

Natural Resources

LANTNAVFACENGCOM

A NATURAL HERITAGE RESOURCES INVENTORY  
OF THE  
NAVAL WEAPONS STATION YORKTOWN  
DEPARTMENT OF THE NAVY  
YORKTOWN, VIRGINIA

FINAL REPORT

DOD CONTRACT #

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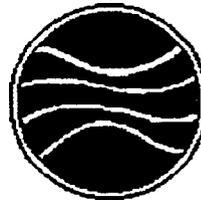


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## EXECUTIVE SUMMARY

### Natural Heritage Inventory Naval Weapons Station Yorktown

This report will indicate the Natural Heritage Resources, that have been verified to occur on Naval Weapons Station Yorktown, Yorktown, Virginia. "Natural Heritage Resources" means the habitat of rare, threatened, and endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest benefiting the welfare of the citizens of the Commonwealth (Code of Virginia, Virginia Natural Areas Preserves Act, 10.1-209). Special Interest Areas (SIA's) have been recommended for the rare plants and animals. The boundaries are based on results of the field inventory, literature review of the life history and habitat needs, and expertise and experience of Division of Natural Heritage staff and network scientists.

The term "rare" as used in this document and by the Division of Natural Heritage refers to a species of plant, animal, or natural community that is not abundant, for reasons including low numbers, uncommon habitats, human disturbance, and naturally restricted geographical distribution. To be considered "rare", a species is at least rare throughout its range in Virginia and may be rare throughout its global range.

Any action which may adversely affect a threatened or endangered species must undergo consultation with the U.S. Fish and Wildlife Service or National Marine Fisheries Service as outlined in Section 7 of the Endangered Species Act. The purpose of this requirement is to identify and resolve potential conflicts between an action and the protected species at an early point in the decision-making process. The OPNAVINST 5090.1A states that at a minimum an Environmental Assessment must be prepared under the National Environmental Policy Act when an action or project may affect a threatened or endangered species. Responsibility for compliance with the Endangered Species Act rests with the activity Commanding Officer. Per OPNAVINST 5090.1A, the cognizant EFD shall be contacted to coordinate all Section 7 consultations under the Endangered Species Act.

Natural Heritage Resources not listed under the Federal Endangered Species Act are nonetheless in decline and may become threatened or endangered in the foreseeable future. Protection recommendations are made for these species so as to prevent further losses of Virginia's natural diversity.

Summary of federal listed threatened, endangered, or Category 2 or 3C species observed and verified during this survey.

Common Name	Scientific Name	Type	Status
bald eagle	<u>Haliaeetus leucocephalus</u>	A	G3/S2S3/LE/LE

Summary of state listed threatened or endangered species observed and verified during this survey.

Common Name	Scientific Name	Type	Status
bald eagle	<u>Haliaeetus leucocephalus</u>	A	G3/S2S3/LE/LE
Mabee's salamander	<u>Ambystoma mabeei</u>	A	G4/S1/NF/LT

Summary of rare species, as identified by Division of Natural Heritage, observed and verified during this survey.

Common Name	Scientific Name	Type	Status
Florida adder's-mouth	<u>Malaxis spicata</u>	P	G3G4/S2/NF/NS

A = animal

P = plant

## INTRODUCTION

### PURPOSE OF THE NATURAL HERITAGE INVENTORY

In 1989, the Department of the Navy asked the DCR-DNH, to conduct a rare, threatened, endangered species inventory within Naval Weapons Station (WPNSTA) Yorktown. This survey for the presence of rare vertebrates and plants was requested as part of the Navy's continuing programs to develop environmentally sound management plans for each facility. In particular, the inventory results would allow WPNSTA Yorktown to make land-use decisions in compliance with the Endangered Species Act of 1973, as amended, OPNAVINST 5090.1A of 1990, and other laws, regulations, and policies that encourage the conservation and perpetuation of rare species.

The Natural Heritage Program was established in 1986 as a joint venture of The Nature Conservancy and the Commonwealth of Virginia. In 1988, the Commonwealth established the Natural Heritage Program as an organizational component of the Virginia Department of Conservation and Recreation within the Division of Natural Heritage.

The Division of Natural Heritage is the Commonwealth's principal manager of data on natural heritage resources, "the habitat of rare, threatened and endangered plant and animal species, and rare or state significant natural communities or geologic sites, and similar features" (Virginia Natural Areas Preserves Act, Code of Virginia sections 10.1-209 et. seq.). These resources are the remnants of our natural heritage and are the focus of the DNH's inventory because they are indicators of the most environmentally significant and sensitive natural areas remaining in Virginia.

The Division of Natural Heritage (DCR-DNH) administers the Virginia Natural Area Preserves Act, which mandates the inventory of occurrences of rare, threatened, and endangered plant and animal species of the Commonwealth. By determining the status and location of each rare species occurrence, priorities for the conservation of Virginia's biodiversity can be established. The information is provided to land managers for use in land or natural resource planning decisions. The natural heritage resource inventory performed on WPNSTA Yorktown is the beginning of a partnership: the DCR-DNH will monitor the status of rare species occurrences, providing for both parties a data source that will regularly update information contained in this final report.

## LOCATION OF NAVAL WEAPONS STATION (WPNSTA) YORKTOWN

The WPNSTA Yorktown is located primarily in York County, Virginia with the southwest edge encompassing a portion of James City County. The WPNSTA Yorktown is bordered by the Colonial National Historic Parkway and the York River to the north, King Creek and U.S. Naval Supply Center Cheatham Annex to the west, Interstate 64 to the south, and Rt. 238 and the town of Lackey to the east.

## PHYSICAL ENVIRONMENT

The WPNSTA Yorktown is located near the interface of the Outer and Upper Coastal Plain biogeographic regions. The southern portion of WPNSTA Yorktown from Rt 238 west to Curtis Cemetary and lying between I-64 and Williamsburg Road is an extension of the Outer Coastal Plain. This region is distinguished by its vegetation, relatively flat topography, and occurrences of coastal plain versions of sinkhole ponds. The topography of the remaining, larger portion of the WPNSTA Yorktown consists of dissected ravines and seepage streams more characteristic of the Upper Coastal Plain as in the Naval Supply Center Cheatham Annex. Several man-made ponds occur in the ravine areas along King Creek. Felgate Creek, in the northern portion of WPNSTA Yorktown is a tidal creek and marsh system. Elevations on WPNSTA Yorktown range from sea level to 90 feet.

A detailed soil survey of James City and York Counties, ommitted the WPNSTA Yorktown (Hodges et. al. 1985). However there are two major soil types that occur on the WPNSTA Yorktown. The Slagle-Emporia-Uchee series is found on the southern portion of the area and is composed of deep, moderately well-drained soils that are dominantly loamy. These soils include the regions of the WPNSTA Yorktown that contain the sinkhole ponds. The remainder of the area is covered by soils of the Emporia-Bohicket-Slagle series. These are deep, well drained to poorly drained soils that are loamy or clayey and found on side slopes and in brackish water marshes.

The climate is categorized as moderate, as it is close to the Chesapeake Bay and Atlantic Ocean, as well as to the York River. The average annual temperature is 69.7° and the average precipitation 47.29 inches. The precipitation is distributed relatively evenly throughout the year but with slightly more falling during the spring and summer.

## PERTINENT CULTURAL HISTORY

The proximity of the study area to the first permanent English settlement in North America suggests that the land has potentially been affected by human use longer than other portions of the United States. Nearby Jamestown was the colonial capitol of Virginia from 1607 to 1698. After Jamestown burned in 1698, the capitol was moved to Williamsburg, approximately 5 miles from WPNSTA Yorktown. The town of Williamsburg served as Virginia's capitol until 1779.

Agriculture and timbering occurred on the York County landscape since the earliest recorded history. The Indians of the Chesapeake Bay region of Virginia were largely agrarian but the impacts of native American societies on the environment is unknown. The documentation provided by the English settlers and the numerous military activities near Jamestown and Williamsburg indicate that significant habitat alteration occurred over much of the area. Most of the impacts were associated with the agricultural economy of eastern Virginia, especially that of the cash crop, tobacco.

Military activity in the study area included the surrender of British General Cornwallis to the American colonialists and their French allies. Civil War battles also affected the study area, particularly the Peninsula Campaign.

Most of York County and adjacent James City County was rural until quite recently. With the development of Colonial Williamsburg (and the associated Colonial National Historical Parkway), Busch Gardens, and Water World, the area has become a major tourist attraction for regional visitors. The area is currently recognized as one of the most desirable retirement areas in the United States. This fact and its geographic location in the "Golden Crescent" of Virginia (the area connecting Washington, D.C., Richmond, and Hampton Roads), makes the area one of the fastest growing regions of Virginia. Development in the past decade was primarily residential and this continues at a rapid rate; however, commercial, recreational, and industrial developments are also increasing.

## GOALS OF THE NATURAL HERITAGE INVENTORY

Between March 1990 and April 1991 the Division of Natural Heritage conducted field surveys and other inventory work on WPNSTA Yorktown to complete the following tasks (as identified in the Interagency Service Agreement between the Department of the Navy and the Virginia Department of Conservation and Recreation's Division of Natural Heritage):

- 1) Arrange for the implementation of a field survey for rare species with potential occurrences on WPNSTA Yorktown.
- 2) Provide a list of rare species with historical and recently verified occurrences on WPNSTA Yorktown.
- 3) Provide maps outlining significant habitat for each rare species recently verified.
- 4) Provide specific management recommendations to protect and perpetuate each rare species found on WPNSTA Yorktown.

## METHODS

### PLANTS

#### Review of existing information

To gather existing data on the rare plants of WPNSTA Yorktown, DCR-DNH staff reviewed the natural heritage data base, botanical literature, and local herbaria which had plant collections from James City and York counties. Botanists knowledgeable about the area were interviewed as well. This work was designed to produce a list of rare plants known from the region which, when combined with an examination of topographic maps, geological data, soil maps, and aerial photographs, directed the field investigation.

#### Field investigation

Fifty-nine (59) visits were made to WPNSTA Yorktown between April and November, 1990. Since no rare species had been previously recorded at WPNSTA Yorktown, inventory efforts were directed towards finding rare plants which were known from nearby areas and might be found at Yorktown. These species included the Federally Threatened species, small whorled pogonia (Isotria medeoloides), and the Federal C2 candidate species for listing, Harper's fimbristylis (Fimbristylis perpusilla), and Virginia least

trillium (Trillium pusillum var virginianum).

During this investigation, the following field data were recorded: species name, dates when the species was sought and/or found, population boundaries, approximate number of individuals, reproductive condition, population viability, associate species, and physical factors, including moisture and sunlight. Any apparent threats to the rare species occurrence were noted. A voucher specimen was collected to verify any rare species which had not been encountered previously.

## ANIMALS

### Review of existing information

A search was made of the available literature to determine the probable or known occurrences of rare animal species or their habitats in the vicinity of WPNSTA Yorktown. In addition, the Division of Natural Heritage database was queried for the occurrence of rare animals. Checklists of species from York and James City Counties as well as more general regional and state checklists were searched for additional information. The preliminary results of the Virginia breeding bird atlas project, "Virginia's Breeding Birds: An Atlas Workbook" (Va. Society of Ornithology 1989) were included in the literature survey. In addition, knowledgeable individuals were contacted to learn of unpublished or historical information. Museum searches were also made for previously collected material from the York and James City County areas, particularly amphibian and reptile records. The Virginia Department of Game and Inland Fisheries BOVA database was queried for potential species on the facility. From these sources a list of rare species recorded from York and James City Counties was created (Table 1).

### Field investigation

Fish: No historic or museum records indicated that any rare, threatened, or endangered species of fish were known or considered likely to occur in the available aquatic habitats at WPNSTA Yorktown. Therefore, no specific collections of fish were made.

Amphibians and Reptiles: Standard field methods were used in terrestrial habitats, including lifting cover objects and hand-collecting. Frogs and toads were identified when mating calls were heard. Aquatic habitats were sampled with dipnets and swim-in type turtle traps. Species of basking turtles were identified with binoculars or spotting scope. Amphibians and reptiles were also

captured with drift fence arrays and pitfall traps (see methods for Mammals).

Birds: Breeding birds were sought during 1990 and during May and June 1991. Birds were observed or identified by song and breeding status using criteria developed by the Virginia Society of Ornithology's Breeding Bird Atlas Project (1989). Significant habitats for wintering or migrating birds were sought during the respective seasons.

Mammals: A variety of methods were used to conduct inventory for rare mammals. Drift fence arrays with pitfall traps were installed at several locations on WPNSTA Yorktown. The region of WPNSTA Yorktown included in the Outer Coastal Plain biogeographic province was deemed to have the greater chance for discovering mammal species different from those previously encountered during the inventory of adjacent NSC Cheatham Annex (DNH 1990).

## RESULTS

### PLANTS

#### Summary of existing information

Searches of the DCR-DNH database, herbariums, literature, and interviews with botanists familiar with the region failed to uncover any rare plant species recorded near or within WPNSTA Yorktown prior to 1990.

#### Field investigation

During 1990 field work, one rare plant species, Florida adder's-mouth (Malaxis spicata), was located in WPNSTA Yorktown. A species account follows which presents status, distribution, description, threats to the species, and a summary of the 1990 findings. Heritage ranks were assigned to Florida adder's-mouth (M. spicata) based on Natural Heritage methodology as explained by Ludwig (1989).

\* \* \* \* \*

SPECIES ACCOUNTSMalaxis spicata, Florida adder's-mouth

**Status:** G3G4/S2 (Rare over its entire range; very rare in Virginia).

Florida adder's-mouth (M. spicata) was classified as a plant of special concern (Porter and Wieboldt 1991).

**Distribution:** This species has been found throughout the Southeastern United States. It occurs in seven Coastal Plain counties in Virginia (Harvill, et al., 1986).

**Description:** This species is a perennial orchid from two to 20 inches tall with two, ovate, sub-opposite, basal leaves. The flowering stalk has up to 50 tiny greenish flowers with a distinctive orange-brown lip which bloom in August. For a more detailed morphological description of this species, refer to Gleason (1952), Godfrey and Wooten (1979), and Radford, et al. (1964).

**Project Findings:** Two sub-populations of this species were located in the western portion of WPNSTA Yorktown. Two plants were observed in flower in the first sub-population. Data were not taken on fruit set in this sub-population. The second sub-population consisted of one individual. This plant produced six capsules in 1990. Both sub-populations were in rich ravine forests, occurring in patches of shadow-witch (Ponthieva racemosa), an uncommon orchid which is on the DCR-DNH plant 'watchlist' and ranked S3.

**Threats:** No threats to the species were observed on WPNSTA Yorktown. However, if land-use within the ravine systems is altered, then the species occurrence would be threatened. Throughout its southeastern range, the species is threatened by the loss of natural woodland habitat and subsequent conversion to pine monocultures.

## ANIMALS

### Summary of existing information.

**Fish:** No rare fish were previously reported or expected from WPNSTA Yorktown.

**Amphibians:** No rare amphibians were expected from the Upper Coastal Plain portion of WPNSTA Yorktown. Additionally, intensive inventory conducted on adjacent NSC Cheatham Annex during 1989-90 failed to discover any rare species (DNH 1990). However, analysis of the existing information showed that the Outer Coastal Plain portion of WPNSTA Yorktown had the potential for several rare species. These included the Mabee's salamander (Ambystoma mabeei), eastern tiger salamander (Ambystoma tigrinum), and barking treefrog (Hyla gratiosa).

**Reptiles:** The canebrake rattlesnake (Crotalus horridus atricaudatus (G5TU2/S1, listed State Endangered) was historically recorded from lower York County in the vicinity of Grafton. Currently, its range in Virginia has been reduced to a few areas in Virginia Beach, Chesapeake, and Newport News. Although no records are known from WPNSTA Yorktown or the immediate vicinity, it was considered a remote possibility.

**Birds:** Records for the bald eagle (Haliaeetus leucocephalus) exist for WPNSTA Yorktown. WPNSTA Yorktown is also near the northern edge of the historic range of the red-cockaded woodpecker (Picoides borealis). A 1975 record exists for York County (Va. Society of Ornithology, 1989).

**Mammals:** No rare mammals were previously recorded for York and James City Counties. The WPNSTA Yorktown is likely within the range of the star-nosed mole (Condylura cristata).

### Field investigation.

Using our compiled list of rare species with potential to occur on WPNSTA Yorktown and our knowledge of the individual species habitat requirements, we planned and conducted field investigations. Two rare vertebrate species, Mabee's salamander (Ambystoma mabeei) and Bald eagle (Haliaeetus leucocephalus) were found on WPNSTA Yorktown during the 1990-91 field investigations.

Eighteen species of amphibians were captured or heard on WPNSTA Yorktown (Table 2). Six of the amphibian species were salamanders and the remainder were anurans (frogs and toads). The Mabee's salamander (A. mabeei) was found in the pond complex near Curtis Cemetary and the pistol range. This salamander breeds in late winter in the sinkhole ponds and adults live in the moist litter of the natural mixed oak-pine woodland.

Although occurring in small numbers in ponds immediately east of the WPNSTA Yorktown, the barking treefrog (Hyla gratiosa) was not heard in the sinkhole pond complexes on WPNSTA Yorktown. However, if the population is small, it is possible that breeding choruses would not be heard every year. Spring 1991 was very dry and barking treefrogs were not heard at several known locations in Virginia. In Virginia, these frogs breed during May and June.

Nineteen species of reptiles were observed or captured including eight turtles, eight snakes, and three lizards (Table 3). None of these species are considered rare, threatened, or endangered. The man-made ponds have provided abundant freshwater turtle habitat. The Canebrake rattlesnake (Crotalus horridus atricaudatus) was not found on WPNSTA Yorktown during the inventory and is not believed to exist there. Had they been present, individuals would have been observed crossing roads at some time.

Bird inventory at WPNSTA Yorktown continued into June 1991. Data collected indicated that the ravine forests along King Creek contains the most diverse forest-dwelling bird fauna, especially during spring migration. The Felgate Creek/Black Swamp system is a valuable habitat for wading birds and shorebirds. The man-made lakes along King Creek are utilized by winter waterfowl. Yellow-crowned night herons (Nyctanassa violaceus) were observed around Roosevelt pond during June 1991. It is likely that they nest somewhere in the York County vicinity, possibly on WPNSTA Yorktown, however, a nest could not be located. Bald Eagles (H. leucocephalus) have nested successfully for several years adjacent to one of the large man-made lakes adjacent King Creek.

The red-cockaded woodpecker (Picoides borealis) was historically known from the Peninsula, but DCR-DNH found no present evidence of suitable habitat for this endangered woodpecker. Nest cavities are easily recognized, but none were located. Management of large tracts on the WPNSTA Yorktown as fire-maintained old growth loblolly pine would be beneficial for maintaining the natural biodiversity of the region and might provide for the natural re-population of red-cockaded woodpeckers (P. borealis).

**Mammals:** During the course of the investigation, 20 species of mammals were captured or observed (Table 5). Eleven of these were captured in pitfall traps. The larger species were identified by observation, sign, and scats. None of the captured species are rare, threatened, or endangered. The southeastern shrew (Sorex longirostris longirostris) is present on WPNSTA Yorktown. The federally Threatened sub-species, the Dismal Swamp southeastern shrew (S. l. fisheri) which was actively sought on Naval Bases in the southeastern Virginia area is clearly not present at WPNSTA Yorktown. This determination was based on body measurements taken from collected specimens.

\* \* \* \* \*

SPECIES ACCOUNTSAmbystoma mabeei (Mabees salamander)

**Description:** A small, stout mole salamander with a relatively small head. Maximum snout-vent length (SVL) =71.7 mm; maximum total length is 122.0 mm. There are 13 costal grooves between the front and rear limbs. Color is dark brown to gray-brown dorsally; lighter below. Abundant whitish flecks and mottling are present laterally. Larvae are pond-type, brown to cream above, paler below. The dorsal fin originates above the forelegs.

**Status:** G4/S2 [Species is common over its range (South Carolina north to Virginia); very rare in Virginia]. The species was listed state threatened by the Virginia Department of Game and Inland Fisheries on 1 January 1992.

**Distribution:** This salamander is restricted primarily to the coastal plain of South Carolina, North Carolina, and Virginia. Breeding populations are associated with sinkhole ponds and Carolina Bays. Its occurrences in Virginia include the western side of Dismal Swamp (City of Suffolk), City of Hampton, York, Southampton, Isle of Wight, and Gloucester Counties (Pague and Mitchell 1991).

**Project Findings:** Mabee's salamander (A. mabeei) was found utilizing the sinkhole pond complexes on WPNSTA Yorktown. Adult salamanders were found in mixed hardwood forests adjacent the sinkhole ponds. Breeding occurred in the sinkhole ponds during February and March and larvae left the ponds in June 1990. Larvae are dependent on standing water in the ponds until metamorphosis, usually June. Due to dry pond conditions, larvae did not successfully reach metamorphosis in 1991.

**Threats:** In all counties where Mabee's salamanders (A. mabeei) are found in Virginia, habitat alteration of the sinkhole pond complexes has occurred. Impacts have taken the form of direct destruction due to development, clearcutting of the immediate surrounding forest, and ditching and draining for agriculture. On WPNSTA Yorktown, the opportunity exists to restore these sites and manage the surrounding land for natural area values.

**Haliaeetus leucocephalus (bald eagle)**

**Description:** A large diurnal raptor of the *buteo* group. Adults have a wingspan of 5.8-7.5 ft. Adult birds (>4 or 5 years of age) are identified by the white head and yellow bill. Immature birds are dark brown with blotches of white on the underwings and tail. Bald eagles feed predominately on fish. Nests are built in tall trees.

**Status:** G3/S2S3 [Globally rare to uncommon; Very rare to rare in the state of Virginia]. Bald eagles (H. leucocephalus) are listed Endangered, both by the federal government and the Commonwealth of Virginia.

**Distribution:** The bald eagle (H. leucocephalus) is found throughout North America. It is most abundant along coastal areas, i.e. Chesapeake Bay, as well as being distributed around the Mississippi River drainage and Great Lakes. Common in Alaska, rare in the east. In Virginia, the bald eagle concentration areas are primarily in the Chesapeake Bay region. A few inland nesting sites are also known. Approximately 100 nests are known in Virginia.

**Project Findings:** On WPNSTA Yorktown a pair of bald eagles (H. leucocephalus) have constructed a nest adjacent Pond #11 and King Creek. Fledglings have been raised successfully for the past several years (D. Bradshaw, pers. comm).

**Threats:** Globally, bald eagle (H. leucocephalus) populations have diminished due to shooting, pesticides, and human encroachment. The eagle nest on WPNSTA Yorktown is located in a dead tree. The long-term persistence of bald eagles in the area will be dependent upon the availability of suitable nesting sites. Additional human recreation pressure on the man-made ponds of the area could lead to nest abandonment. The long-term viability of bald eagles in the Chesapeake Bay region depends not only on protecting existing nesting, roosting, and feeding sites, but also on maintaining a large amount of future potential habitat. An additional threat specific to WPNSTA Yorktown may be the proximity of the unexploded ordnance facility. The noise produced at this facility may have potential impactson bald eagle behavior and should be monitored.

## DISCUSSION

### RARE PLANTS

Though Yorktown was extensively searched for rare plants, only one rare species, Florida adder's-mouth (Malaxis spicata), was found during 1990 field work. The orchid was found in a high-quality ravine system along King Creek which, combined with the site's other significant resources, forms a significant area recommended for protection.

Rare species lists maintained by the Division of Natural Heritage are constantly refined to reflect the current level of knowledge regarding Virginia's biota. Because of this, shadow-witch (Ponthieva racemosa), formerly considered rare and found in Yorktown was not included with the rare species in the results of this report. This species, which is cited in the report on the rare species of Cheatham Annex (DCR-DNH, 1990), has been re-ranked to S3 status in Virginia. General population trends for these species are still monitored by the Division of Natural Heritage and the plants are retained on a "watchlist" of species which may warrant future conservation consideration. Figure 3 shows the locations of significant populations of Shadow-witch (P. racemosa) seen in 1990 at WPNSTA Yorktown.

### RARE ANIMALS

Two rare vertebrates species were found on WPNSTA Yorktown during the 1990-91 inventory. The Mabee's salamander (Ambystoma mabeei) reaches its westernmost known locality on the Lower Peninsula at WPNSTA Yorktown. This salamander is dependent on the naturally occurring sinkhole pond complexes of the region for breeding and maturation of the larvae. Additionally, the naturally occurring mixed hardwood and pine forests in the areas surrounding these ponds are the habitat of the adults. The conversion of these areas surrounding sinkhole ponds to monocultures of planted pine eliminates this species, as well as adversely affecting the other associated amphibian species. Where these unique sinkhole pond wetland communities occur in Virginia, they should be protected for their contribution to the biodiversity of the region. Buffer zones of at least 300 m should be acknowledged around individual sinkhole ponds. This represents the average distance that other adult salamanders of the Genus Ambystoma wander from the ponds during the non-breeding season (Semlitch 1981; Semlitch 1983). Ideally, aggregations of sinkhole ponds would not be fragmented by logging or development. Drainage ditches in the vicinity of these sinkhole pond complexes destroys the groundwater hydrology and eliminates their associated flora and fauna.

The bald eagle (H. leucocephalus) nest on WPNSTA Yorktown is located in a dead tree adjacent Pond #11. Previously collected

data indicates that the eagles have successfully reproduced at this location for several years (D. Bradshaw, pers. comm.; M. Byrd, pers. comm.). During this inventory we noted recreational use of Pond #11 by boaters and fisherman. If this recreational pressure has been consistent over the past several years, then the eagles are coping with it. If the intent is to increase recreational use of Pond #11, then this may cause the eagles to abandon the nest site. Coordination on use of Pond #11 should be done with the U.S. Fish and Wildlife Service (USFWS) and Virginia Department of Game and Inland Fisheries (VDGIF).

The apparent decline in songbirds (warblers, vireos, etc) in North America is linked to destruction of tropical rain forests where these birds winter, as well as modifications and loss of summer breeding habitat. Fragmentation of large tracts of contiguous natural forest habitat, whether through road construction, logging, or development is occurring at a rapid rate. Fragmenting these habitats creates numerous ecological problems, one of which includes allowing brown-headed cowbirds (Molothrus ater), a field and edge species, access to interior forests. They lay their eggs in the nests of warblers and vireos, hence reducing the reproductive output of the songbirds. During the Natural Heritage inventory of WPNSTA Yorktown, large numbers of brown-headed cowbirds were observed. This is likely due to the intensive management the area receives.

#### OTHER NATURAL HERITAGE RESOURCES

The Division of Natural Heritage also monitors rare and exemplary natural communities, significant geological features, invertebrates, important corridors, animal congregation sites, large forested tracts of land, and several other categories. While this study was constructed for vertebrate animals and plants, all other significant resources were noted.

Concerns have been raised about the occurrence of sea turtles in the York River, adjacent to WPNSTA Yorktown. The Kemp's ridley sea turtle (Lepidochelys kempii) and Loggerhead sea turtle (Caretta caretta) utilize York River and adjacent Chesapeake Bay as feeding grounds during the summer months. Yorktown WPNSTA can strive to reduce effluents and runoff into the York River hence contributing to improved habitat conditions for sea turtles in the Chesapeake Bay region.

## PROTECTION RECOMMENDATIONS

### King Creek Ravines Special Interest Area

#### (Botanical Area)

The co-occurrence of florida adder's-mouth (Malaxis spicata), and the number of other uncommon calciphile plants in lime soils of the marl ravines along King Creek indicates that these marl ravines are a state-significant rare plant habitat. To protect the most significant ravines, the King Creek Ravines Special Interest Area is recommended in Figure 6. This Special Interest Area includes both sub-populations of florida adder's-mouth (M. spicata) at Yorktown, large populations of uncommon plants including shadow-witch (Ponthieva racemosa) and drooping bulrush (Scirpus lineatus), and significant areas of mature hardwoods including areas dominated by umbrella magnolia (Magnolia tripetala) and southern sugar maple (Acer barbatum). The boundaries are designed to include the ravines where the rare species can be found as well as the uplands where land use should be managed so as not to negatively effect the rare species and significant forest communities.

Additionally, bald eagles (Haliaeetus leucocephalus) nest on Pond # 11 on an adjacent Special Interest Area (see below). An undisturbed forest habitat is required around the nest site, as well as providing for the eventual relocation of the existing nest when the current nest tree falls. The ravine habitats of this Special Interest Area contain a significant number of large trees, which over time could approach old-growth characteristics. This area is similiar to the Queen Creek area on NSC Cheatham Annex, but has received less management and manipulation. The fauna of this area is similiar to the Queens Creek area. The greatest density and diversity of songbirds were observed along King Creek ravine forests.

To protect the significant habitat in the Special Interest Area, timber operations which avoid negative impacts are recommended. These practices include: 1) using Gypsy Moth control practices which are as host-specific as possible, 2) utilizing timber harvest procedures outside of the preserve bounds so that sedimentation of streams draining into Special Interest Area is not increased, and 3) not cutting within the preserve bounds.

Also necessary to protect the preserves' significant habitats, protection of the groundwater quality/quantity within preserve bounds is recommended. This requires that 1) no extensive paving occurs within or near the preserve, as it will limit recharging of surficial aquifers which feed the seeps of the ravines and 2) that herbicide and pesticide treatments which pollute groundwater are not used.

A monitoring program is recommended in the Special Interest Area to determine if management is required to control exotic vegetation which may threaten the native vegetation. The exotic grass Eualia viminea is especially prone to invasion within the ravine habitat. The number of individuals and extent of the rare species populations should be monitored to determine if populations are diminishing. Changes in the exotic grass' population numbers and observable competition effects should also be monitored.

If these recommendations are enacted and land-use within the King Creek Special Interest Area does not change significantly, little if any species-specific management should be required to maintain the rare plants found in the natural area preserves within Yorktown.

#### Pond #11 Special Interest Area

This area is designed to protect the existing bald eagle (Haliaeetus leucocephalus) nest located on Pond # 11. (Figure 4). Protection boundaries are modeled according to guidelines in Kline (1985). The size of the protection zone around eagle nests varies with time of year, with nesting being the most critical. Certain eagle pairs may be more tolerant of disturbance than others. Any disturbance, including human presence should be prevented within 330 ft of the nest during 15 December - 15 June. Timber cutting and landclearing should not occur. Between 330 and 660 ft from the nest, no disturbances should occur during the nesting season, but selective thinning of timber stands and recreational activities can occur at other times of year. Finally the area extending approximately 1/4 mile from the nest, which is represented by the boundaries on Figure 4, should be managed with eagle protection in mind. Timber cutting and road construction should be restricted. These are general recommendations and any planned land use changes should be coordinated with the VDGIF, USFWS, and DCR-DNH.

#### Curtis Cemetary Sinkhole Ponds Special Interest Area

The protection boundaries drawn for this area are designed to protect the sinkhole pond complex of this area, the Mabee's salamander population (A. mabeei) and the remaining mixed hardwood forest. The major portion of this area currently exists as a several year old clearcut. This area should be allowed to regenerate naturally, i.e. not treated with herbicides to suppress the hardwoods. Areas on the western boundary of this special interest area have also been previously cut and planted in pine, although some hardwoods remain. Natural succession should eliminate the pines over time. Any ditching in the vicinity which will affect the hydrology must be avoided. Further loss or disruption of these sinkhole ponds will result in a significant loss of WPNSTA Yorktown's biodiversity.

Halstead Road Sinkhole Ponds Special Interest Area

The protection boundaries for this area are designed to protect the sinkhole pond complex and the seepage marsh. Logging activities in this area should be curtailed to prevent further fragmentation of this complex. A drainage ditch at the northern portion of this area is likely responsible for a lack of water in the adjacent pond. This ditch should be filled.

**FUTURE WORK**

The results of this inventory are believed to reflect the actual occurrences of rare species on the WPNSTA Yorktown. Several species are difficult to inventory for and may have been missed during the survey, specifically bats. Future work should focus on monitoring the rare species occurrences for the continued existence and viability of the populations. Since WPNSTA Yorktown is a large tract of contiguous ownership, the potential to manage it for the overall biodiversity of the Lower Peninsula could be realized. It is toward this goal that we would like to see WPNSTA Yorktown strive.

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TABLE 1

## RARE VERTEBRATE ANIMALS RECORDED FROM YORK AND JAMES CITY COUNTIES

**Amphibians**

<u>Ambystoma mabeei</u> (Mabee's salamander)	G4/S2
<u>Ambystoma tigrinum</u> (eastern tiger salamander)	G5/S1
<u>Siren lacertina</u> (greater siren)	G5/SU
<u>Hyla gratiosa</u> (barking treefrog)	G5/S1

**Reptiles**

<u>Crotalus horridus atricaudatus</u> (canebrake rattlesnake)	G5TUQ/S1
---------------------------------------------------------------	----------

**Birds**

<u>Ixobrychus exilis</u> (least bittern)	G5/S2
<u>Haliaeetus leucocephalus</u> (bald eagle)	G3/S2S3
<u>Circus cyaneus</u> (northern harrier)	G5/S1S2
<u>Falco peregrinus</u> (peregrine falcon)	G3/S1
<u>Ardea herodias</u> (great blue heron)	G5/S3
<u>Casmerodius albus</u> (great egret)	G5/S2
<u>Rallus elegans</u> (king rail)	G4Q/S2
<u>Picoides borealis</u> (red-cockaded woodpecker)	G2/S1
<u>Actitis macularia</u> (spotted sandpiper)	G5/S2

**MAMMALS**

<u>Condylura cristata parva</u> (star-nosed mole)	G5T4/S2
<u>Sylvilagus palustris</u> (marsh rabbit)	G5/S2S3

TABLE 2

AMPHIBIANS IDENTIFIED OR COLLECTED DURING INVENTORY  
WPNSTA Yorktown

## SALAMANDERS

<u>Ambystoma mabeei</u>	Mabees salamander
<u>Ambystoma maculatum</u>	spotted salamander
<u>Ambystoma opacum</u>	marbled salamander
<u>Plethodon cinereus</u>	red-backed salamander
<u>Plethodon chlorobryonis</u>	Coastal Plain slimy salamander
<u>Notophthalmus viridescens</u>	red-spotted newt

## FROGS

<u>Acris crepitans</u>	northern cricket frog
<u>Bufo terrestris</u>	southern toad
<u>Hyla chrysoscelis</u>	gray treefrog
<u>Hyla cinereus</u>	green treefrog
<u>Pseudacris triseriata</u>	upland chorus frog
<u>Pseudacris crucifer</u>	spring peeper
<u>Gastrophryne carolinensis</u>	eastern narrow-mouthed toad
<u>Rana catesbeiana</u>	bullfrog
<u>Rana clamitans</u>	green frog
<u>Rana utricularia</u>	leopard frog
<u>Rana palustris</u>	pickerel frog
<u>Scaphiopus holbrooki</u>	spadefoot toad

TABLE 3

REPTILES IDENTIFIED OR COLLECTED DURING INVENTORY  
WPNSTA Yorktown

## TURTLES

<u>Chelydra serpentina</u>	common snapping turtle
<u>Chrysemys picta</u>	painted turtle
<u>Clemmys guttata</u>	spotted turtle
<u>Trachemys scripta</u>	yellow-bellied slider
<u>Pseudemys rubriventris</u>	red-bellied turtle
<u>Kinosternon subrubrum</u>	eastern mud turtle
<u>Terrapene carolina</u>	eastern box turtle
<u>Sternotherus odoratus</u>	musk turtle (Stinkpot)

## SNAKES

<u>Carphophis amoenus</u>	worm snake
<u>Coluber constrictor</u>	black racer
<u>Diadophis punctatus</u>	ringneck snake
<u>Nerodia sipedon</u>	northern water snake
<u>Elaphe obsoleta</u>	black rat snake
<u>Opheodrys aestivus</u>	rough green snake
<u>Virginia valeriae</u>	smooth earth snake
<u>Virginia striatula</u>	rough earth snake

## LIZARDS

<u>Eumeces fasciatus</u>	five-lined skink
<u>Sceloporus undulatus</u>	fence lizard
<u>Scincella lateralis</u>	ground skink

TABLE 4.

BIRDS IDENTIFIED DURING INVENTORY  
WPNSTA Yorktown

Great blue heron	
Great egret	
Green-backed heron	P
Yellow-crowned night-heron	
Canada goose	P
Wood duck	B
Black vulture	
Turkey vulture	
Osprey	B
Bald eagle	B
American kestrel	P
Wild turkey	B
Northern bobwhite	B
Killdeer	B
Laughing gull	
Mourning dove	B
Yellow-billed cuckoo	B
Barred owl	P
Chimney swift	B
Ruby-throated hummingbird	P
Belted kingfisher	B
Red-headed woodpecker	B
Red-bellied woodpecker	B
Downy woodpecker	B
Hairy woodpecker	P
Northern flicker	B
Pileated woodpecker	B
Eastern wood-pewee	B
Acadian flycatcher	B
Great-crested flycatcher	B
Eastern kingbird	B
Purple martin	B
Northern rough-winged swallow	
Barn swallow	B
Blue jay	B
American crow	B
Fish crow	B
Carolina chickadee	B
Tufted titmouse	B
White-breasted nuthatch	B
Carolina wren	B
Blue-gray gnatcatcher	B
Eastern bluebird	B
Wood thrush	B
American robin	B
Northern mockingbird	B
Brown Thrasher	B

European starling	B
White-eyed vireo	B
Yellow-throated vireo	P
Red-eyed vireo	B
Northern parula	B
Yellow-throated warbler	B
Pine warbler	B
Prairie warbler	B
American redstart	P
Prothonotary warbler	P
Ovenbird	B
Louisiana waterthrush	P
Kentucky warbler	P
Common yellowthroat	B
Hooded warbler	B
Yellow-breasted chat	P
Summer tanager	B
Northern cardinal	B
Blue grosbeak	P
Indigo bunting	B
Rufous-sided towhee	B
Chipping sparrow	B
Field sparrow	B
Red-winged blackbird	B
Eastern meadowlark	B
Common grackle	B
Brown-headed cowbird	B
Orchard oriole	P
House finch	P
American goldfinch	P
House sparrow	B

B = confirmed breeding  
P = probable breeding

TABLE 5

MAMMALS IDENTIFIED OR COLLECTED DURING INVENTORY  
WPNSTA Yorktown

<u>Sorex longirostris longirostris</u>	southeastern shrew
<u>Blarina carolinensis</u>	short-tailed shrew
<u>Cryptotis parva</u>	least shrew
<u>Scalopus aquaticus</u>	eastern mole
<u>Eptesicus fuscus</u>	big brown bat
<u>Sylvilagus floridana</u>	eastern cottontail rabbit
<u>Sciurus carolinensis</u>	eastern gray squirrel
<u>Glaucomys volans</u>	southern flying squirrel
<u>Oryzomys palustris</u>	rice rat
<u>Reithrodontomys humulus</u>	harvest mouse
<u>Peromyscus leucopus</u>	white-footed mouse
<u>Mus musculus</u>	house mouse
<u>Microtus pennsylvanicus</u>	meadow vole
<u>Microtus pinetorum</u>	pine vole
<u>Ondatra zibethica</u>	muskrat
<u>Urocyon cinereoargenteus</u>	gray fox
<u>Vulpes vulpes</u>	red fox
<u>Procyon lotor</u>	raccoon
<u>Didelphis virginianus</u>	opposum
<u>Odocoileus virginiana</u>	white-tailed deer

**FIGURE HEADINGS**

- Figure 1. The location of the Naval Weapons Station Yorktown, in York and James City Counties, Virginia. Sites within Naval Weapons Station Yorktown that were trapped for small mammals, amphibians, and reptiles are indicated with a filled circle.
- Figure 2. The locations of the Florida adder's-mouth (Malaxis spicata) within the Kings Creek Special Interest Area.
- Figure 3. The locations of the shadow-witch Pontheiva racemosa at WPNSTA Yorktown, 1990.
- Figure 4. The location of the Bald Eagle (Haliaeetus leucocephalus) nesting site and recommended protection boundaries for the Pond # 11 Special Interest Area.
- Figure 5. The recommended boundaries for the Curtis Cemetary Sinkhole Ponds Specieal Interest Area.
- Figure 6. The recommended boundaries for the King Creek Ravines Special Interest Area.
- Figure 7. The recommended boundaries for the Halstead Road Sinkhole Ponds Special Interest Area.

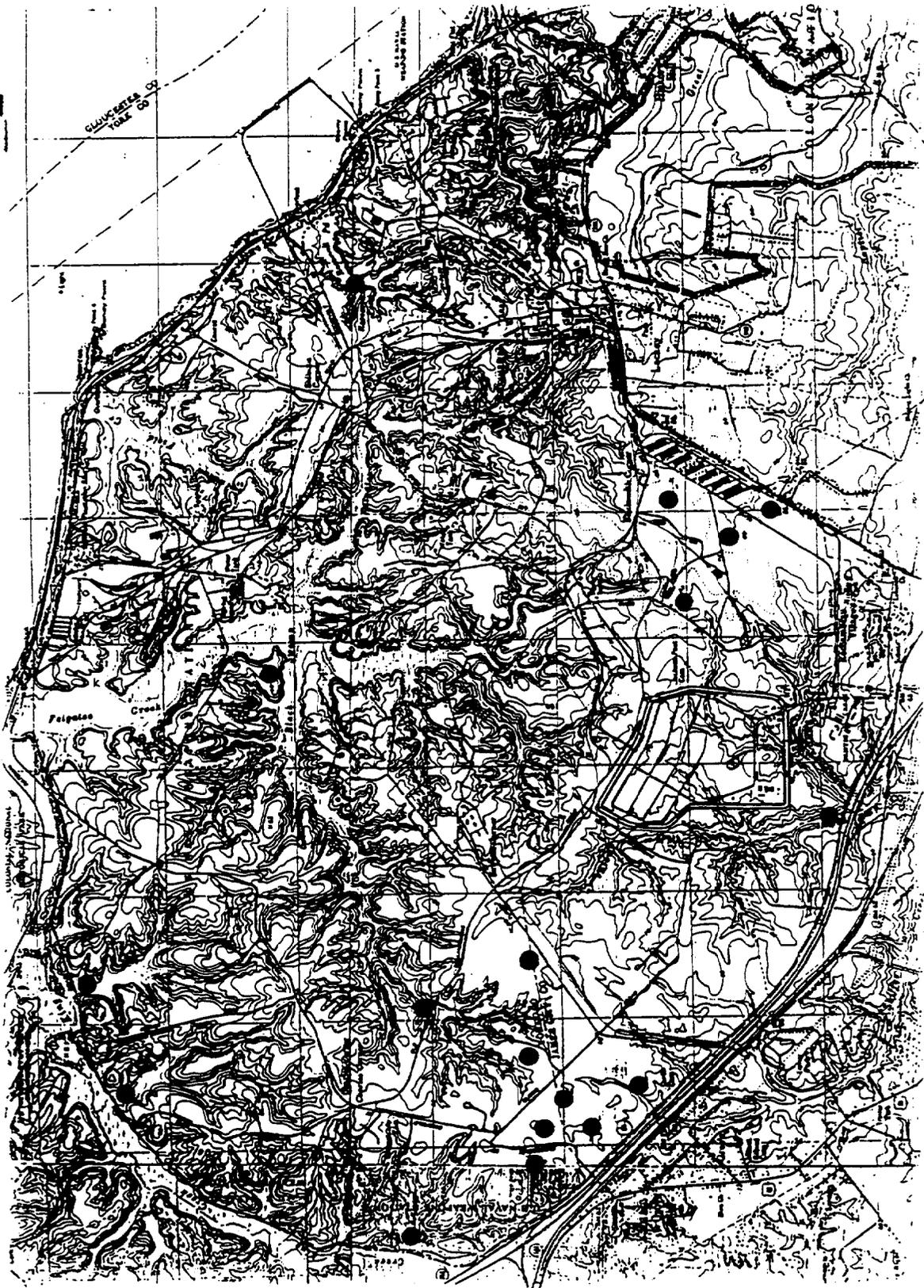


FIGURE 1

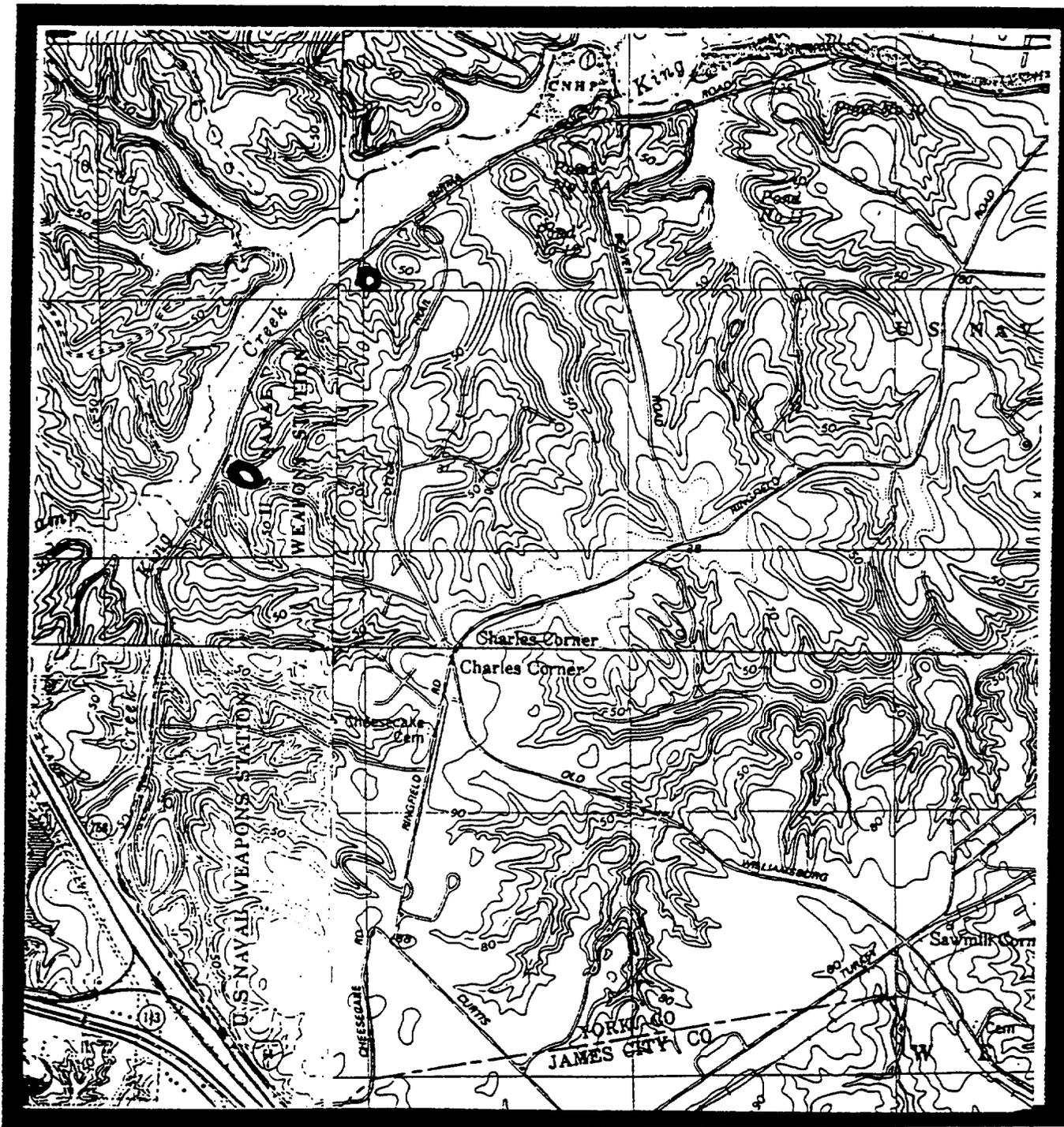


FIGURE 2



FIGURE 3

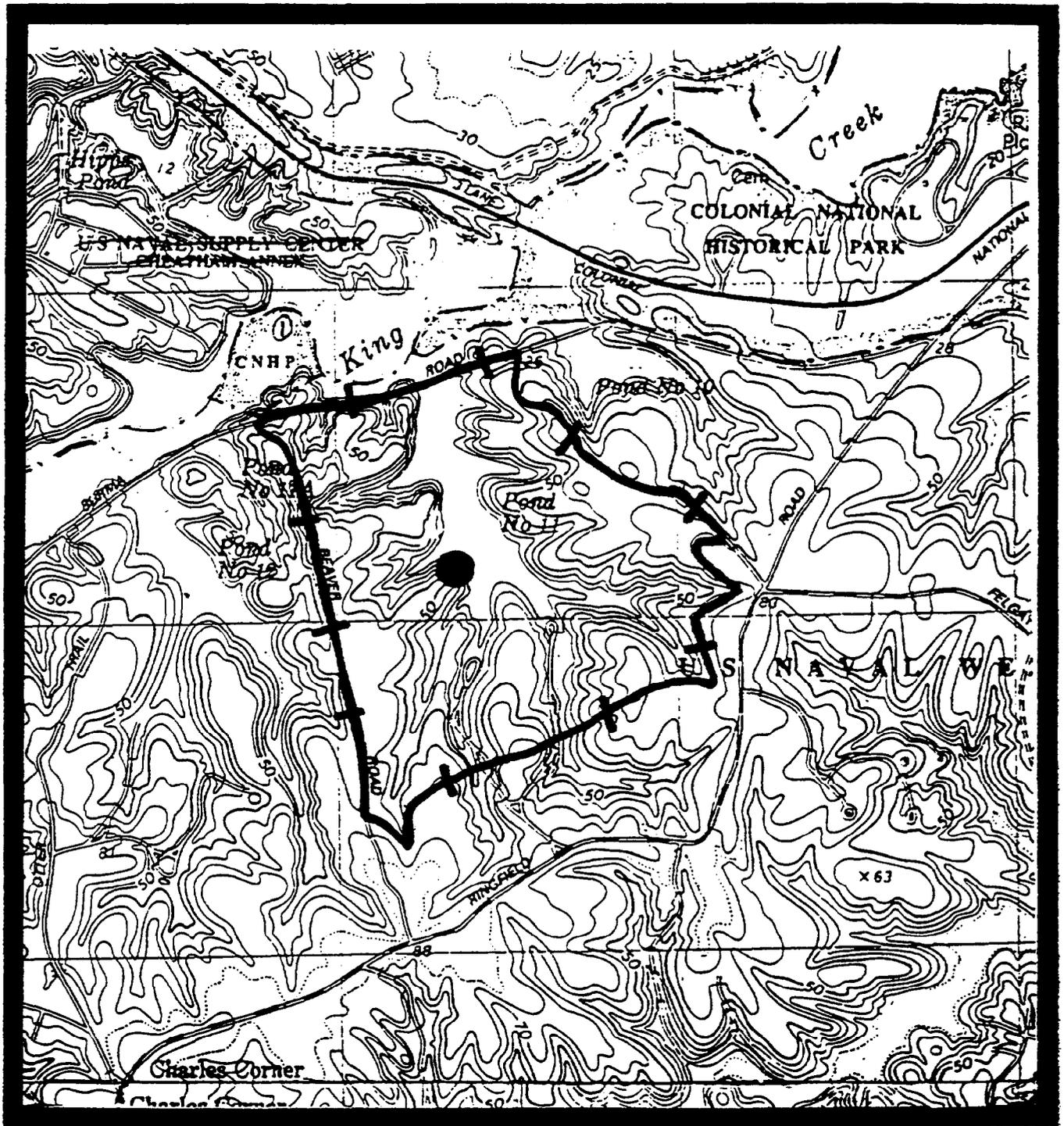


FIGURE 4

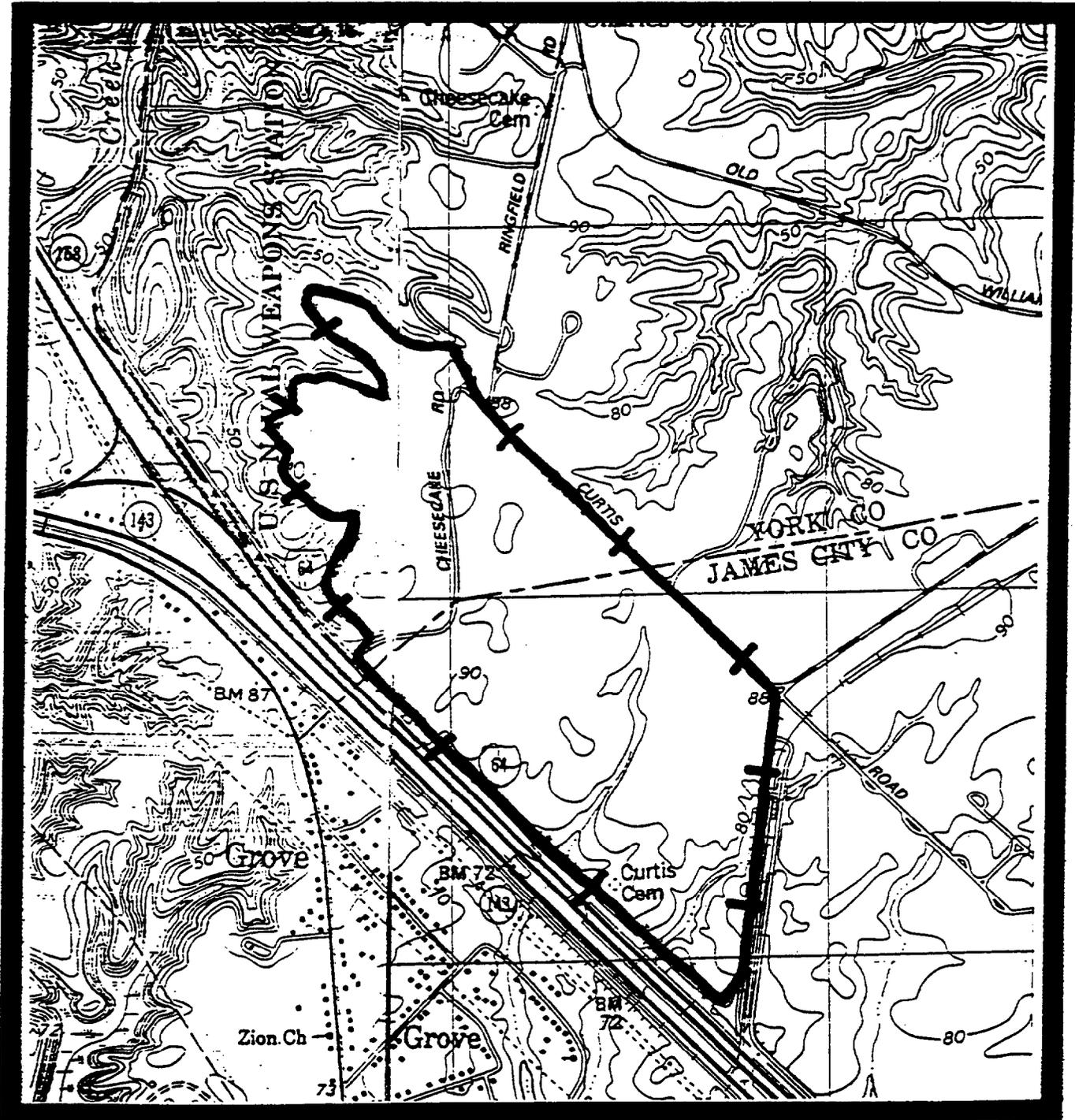


FIGURE 5

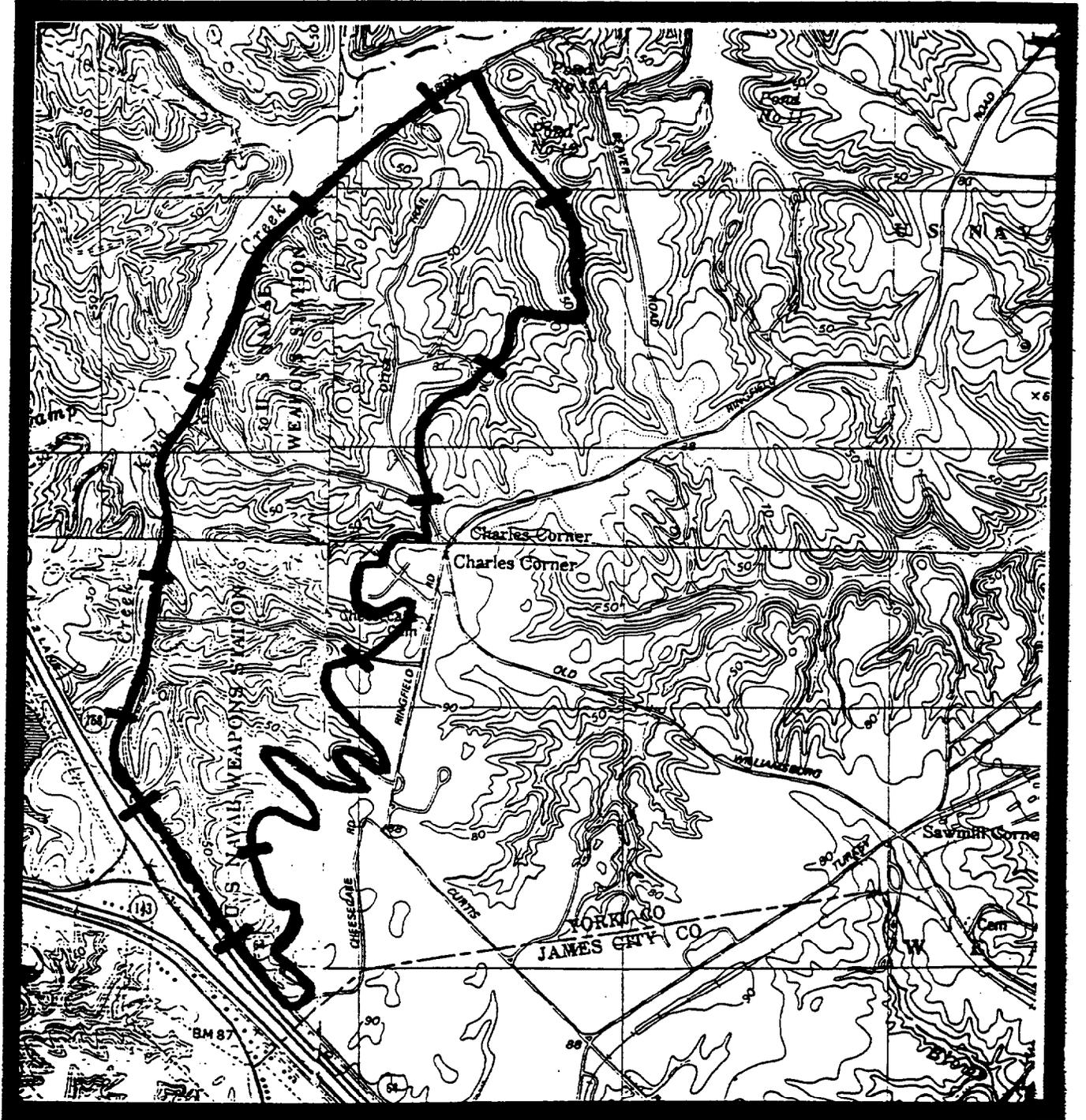


FIGURE 6

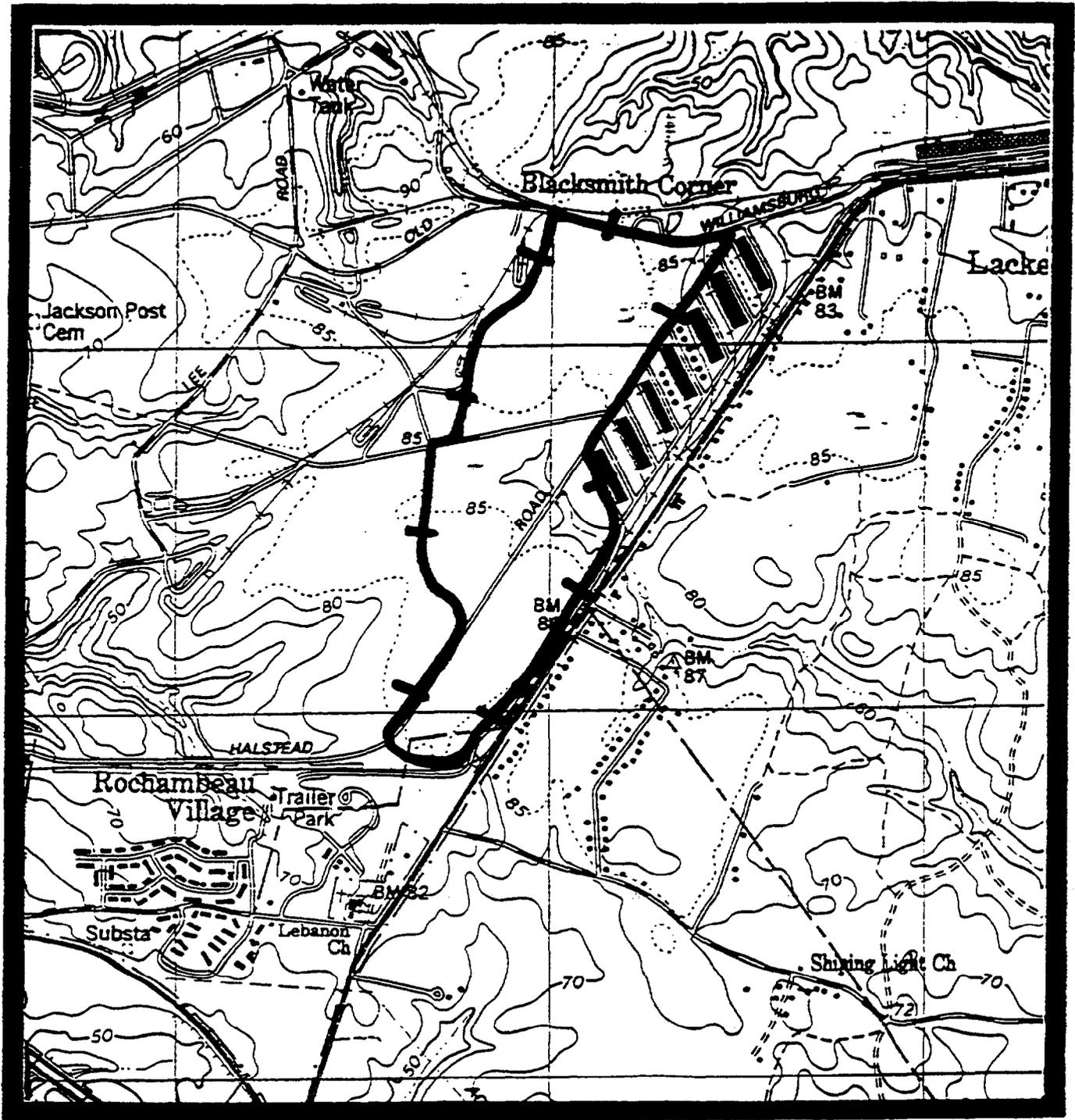


FIGURE 7

Definition of Abbreviations Used on Natural Heritage Resource Lists  
of the  
Virginia Department of Conservation and Recreation

Natural Heritage Ranks

The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHR's," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The primary criterion for ranking NHR's is the number of populations or occurrences, i.e. the number of known distinct localities. Also of great importance is the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals. Other considerations may include the quality of the occurrences, the number of protected occurrences, and threats. However, the emphasis remains on the number of populations or occurrences such that ranks will be an index of known biological rarity.

- S1 Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.
- S2 Very rare; usually between 5 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.
- S3 Rare to uncommon; usually between 20 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- S4 Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.
- S5 Very common; demonstrably secure under present conditions.
- SA Accidental in the state.
- SH Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
- SN Regularly occurring migrants, transients, seasonal non-breeding residents. Usually no specific site can be identified with its range in the state. (Note that congregation and staging areas are monitored separately.)
- SU Status uncertain, often because of low search effort or cryptic nature of the element.  
Apparently extirpated from the state.

Global ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note that GA and GN are not used and GX means apparently extinct. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "TM". The global and state ranks combined (e.g. G2/S1) give an instant grasp of a species' known rarity.

These ranks should not be interpreted as legal designations.

Federal Legal Status

The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

- |                            |                                                                                   |
|----------------------------|-----------------------------------------------------------------------------------|
| LE - Listed Endangered     | JA - Former candidate - presumed extinct                                          |
| LT - Listed Threatened     | JB - Former candidate - not a valid species under current taxonomic understanding |
| PE - Proposed Endangered   | JC - Former candidate - common or well protected                                  |
| PT - Proposed Threatened   | NF - no federal legal status                                                      |
| CT - Candidate, category 1 |                                                                                   |
| C2 - Candidate, category 2 |                                                                                   |

State Legal Status

The Division of Natural Heritage uses similar abbreviations for State endangerment.

- |                        |                            |
|------------------------|----------------------------|
| LE - Listed Endangered | PE - Proposed Endangered   |
| LT - Listed Threatened | PT - Proposed Threatened   |
| C - Candidate          | NS - no state legal status |

For information on the laws pertaining to threatened or endangered species, contact:

- U.S. Fish and Wildlife Service for all FEDERALLY listed species
- Department of Agriculture and Consumer Services Plant Protection Bureau for STATE listed plants and insects
- Department of Game and Inland Fisheries for all other STATE listed animals