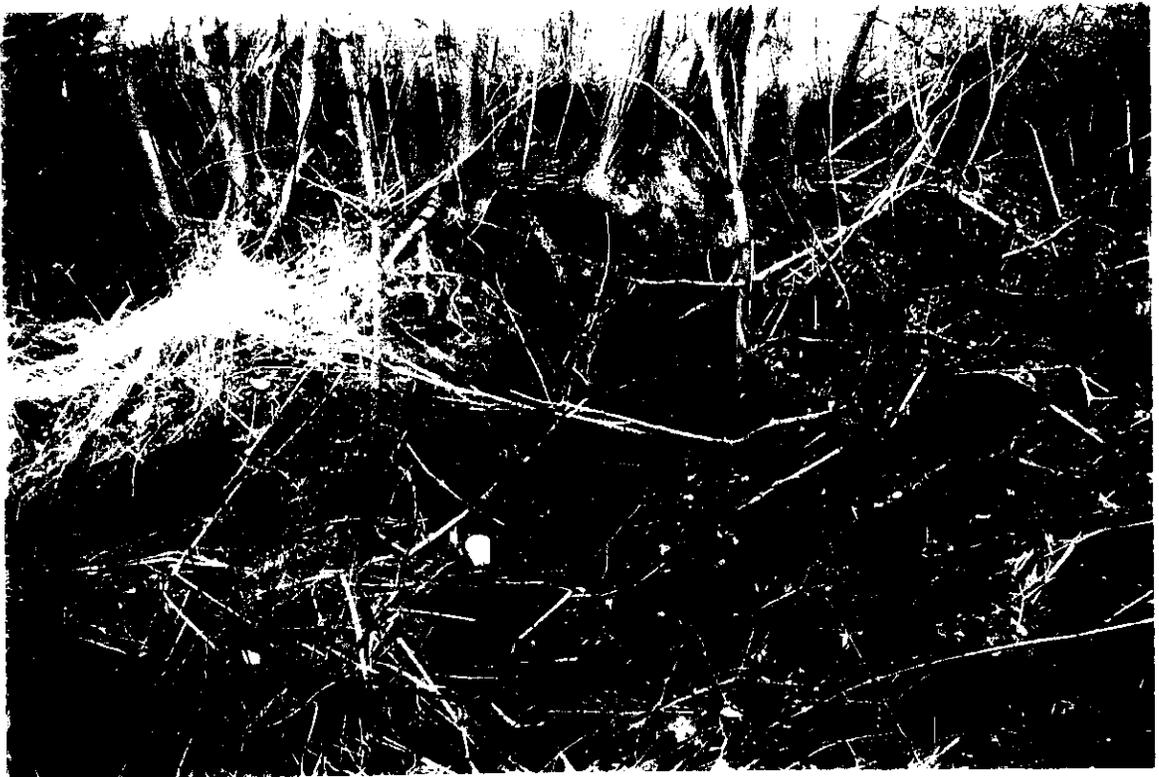
**APPENDIX E
PHOTOGRAPHS**

Swamp Pink (Helonias bullata) and Potential Habitat at Fort Monmouth

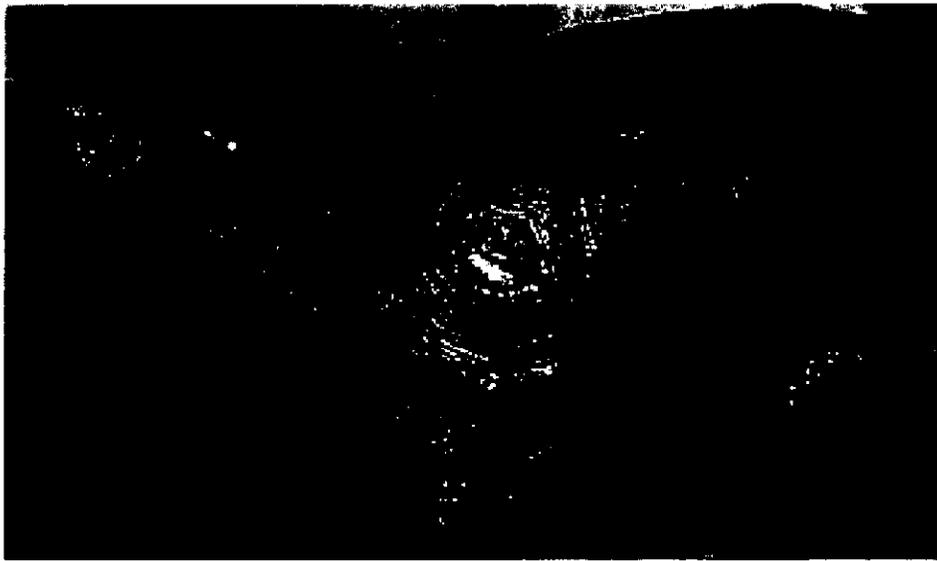




Figure 10-10



Northern Bog Turtle (Clemmys muhlenbergii) and Potential Habitats at Fort Monmouth



Northern bog turtle (*Clemmys muhlenbergii*)

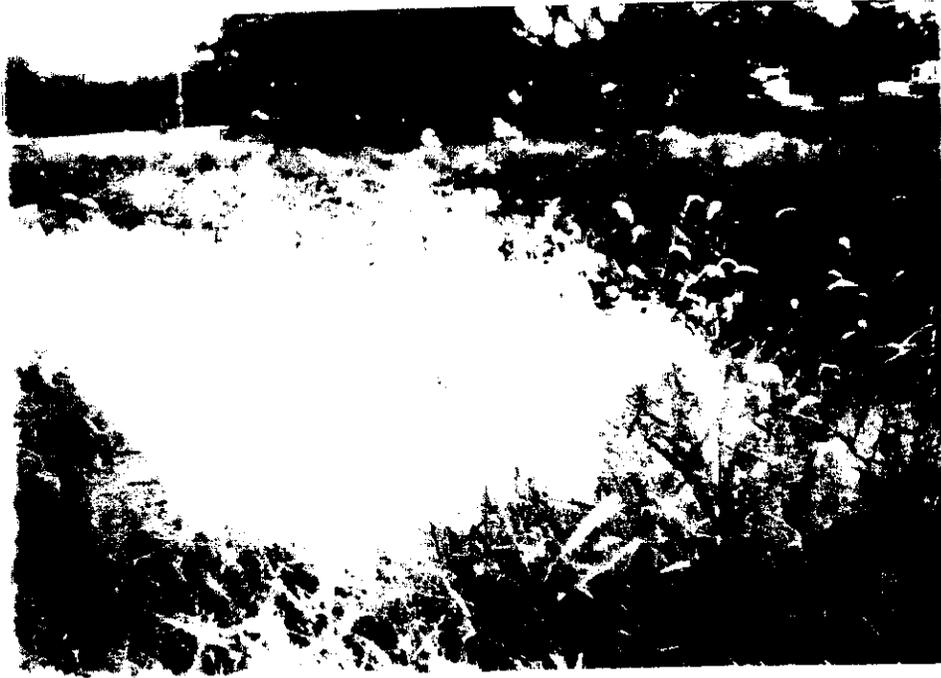


Figure 1. Aerial view of the study area showing the location of the study site (indicated by a red dot) and the surrounding landscape.

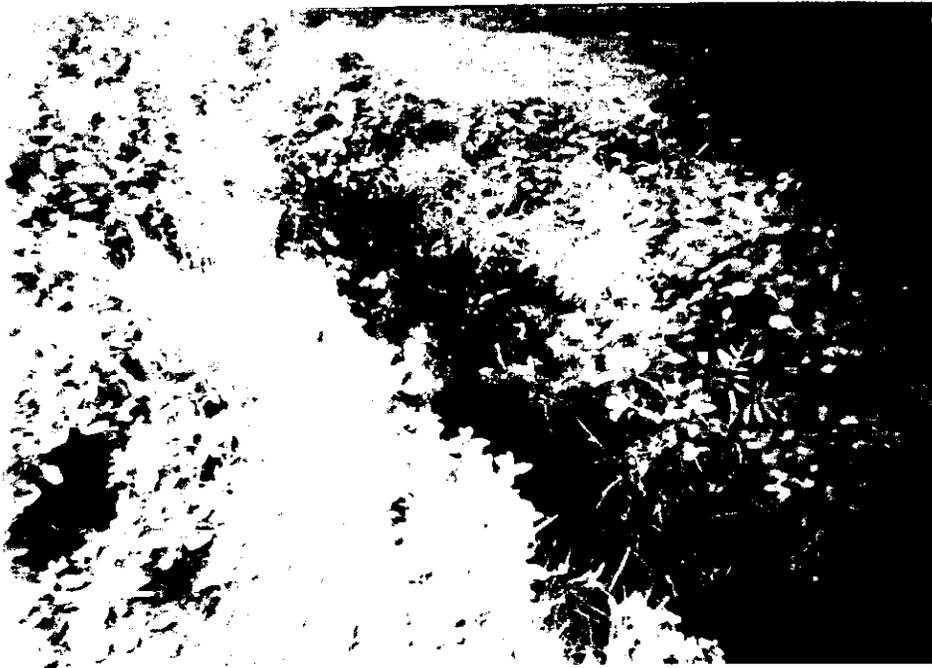




Fig. 23 View from the stream looking west. The stream here parallels Corregidor Road, then runs under Hope Road, to the golf course. The slopes are vegetation free along its course. The stream bed is grassed along most of its distance.



Fig. 31 Stream bottom gravelly sand, with little vegetation.



Fig. 33 View of the swale off Guam Lane. This is located between Corregidor Road and Laboratory Road, behind buildings 2566 (Youth Activities Center) and 2569. The grassed area leads to shallow banks with *Phragmites communis* and *Typha* spp. Shown in the foreground.