AN INVENTORY FOR RARE, THREATENED, AND ENDANGERED SPECIES IN THE JAMESTOWN ISLAND 400 PROJECT AREA, COLONIAL NATIONAL HISTORICAL PARK

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INTRODUCTION

In the spring of 2000, the Colonial National Historical Park, National Park Service, U. S. Department of the Interior (CNHP), contracted with the Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNH) to conduct an inventory of natural heritage resources within the Jamestown Island 400 (JI400) Project Area, CNHP. The primary purpose of the inventory is to determine the presence of rare, threatened, and endangered plant and animal species. The practical goal of the inventory is to assist CNHP personnel in decisions concerning land use, maintenance activities, public access, site placement for facilities, and management of areas containing natural heritage resources. This report details the findings of the inventories conducted for rare, threatened, and endangered plants and animals.

DCR-DNH is the state agency responsible by statutory authority under the Virginia Natural Area Preserves Act (Section 10.1-209 through 217, Code of Virginia) for inventory, database maintenance, protection, and management of Virginia's natural heritage resources. Such resources are defined as the habitat of rare, threatened, or endangered plant and animal species, rare or state significant communities, and other natural features. DCR-DNH provides the only comprehensive effort to identify the Commonwealth's most significant natural areas through ongoing scientific biological survey. Data gathered during this state-wide survey is assembled and managed through a sophisticated Biological and Conservation Data System (BCD) in which information on ecosystems and species, their biology, habitats, locations, conservation status, and management needs is continually updated and refined. DCR-DNH is part of an international network of natural heritage programs coordinated by NatureServe, which utilize standardized inventory methodologies and database management technologies such as BCD.

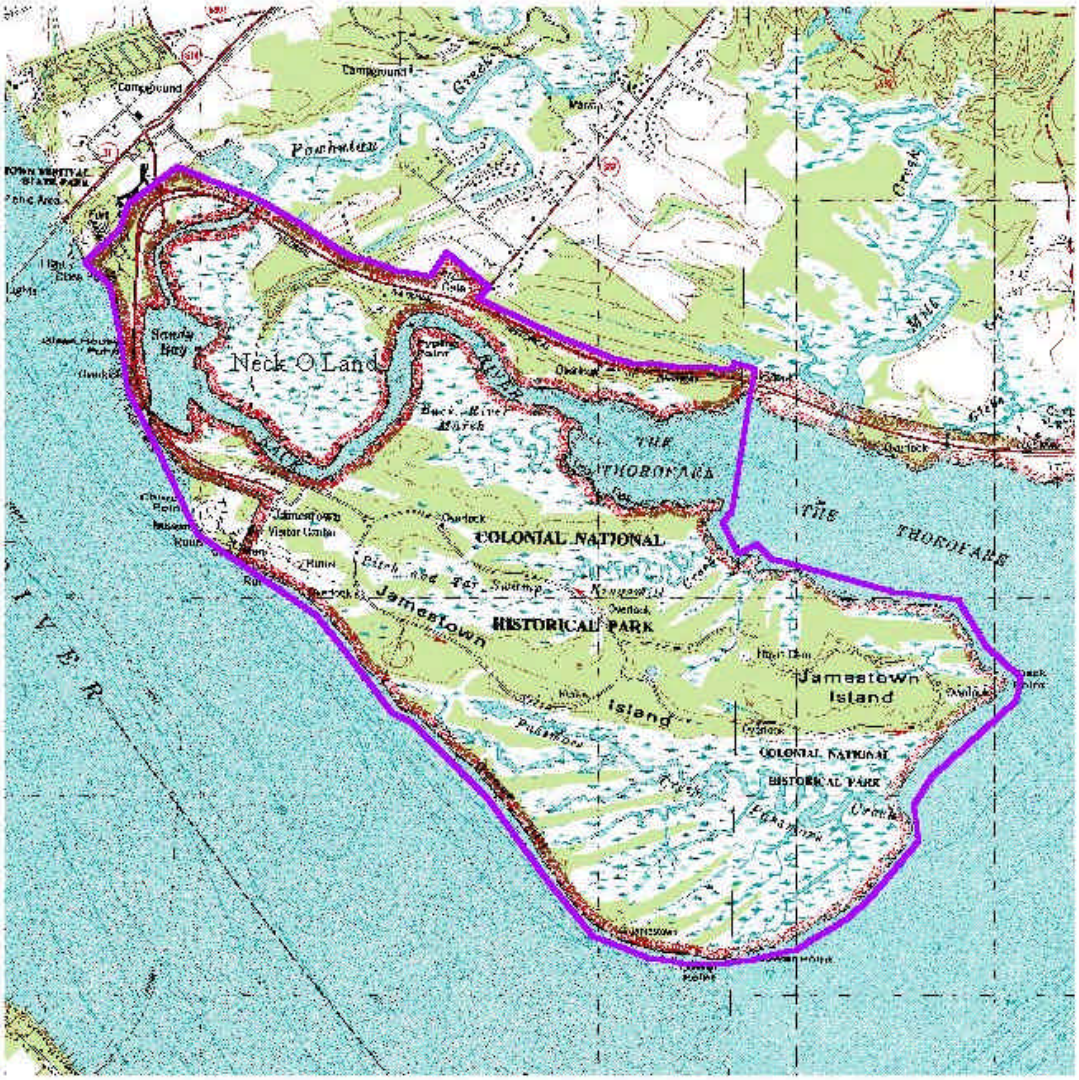
The JI400 Project Study Area covers approximately 2,263 acres and includes all of Jamestown Island and its associated marshes, the Neck O Land area, the Isthmus and Glasshouse Point areas, and the Colonial Parkway to the overlook just west of Mill Creek. The site is mapped on the Surry and Hog Island U.S. Geological Survey 7.5' topographic quadrangles in Figure 1. A small portion of the study area is owned by the Association for the Preservation of Virginia Antiquities (APVA) on the west end of Jamestown Island.

EXPLANATION OF THE NATURAL HERITAGE RANKING SYSTEM

Each of the significant natural features (species, community type, etc.) monitored by DCR-DNH is considered an element of natural diversity, or simply an **element**. Each element is assigned a rank that indicates its relative rarity on a five-point scale (1 = extremely rare; 5 = abundant; Table 1). The primary criterion for ranking elements is the number of occurrences, *i.e.*, the number of known distinct localities or populations. Also of great importance is the number of individuals at each locality or, for highly mobile organisms, the total number of individuals. Other considerations include the condition of the occurrences, the number of protected occurrences, and threats. However, the emphasis remains on the number of occurrences, so that ranks essentially are an index of known biological rarity. These ranks are assigned both in terms of the element's rarity within Virginia (its State or S-rank) and the element's rarity over its entire range (its Global or G-rank). Subspecies and varieties are assigned a Taxonomic (T-) rank in addition to their G-rank.

Figure 1.

Jamestown Island 400 Project Study Area



0.6 0 0.6 1.2 Kilometers

N

Jamestown Island 400 Project Study Area

Table 1. Definition of natural heritage State rarity ranks. Global ranks are similar, but refer to a species' range-wide status. Note that GA and GN are not used and GX means extinct. Sometimes ranks are combined (*e.g.* S1S2) to indicate intermediate or somewhat unclear status. Elements with uncertain taxonomic validity are denoted by the letter Q after the global rank. These ranks should not be interpreted as legal designations.

S1	Extremely rare; usually 5 or fewer occurrences in the state; or may have a few remaining individuals; often especially vulnerable to extirpation.
S2	Very rare; usually between 5 and 20 occurrences; or few occurrences with many individuals; often susceptible to becoming endangered.
S3	Rare to uncommon; usually between 20 and 100 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 more than 100 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 more than 15 years; this rank is used primarily when inventory has been attempted recently.
SN	Regularly occurring migrants or transient species which are non-breeding, seasonal residents. (Note that congregation and staging areas are monitored separately)
SU	Status uncertain, often because of low search effort or cryptic nature of the element.
SX	Apparently extirpated from the State

Taken together, these ranks give an instant picture of an element's rarity. For example, a designated rank of G5S1 indicates an element which is abundant and secure range-wide, but extremely rare in Virginia. Rarity ranks used by DCR-DNH are not legal designations, and they are continuously updated to reflect new information.

The spot on the landscape that supports a natural heritage resource is an **element occurrence**. DCR-DNH has mapped over 10,000 element occurrences in Virginia. Information on the location and quality of these element occurrences is computerized within the Division's BCD system, and additional information is recorded on maps and in manual files.

In addition to ranking each element's rarity, each element occurrence is ranked to differentiate large, outstanding occurrences from small, vulnerable ones. In this way, protection efforts can be aimed

not only at the rarest elements, but at the best examples of each. Species occurrences are ranked in terms of quality (size, vigor, etc.) of the population; the condition (pristine to disturbed) of the habitat; the viability of the population; and the defensibility (ease or difficulty of protecting) of the occurrence. Community occurrences are ranked according to their size and overall natural condition. These **element occurrence ranks** range from A (excellent) to D (poor). Sometimes these ranks are combined to indicate intermediate or somewhat unclear status, *e.g.* AB or CD, etc. In a few cases, especially those involving cryptic animal elements, field data may not be sufficient to reliably rank an occurrence. In such cases a rank of E (extant) may be given. Historical records are indicated as H. Element occurrence ranks reflect the current condition of the species' population or community. A poorly-ranked element occurrence can, with time, become highly-ranked as a result of successful management or restoration.

Element ranks and element occurrence ranks form the basis for ranking the overall significance of sites. Site **biodiversity ranks** (B-ranks) are used to prioritize protection efforts, and are defined as follows:

B1 Outstanding Significance: only site known for an element; an excellent occurrence of a G1 species; or the world's best example of a community type.

B2 Very High Significance: excellent example of a rare community type; good occurrence of a G1 species; or excellent occurrence of a G2 or G3 species.

B3 High Significance: excellent example of any community type; good occurrence of a G3 species.

B4 Moderate Significance: good example of a community type; excellent or good occurrence of state-rare species.

B5 General Biodiversity Significance: good or marginal occurrence of a community type or state-rare species.

Note: sites supporting rare subspecies or varieties are considered slightly less significant than sites supporting similarly ranked species.

The U.S. Fish and Wildlife Service (USFWS) is responsible for the listing of endangered and threatened species under the Endangered Species Act of 1973, as amended. Federally listed species (including subspecific taxa) are afforded a degree of legal protection under the Act, and therefore sites supporting these species need to be identified. USFWS also maintains a review listing of potential candidate endangered and threatened taxa. Table 2 illustrates the various status categories used by USFWS and followed in this report. The status category of candidate species is based largely on the Service's current knowledge about the biological vulnerability and threats to a species.

In February 1996 the US Fish and Wildlife Service revised its categories for the candidate list in the following manner: Taxa formerly considered as ‘Category 1’ candidates for listing are now considered as ‘Candidate’. Taxa formerly considered as ‘Category 2’ (C2) candidates are no longer

Table 2. U.S. Fish and Wildlife Service species status codes, with abbreviated definitions	
LE	Listed endangered
LT	Listed threatened
LT/PDT	Listed as Threatened but proposed for delisting by the USFWS. The species is still protected under the Endangered Species Act until such delisting is official.
PE	Proposed to be listed as endangered
PT	Proposed to be listed as threatened
C	Candidate (formerly category 1): status data supports listing of taxon as endangered or threatened, but listing has been delayed by pending proposals of higher priority taxa.
E(S/A)	Treat as endangered because of similarity of appearance
T(S/A)	Treat as threatened because of similarity of appearance
SOC	Species of Concern -- species that merit special concern (not a regulatory category)
NF	No federal legal status

being maintained by the Service as Candidate or Status Review taxa. The Service has suggested that such taxa be considered 'Species of Concern' (SOC) or Species at Risk", neither of which has any official status. The Virginia Field Office of the USFWS maintains a list of these SOC, which includes all taxa globally ranked as G1-G2/G3. Taxa formerly considered as 'Category 3' candidates are no longer being maintained by the Service. This included taxa for which the Service had persuasive evidence of extinction (3A); that did not represent distinct entities meeting the Act's definition of 'species' (3B); or that had proven to be more abundant or widespread, or not subject to any identifiable threat (3C).

In Virginia, two acts have authorized the creation of official state endangered and threatened species lists. One act (section 29.1-563 through 570, Code of Virginia), administered by the Virginia Department of Game and Inland Fisheries (VDGIF), authorizes listing of fish and wildlife species, not including insects. The other act (section 3.1-1020 through 1030, Code of Virginia), administered by the Virginia Department of Agriculture and Consumer Services (VDACS), allows for listing of plant and insect species. In general, these acts prohibit or regulate taking, possessing, buying, selling, transporting, exporting, or shipping of any endangered or threatened species appearing on the official lists. Species protected by these acts are indicated as either listed endangered (LE) or listed threatened (LT). Species under consideration for listing are indicated as candidates (C). In addition, DGIF has created an informal category of Special Concern (SC) for animals that merit special attention; this is an unprotected status.

METHODOLOGY

BOTANICAL INVENTORY

For purposes of this study, rare plants are defined as the rarest known species in Virginia as designated by DCR-DNH. In Virginia, rare plants include species with global ranks of G1, G2, and G3, and state ranks of S1, S2, SH, and SX. Data on species with state ranks of S1, S2 (or S2S3), SH, and SX are maintained in the BCD system and summarized annually on a master list of Virginia's rare plants (Townsend 2001). Species with state ranks of S3 and SU are not tracked using BCD, but maintained on a separate "watchlist." Only general information about watchlist species is recorded in the field and maintained in manual information files.

This report includes field work from 2000 through 2001, incorporating that conducted in 2000 on the Neck O Land tract and reported in Chazal and Van Alstine (2001). In late 2000 the study area was expanded to include the larger Jamestown Island area. The same methodology used in 2000 on the Neck O Land tract was applied to the larger study area. To initiate the inventory of rare plants on the Jamestown Island study site, existing data on element occurrences within and near the site were obtained from DCR-DNH's BCD database and manual files. Data in BCD were partly based on information gathered from botanical literature and from examination of collections at the following institutions: College of William and Mary, George Mason University, Longwood College, Lynchburg College, National Arboretum, Old Dominion University, University of Richmond, U.S. National Herbarium (Smithsonian Institution), University of North Carolina, Virginia Commonwealth University, and Virginia Polytechnic Institute and State University.

Two rare plant species, sensitive joint-vetch (*Aeschynomene virginica*, G2/S2, LT) and gaping panic grass (*Steinchisma hians*, G5/SH) had been documented on this section of Colonial National Historical Park prior to this inventory. M.L. Fernald and B. Long collected a specimen of sensitive joint-vetch on 8-22-1939 on the "tidal shore of Back River, opposite Jamestown Island" (Coll. # 11052, US National Herbarium). Fernald noted it was close to the [ferry] landing (Fernald 1940). Gaping panic grass was collected on Jamestown Island in 1983 on the edge of the Pitch and Tar Swamp (G. North, Coll.# 1170, College of William and Mary Herbarium). Not far north of the Neck O Land study area, an extensive population of Parker's pipewort (*Eriocaulon parkeri*, G3/S2), a mudflat species first documented here by Fernald in 1939 (US National Herbarium, Coll. #10988), was confirmed along much of Powhatan Creek north of the Colonial Parkway bridge (Ludwig 1993, Wright unpublished data 1990). Two other plant rarities, small whorled pogonia (*Isotria medeoloides*, G2G3/S2, LT/LE) and Virginia least trillium (*Trillium pusillum* var. *virginiana*, G3T2/S2) are known from a number of occurrences in the Powhatan Creek drainage near Williamsburg (DCR-DNH database).

In 2000, plant surveys on the Neck O Land portion of the study site were conducted between 18 May and 25 October. A survey of the uplands in the northern portion of the Neck O Land site was conducted in mid-May for the federally listed threatened species small whorled pogonia (*Isotria medeoloides*). Appropriate habitat for this species, second- to third-growth hardwood stands on moderate to level slopes with sparse herbaceous plant cover, was sought in the uplands both south and north of the Parkway. A boat survey for the mudflat rarity Parker's pipewort (*Eriocaulon parkeri*) was conducted in early October at low tide. Exposed mudflats along the shoreline of

Powhatan Creek, immediately north of the Colonial Parkway, Sandy Bay, Back River, and in the interior of the marsh were visually scanned for the most appropriate habitat. The sites with the highest potential were then searched by foot. A boat survey for sensitive joint-vetch was conducted in mid-October at high tide to allow the survey to be conducted as far into the interior of the marsh as possible. Boat surveys for sensitive joint-vetch were carried out by means of the boat being slowly driven along the shoreline as one surveyor scanned the marsh with binoculars. A survey for sensitive joint-vetch by foot was conducted in mid-October in marsh areas accessed from adjacent uplands and from the remains of the road leading to the old ferry landing.

Survey work in 2001 was conducted on the expanded study area between 26 April and 19 September. A search for Virginia least trillium (*Trillium pusillum* var. *virginianum*) was done in late April in a small forested wetland north of the Parkway on the northwest corner of the Neck O Land section. A survey for small whorled pogonia was conducted in early June in hardwood-dominated stands south of the Parkway and east of the Neck O Land tract and near the Glasshouse. Surveys for Parker's pipewort and sensitive joint-vetch were conducted in September by boat in the marshes along Back River that were not surveyed in 2000 and in the Passmore Creek area . The marsh along the ponded area within the Pitch and Tar Swamp was surveyed by foot in September. The location for sensitive joint-vetch seen in 2000 was visited two times in 2001 to reassess this population.

During the botanical inventory, field data were recorded during each site survey. These data included the site location, directions, and a site description, as well as comments on land use, potential hazards, exotic flora and fauna, and off-site considerations. When a rare plant occurrence was located, additional data were recorded, including the date(s) when the species was found, population boundaries and concentrations within those boundaries, approximate number of individuals, reproductive and phenological status, and species viability. Habitat factors such as moisture, light, and associated species, as well as any apparent immediate or long-term threats to the rare species population were also noted. When a plant rarity was found, the location was documented by a Global Positioning System (GPS) unit; this was done by NPS staff in 2000 and by the DCR-DNH field botanist in 2001. Photographs of the species and habitat were taken using a digital camera. In general, when population size allows, a voucher specimen would be collected to verify the identity of the rare species. Rare species occurrences were ranked on the basis of all available data and Element Global Rank Specifications developed by The Nature Conservancy and National Heritage Programs. Data on plant rarities found in this survey have been entered into DCR-DNH's BCD database.

ZOOLOGICAL INVENTORY

For purposes of this study, rare animals are defined as the rarest known species in Virginia. They include species with global ranks of G1, G2, and G3, and state ranks of S1, S2, S3, SH, SX, and SU (Roble 2001). Data on species with state ranks of S1, S2 (or S2S3), SH, and SX are maintained in the BCD system and summarized regularly on a master list of Virginia's rare animals. Species with state ranks of S3 (including some S3S4) and SU are not tracked using BCD, but maintained on a separate "watchlist." Only general information about watchlist species is recorded in the field and maintained in manual information files.

To initiate inventory of rare animals at CNHP, existing data on element occurrences within and near (e.g., on appropriate habitat on the same USGS 7.5' quadrangle) the park were obtained from the BCD database and reviewed. Data in BCD are partly based on information gathered from zoological literature and from examination of selected collections at the following institutions: U.S. Museum of Natural History, the Carnegie Museum, Lord Fairfax Community College, Eastern Mennonite College, Old Dominion University, Virginia Polytechnic Institute and State University, Virginia Commonwealth University, and the Virginia Museum of Natural History.

Rare animals known from the study area include the Bald Eagle (*Haliaeetus leucocephalus*, G4/S2, LT) and a Great Blue Heron (*Ardea herodias*, G5/S3S4) colony (although Great Blue Heron individuals are not an element, breeding colonies of 50 or more nests are tracked and smaller colonies are watchlisted; Clark and Rafkind 1998). The Least Bittern (*Ixobrychus exilis*, G5/S3B/S3N) is known from the JI400 Project Area (Clark and Rafkind 1998) but has recently been upgraded to the DCR-DNH watchlist (S. Roble pers. comm.). Zoological inventory focused on the marsh habitat, as the majority of potential rare, threatened, and endangered species would be found here (e.g., bald eagles, rails, bitterns, and the Rare skipper, *Problema bulenta*, G2G3/S1). Bald eagle and great blue heron rookery data is based on aerial surveys of nesting sites which are conducted on an annual basis by the Center for Conservation Biology, College of William and Mary (Virginia Department of Game and Inland Fisheries 2001).

Surveys were conducted from June to October 2000 and March to September 2001 in both marsh and upland habitats. Figure 2 shows the locations of traps and call-survey sites used in 2000 and 2001. Methodologies included the following:

<u>Bird song tapes</u> - Recordings of bird songs were played in appropriate habitats to elicit response from rare or cryptic bird species. Specifically, on 5 July 2001 between 1800 – 2000h, at fourteen locations, a recording of five rail and bittern species vocalizations were played for several minutes each in an attempt to hear a responding call (Davis 1986).

<u>Bird surveys</u> – Additional surveys for avifauna on Jamestown Island included visual survey techniques and listening for target bird species in suitable habitats during appropriate seasons.

<u>Dip-nets</u> - Dip-netting was the primary technique used to sample aquatic vertebrate and invertebrate taxa. Dip nets were dragged through emergent vegetation and along the bottom in areas with accumulated detritus.

<u>Hand collection</u> - Reptiles and amphibians, as well as some invertebrates, were collected by hand in terrestrial habitats, where various cover objects were overturned in search of cryptic species.

<u>UV-light traps</u> – Nocturnal invertebrates were captured using standard bucket traps equipped with a blacklight (= ultraviolet) powered by a 12-volt gel-cell battery. Ethyl acetate was used as a killing agent. Traps were run overnight in a variety of habitats

No vertebrates were collected. All invertebrate specimens collected during the study were preserved using standard methods (McDiarmid 1994). Most of the specimens have been or will be deposited in the Virginia Museum of Natural History; some specimens may be deposited in the

National Museum of Natural History and the reference collection (primarily Lepidoptera and Odonata) of DCR-DNH.

ECOLOGICAL INVENTORY

An inventory of vegetation communities was conducted by DCR-DNH on the JI400 Project Area. The results of this study are fully detailed in Weber and Coulling (2002), however, significant communities are reported here in the conservation site reports.

RESULTS AND DISCUSSION

BOTANY

Two rare plant species were found during the 2000-2001 surveys, the federally listed threatened sensitive joint-vetch (*Aeschynomene virginica*) and the state rare gaping panic grass (*Steinchisma hians*). Details on these rare species follow.

The sensitive joint-vetch was found in mid-October 2000 in the marsh north of Back River. A population of 13 flowering and fruiting plants, ranging from an estimated 4.5-6 feet tall, were found immediately east of the inundated berm associated with the old road to the ferry landing and approximately 0.1 mile north of this former ferry landing site. Due to the small size of the population and its federal status, no voucher specimen was collected for this population, but the identity was confirmed in the field. In 2001, two visits to the site of the plants seen in 2000 failed to find any plants. When found in 2000, the plants were growing on substrate slightly higher than the adjacent marsh on the shoulder of the ferry road berm. This area is between the highest portion of the berm, which is densely vegetated with giant cordgrass (*Spartina cynosuroides*), and a more open area within the Oligohaline Tidal Marsh community, a possible muskrat "eat-out" zone. Other sensitive joint-vetch populations have been associated with such areas where muskrats remove much of the vegetation (U.S. Fish and Wildlife Service 1995). Some of the associated plant species included: giant cordgrass (*Spartina cynosuroides*), narrow leaved cattail (*Typha angustifolia*), dotted smartweed (*Polygonum punctatum*), halberd-leaf tearthumb (*Polygonum arifolium*), Walter's barnyard grass (*Echinochloa walteri*), arrow-arum (*Peltandra virginiana*), smooth bur-marigold (*Bidens laevis*), salt-marsh bulrush (*Bolboshoenus novae-angliae*), long leaved aster (*Aster novi-belgii*), and wood reedgrass(*Cinna arundinacea*).

Sensitive joint-vetch, an annual plant in the bean (Fabaceae) family, was historically distributed in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. This globally rare plant has been extirpated in Pennsylvania and Delaware (Kartesz 1999). It is found in fresh to slightly brackish tidal marshes, tolerating a narrow range of salinity levels (Rouse and Belden 1995). In Virginia, sensitive joint-vetch has been documented on six river systems – the Potomac, Rappahannock, Mattaponi, Pamunkey, Chicahominy, and James. Twenty populations have been seen in Virginia since 1980 with most of these still considered extant; twelve historical populations are known (Belden 2000; Belden pers. comm.) The largest populations of sensitive joint-vetch typically have been found in the "estuarine meander zone of tidal rivers where sediments transported from upriver settle out and extensive marshes form" (US Fish and Wildlife Service 1995). Some Virginia occurrences, however, have been found in marsh habitats disturbed by human activities (DCR-DNH database).

The reason for the lack of plants in 2001 is unknown. It is perhaps related to unfavorable conditions, such as high salinity levels arising from low rainfall / low freshwater input, during the late May – early June germination period (A. Belden, pers. comm.). Rainfall totals for the Jamestown Island area were not available to lend support to this. Population numbers at a site are known to fluctuate widely for this species (U.S. Fish and Wildlife Service 1995).

This rediscovered population on the Neck O Land study site represents the farthest downstream extant population known on the James River. Other lower James River populations previously documented have been sought but not relocated, due to habitat loss or degradation (Belden and Van Alstine 1998, Rouse and Belden 1995). The population in the Neck O Land portion of the study area was unsuccessfully searched for by boat in 1990 (Wright 1990), 1998 (Belden and Van Alstine 1998), and in 2000 during the current study. The occurrence of saltmarsh cordgrass (*Spartina alterniflora*), observed in 1998 in the marshes along Back River, was suggested as evidence that salinity levels were higher in 1998 than they were in 1939 and, therefore, the habitat became less favorable for sensitive joint-vetch (Belden and Van Alstine 1998). As the collection site in 1939 appears to have been along the Back River, the location of the population in 2000 in a more interior and presumably fresher-water marsh site may reflect changed salinity levels in the more exterior portions of the marsh.

The state rare gaping panic grass (*Steinchisma hians*) was found in what is probably the previously known location for it on lands owned by the Association for the Preservation of Virginia Antiquities (APVA) on the west end of Jamestown Island. The herbarium label notes this species was "locally abundant in occasionally inundated seepage area at margin of mowed lawn/Pitch and Tar Swamp, Jamestown Island" (G. North, Coll. #1170, College of William and Mary). In 2001, it was found in a periodically mowed field just upslope from the upper end of the Pitch and Tar Swamp on the north side. Plants were also found around the outer, drier margins of the open wetland that is left unmowed south of the Pitch and Tar Swamp. The drier section that had recently been mowed when the survey was conducted is likely to include gaping panic grass too, so the true size of the southern subpopulation is not known. Associated species at the Jamestown Island locations include the watchlist species big carpet grass (*Axonopus furcatus*), Florida paspalum (*Paspalum floridanum*), panic grass (*Panicum anceps*), fall witch grass (*Panicum dichotomiflorum*), pasture flatsedge (*Kyllinga gracillima*), and grass-leaved rush (*Juncus biflorus*). Gaping panic grass, a perennial species, is a grass of various wetland habitats whose global distribution includes the southern U.S., north to Virginia and Missouri, as well as Mexico, Central America, and South America. The other historical records for gaping panic grass in Virginia are from the late 1930's and early 1940's in the southern Coastal Plain and Piedmont (DCR-DNH data base).

No other plant rarities were found within the study area. Little likely habitat for small whorled pogonia was found in the uplands; hardwood-dominated stands were either on steep slopes or supported dense stands of the invasive alien Japanese stilt grass (*Microstegium vimineum*). No Parker's pipewort was found on the exposed mudflats of the study area. In fact, there was little diversity in the small herb flora of this habitat, with the mat-forming lilaeopsis (*Lilaeopsis chinensis*) being one of the few species observed. Wright (1990), reporting on the extensive population of Parker's pipewort upstream on Powhatan Creek, noted that the plants there were restricted to "areas not impacted by boat wake or storm action." The shorelines in the lower Powhatan Creek drainage within the Neck O Land study area may be subject to more boat wake and storm action that makes the exposed mud less favorable for colonization by small plants.

ZOOLOGY

The federally threatened, Virginia endangered Bald Eagle (*Haliaeetus leucocephalus*) is known to nest within the Jamestown Island study area. In 2001, three active nests were documented on Jamestown Island (Virginia Department of Game and Inland Fisheries 2001). Bald eagle individuals were observed utilizing the rivers and marshes in the study area regularly by DCR-DNH biologists. The presence of the bald eagle should be taken into consideration in development of a comprehensive conservation plan, however, management recommendations and conservation concerns should be addressed by the regulating authorities (USFWS and VDGIF).

A great blue heron (*Ardea herodias*) colony is located in the Passmore Creek marshes not far from the Bald eagle nest located there (Center for Conservation Biology 1998). A total of 220 nesting pairs were observed in 1997 (Center for Conservation Biology 1998), however the colony is thought to be growing and expanding (Watts pers. comm. 2002).

No other rare, threatened, or endangered animal species were found within the JI400 Project Study Area, however two observations are noteworthy. First, on 15 August 2000, a single Virginia Rail (*Rallus limicola*, G5/S2BS3N) was seen in flight over open water. For most bird species on DCR-DNH's tracking list (Roble 2001), there must be evidence of breeding to be considered an element occurrence. The solitary sighting of the Virginia Rail this late in the year does not conclusively indicate that this species breeds in the area (Virginia Society of Ornithology 1989). Further surveys in 2001 did not find this species but additional surveys are warranted.

The second animal finding worthy of mention is an observation of a Rare skipper (*Problema bulenta*, G2G3/S1) population just outside of the JI400 Project Study Area (Figure 8 in the Mill Creek Conservation Site Report). This record is only the second known locality for the Rare skipper in Virginia (Nicolay 1979; Hobson 1999). It was first observed on 19 July 2001 and last observed on 6 September 2001. On 22 August 2001 139 individuals were counted in the small marsh area at one time. It was observed nectaring on swamp milkweed (*Asclepias incarnata*), pickerelweed (*Pontederia cordata*), and rattlesnake master (*Eryngium aquaticum*). Other lepidopterans seen in the same area include: broad wing skipper (*Poanes viator*), dion skipper (*Euphyes dion*), Delaware skipper (*Anatrytone logan*), silver sided skipper (*Epargyreus clarus*), and monarch (*Danaus plexippus*).

The Rare skipper was formerly a candidate (Category 2) for listing under the federal Endangered Species Act. Currently, it receives no legal protection in any of the seven states in which it occurs, despite its rarity and sporadic distribution (Hobson 1999).

The life history of the Rare skipper is poorly documented. It is associated with tidal marshes or upland habitats with abundant nectar sources in the vicinity of tidal marshes. Larvae have been reported to feed on big cordgrass (*Spartina cynosuroides*), and southern wild rice (*Zizaniopsis miliacea*) and wild rice (*Zizania aquatica*) (Cromartie and Schweitzer 1993; Glassberg 1999) All of these plants are found within the JI400 Project Study Area. Although the Rare skipper was not found within the JI400 Project Study Area boundaries, it is possible that this species utilizes

different pockets of appropriate habitats in different years. Because this occurrence is adjacent to the JI400 Project Study Area and on CNHP property, a conservation site report is given which describes the habitat and suggested boundaries for protecting this population. Future monitoring of the known site and surveys of adjacent areas are highly recommended.

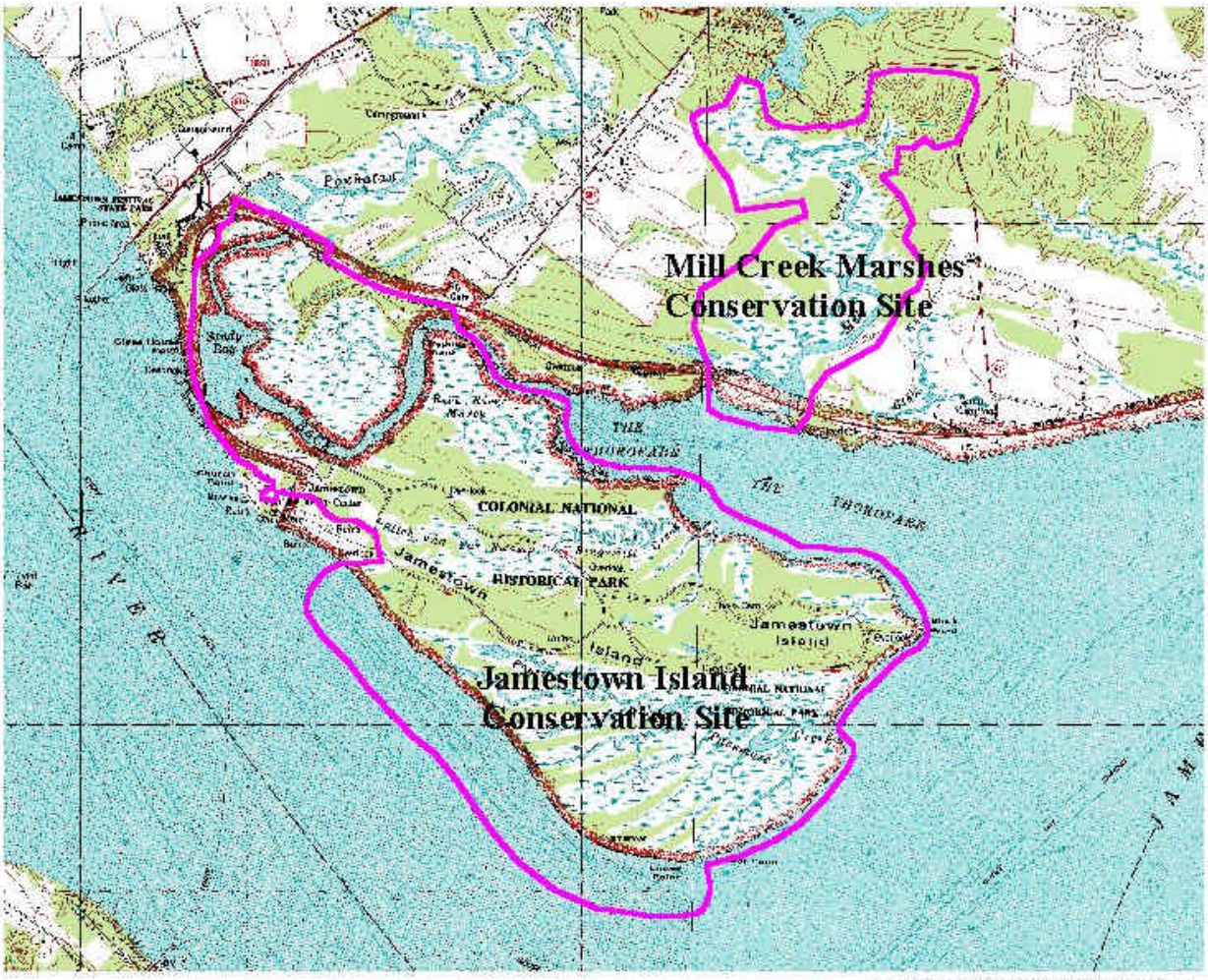
SUMMARY OF FINDINGS

Two rare plant species, sensitive joint-vetch (*Aeschynomene virginica*) and gaping panic grass (*Steinchisma hians*) have been found on the JI400 Project Study Area. Bald eagles (*Haliaeetus leucocephalus*) and a Great blue heron colony have been documented to nest on Jamestown Island. No other rare animal species have been found within the study area proper however the Rare skipper (*Problema bulenta*) was found adjacent to the study area and a portion of the suggested conservation area does occur within CNHP boundaries. Some identifications on some specimens are pending. Details on the rarity ranks and federal status of sensitive joint-vetch and gaping panic grass are summarized in the conservation site report in the following section. The locations of the rare species are shown in the conservation site reports which follow.

Two conservation sites are associated with the JI400 Project Area: Jamestown Island and Mill Creek Marshes (Figure 3). The former Back River Marshes, Upper Jamestown Island Fields (Chazal and Van Alstine 2000), and Jamestown Island Marshes (Clark and Rafkind 1998) conservation sites were merged and extended to create this new Jamestown Island conservation site. This report has modified and updated the information included in that description.

Figure 3.

Conservation Sites in the Jamestown Island 400 Project Area, Colonial National Historical Park



1 0 1 2 Kilometers

N

Conservation Site Boundary

INTRODUCTION TO THE CONSERVATION SITE REPORTS

To enhance protection and facilitate management of biodiversity at CNHP, a boundary has been provided for a landscape unit which merits practical and justifiable recommendation as a conservation site. For purposes of this report, a Conservation Site is a natural area that includes one or more element occurrences and has been assigned a biodiversity rank of at least B5. A report follows for the Conservation Site identified during the Natural Heritage Inventory. The following standard reporting format is used for each Conservation Site:

SITE NAME: Site names generally reflect a geographic locality and, in some cases, a prevalent landscape feature.

SIZE: The approximate acreage within the conservation planning boundary, as determined in ArcView by polygon coverage.

BIODIVERSITY RANK: The overall significance of the natural area, in terms of the rarity of natural heritage resources and the quality of their occurrences, is indicated. As described in the Methodology section, these ranks range from B1 (very high significance) to B5 (general biodiversity significance).

LOCALITY: The county (or counties) containing the site is listed.

QUADRANGLE: The name of the USGS 7.5' quadrangle(s) that includes the site is listed.

QUADRANGLE CODE: The code used by DCR-DNH for the quadrangle is listed. The first five digits of the code represent latitude and longitude (in degrees) of the quadrangle.

LOCATION: Location of the site within Colonial National Historical Park, using geographical landmarks, is given.

NATURAL HERITAGE RESOURCE SUMMARY TABLE: This field provides a synopsis of the natural heritage resources (i.e. rare species), together with their status ranks (global, state, USFWS, Virginia legal) and element occurrence ranks. Detailed occurrence data for the rare species can be found following each site report.

SITE DESCRIPTION: A brief narrative describing the site, its significant elements, vegetation, habitat, and current land use is presented. The first reference to a species in a narrative is by common name, followed by its scientific name in parentheses. Subsequent references to the same species are by common name only.

BOUNDARY JUSTIFICATION: The preliminary conservation planning boundary delineated in this report contains all known occurrences of natural heritage resources and adjacent buffer lands required for their immediate protection. The information field explains the basis for the specific site boundaries.

THREATS: Threats to the site and its natural heritage resources are described. These may include both real, imminent threats and potential threats posed by types of land use activities or other factors that currently are not impacting the site.

MANAGEMENT RECOMMENDATIONS: This field is a summary of the major issues and factors that should be considered in management of the conservation site for its biodiversity and natural heritage resource values. As a rule, generalized recommendations are provided based on potential threats identified during the survey work. The expertise of inventory biologists familiar with each site, as well as input from DCR-DNH natural areas program biologists, has been utilized in preparing these recommendations. However, within the context of a short-term (1 year) inventory effort it may be difficult to identify highly specific management strategies. In addition, the management needs of a few element occurrences are so obscure that additional study by experts may be needed. In many cases, monitoring of element occurrences or site factors is recommended to determine the best long-term management practices. In all cases, if land use changes or specific high-impact actions are proposed within a site's boundary, consultation with DCR-DNH staff is recommended to assess impacts on the natural heritage resources.

PROTECTION RECOMMENDATIONS: A summary of the actions and priority needed to ensure long-term protection of the site and its elements is provided.

REFERENCES: Pertinent literature is listed.

SITE MAPS: The site map, drawn with ArcView on digital copies of the USGS 7.5' quad(s), shows the preliminary Conservation Planning Boundary. This boundary includes additional land determined to be important for long-term maintenance of the elements and considers the following factors when drawing these boundaries:

- the extent of current and potential habitat for rare species and exemplary natural communities;
- species movement and migration corridors;
- maintenance of surface water quality within the site and the surrounding watershed;
- maintenance of the hydrologic integrity of groundwater resources;
- land intended to mitigate a wide variety of off-site impacts;
- land or activities necessary to preclude or minimize exotic species; and
- land necessary for management activities, e.g., prescribed burning.

The boundaries are intended for conservation planning purposes and, at the very least, should prevent inadvertent damage to the natural areas.

ELEMENT LOCATION MAPS: Maps showing the exact location of each element occurrence within a site are included following the site map. In the case of animal elements, which are often highly mobile organisms, the maps indicate where actual collections were made and/or specimens were observed. These location maps are intended to provide CNHP natural resource managers with requisite site-specific information. However, since rare species are often

sensitive to disturbance or may be sought out by collectors, we strongly recommend that this information not be shared with the general public or with persons not directly involved in the stewardship of these sites.

JAMESTOWN ISLAND

Size: approximately 2,189 acres **Biodiversity Rank:** B3

Locality: James City County, VA

Quadrangle: Surry **Quadrangle Code:** 3707627
Hog Island 3707626

Location: A 8.86 km^2 section of tidal marshes and adjacent uplands encompassing most of Jamestown Island and the Neck O Land area (Figure 3). The former Back River Marshes (Chazal and Van Alstine 2001), Upper Jamestown Island Fields, and Jamestown Island Marshes (Clark and Rafkind 1998) conservation sites were merged and extended to create this new conservation site.

NATURAL HERITAGE RESOURCES SUMMARY TABLE

Scientific Name	Common Name	Global Rarity Rank	State Rarity Rank	USFWS Status	VA Legal Status	Element Occurrence Rank
Plants:						
Aeschynomene virginica	Sensitive joint-vetch	G2	S2	LT		D
Steinchisma hians	Gaping panic grass	G5	S1	-	-	C
Animals:						
Haliaeetus leucocephalus	Bald eagle	G4	S2S3B/S3N	LT/PDL	LT	E
Haliaeetus leucocephalus	Bald eagle	G4	S2S3B/S3N	LT/PDL	LT	E
Haliaeetus leucocephalus	Bald eagle	G4	S2S3B/S3N	LT/PDL	LT	E
Great blue heron colony		-	-	-	-	B
Community:						
Tidal Oligohaline Marsh		-	-	-	-	B

Site Description

The Jamestown Island Conservation Site is primarily owned by CNHP, which is managed for historical resources, including active archeological activities. Visitors can travel on the loop roads by car, bike, or foot. Powhatan Creek and Back River are frequently used by boaters. The Neck O Land marshes include the remains of the old ferry landing, and the berm from the old road to the ferry landing. Old pilings from duck blinds and maybe houses can be found in the southern and thoroughfare marshes. Several old homesteads occur on the uplands. A portion of the parking lot and Colonial Parkway on Jamestown Island have been included.

This site (Figure 4) contains tidal marsh communities located north of the Back River (Neck O Land) and on Jamestown Island (including the Back River Marsh, Passmore Creek Marsh, and Pitch and Tar Swamp). The tidal marshes in the Jamestown Island area are primarily oligohaline, with pockets of fresher water where plants with lower salt tolerances occur. The tidal oligohaline marshes (Fleming et al. 2001) include giant cordgrass (*Spartina cynosuroides*), wild rice (*Zizania aquatica*), dotted smartweed (*Polygonum punctatum*), halberd-leaf tearthumb (*Polygonum arifolium*), Walter's barnyard grass (*Echinochloa walteri*), bull-tongue arrowhead

(*Sagittaria lancifolia*), arrow-arum (*Peltandra virginica*), and other species. In some areas, creeping spikerush (*Eleocharis fallax*) or common threesquare (*Schoenoplectus pungens*) dominate. Tidal freshwater marsh areas, dominated by wild rice (*Zizania aquatica*), is present in some of the higher, back sections of the marshes. The invasive exotic common reed (*Phragmites australis*) is also present in scattered dense stands and as young plants. These marshes are represented by the following alliances in the U. S. National Vegetation Classification (USNVC): *Typha* (*angustifolia, domingensis*) Tidal Herbaceous Alliance, *Zizania aquatica* tidal herbaceous alliance, *Peltandra virginica – Pontederia cordata* Tidal Herbaceous Alliance, *Schoenoplectus americanus* Tidal Herbaceous Alliance, *Spartina cynosuroides* Tidal Herbaceous Alliance, and *Phragmites australis* Tidal Herbaceous Alliance (Weber and Coulling 2002).

In addition to the marshes, the Jamestown Island conservation site is approximately half forested (including forested wetlands). The forested areas, lying mostly on the northern part of the island and upland from the Back River marsh, consist of mesic and hydric woodlands of loblolly pine-dominated to mixed pine-hardwood stands. Exotic plants, particularly Japanese stilt grass, (*Microstegium vimineum*), dominate the herbaceous layer in some of the upland.

This site also encompasses field habitat found toward the western end of Jamestown Island on lands mostly owned by the Association for the Preservation of Virginia Antiquities (APVA). The field habitat, portions of which are at least seasonally wet, are separated by an upper section of the Pitch and Tar Swamp. This section consists of a brackish area of red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), loblolly pine (*Pinus taeda*), southern bayberry (*Myrica cerifera*) and mixed herbaceous cover. In this western most area of the Swamp, tidal influences have been described as insignificant (North 1984). A more saturated open habitat of mixed herbaceous wetland species such as Walter's barnyard grass (*Echinochloa walteri*), saltmeadow cordgrass (*Spartina patens*), flatsedges (*Cyperus* spp.), dotted smartweed (*Polygonum punctatum*), marsh seedbox (*Ludwigia palustris*), saltmarsh fleabane (*Pluchea odorata*), and frog-fruit (*Phyla lanceolata*), mowed less frequently, is also found in the field on the south side. Developed areas within the site include buildings owned by APVA, a road into the APVA structures, a pathway through the field on the south side, and the National Park Service parking lot on the north side of the site. A mixed forest of loblolly pine (*Pinus taeda*) and hardwoods lies between the northern field and the parking lot with species such as American elm (*Ulmus americana*), red maple (*Acer rubrum*), persimmon (*Diospyros virginiana*), and eastern red cedar (*Juniperus virginiana*) immediately bordering the field.

The Jamestown Island conservation site contains a small population of the federally listed plant sensitive joint-vetch (*Aeschynomene virginica*) which was rediscovered in 2000 in the marsh east of Sandy Bay just east of the berm for the old road to the ferry landing (Figure 5). This species had been last documented in 1939 near the ferry landing (Fernald 1940). This rediscovered population on the Neck O Land study site represents the farthest downstream extant population known on the James River. The plants grow on the edge of an area that appears to be a muskrat "eat-out", an area where muskrats have removed much of the vegetative cover. Other populations of sensitive joint-vetch have been associated with this natural disturbance, and it has been suggested that such disruption in the vegetation cover provides germination sites for the sensitive joint-vetch (US Fish and Wildlife Service 1995).

The Jamestown Island Conservation Site also contains three nesting sites for the Federally threatened Bald eagle (*Haliaeetus leucocephalus*). Two of the nests were first established in 2001, while the third nest has been in use since 1987 (Virginia Department of Game and Inland Fisheries 2001). All three eagle pairs were successful in fledging young in 2001 (Figure 6, Nest A – 2 fledglings, Nest B – 1 fledgling, Nest C – 3 fledglings).

Breeding bald eagles are considered very rare in Virginia. The species is currently listed as threatened by the Federal Endangered Species Act but is proposed for delisting. Additionally, it is listed as threatened by the Virginia Endangered Species Act. Although bald eagle populations have made a steady recovery since the ban on the use of certain persistent pesticides in the United States, the species continues to be threatened by habitat loss and human disturbance.

In addition to federally-listed Bald Eagles nesting on Jamestown Island, the Island also supports a mixed Great Blue Heron (*Ardea herodias*) rookery (Figure 7). While Great Blue Herons are not federally listed, they are protected by other federal laws such as the Migratory Bird Treaty Act of 1918, and local regulations that protect colonial waterbirds. As habitat necessary for rookeries becomes fragmented, and shorelines are increasingly developed, healthy, productive heron rookeries are significant and worthy of note. Colonial nesting birds (such as herons and egrets) pack large numbers of nests into a few, small areas. This behavioral trait makes entire populations vulnerable to a single disturbance or natural disaster. For nesting, Great Blue Herons require tall trees in fairly large, remote woodlands close to water. Peak nesting times are March through May, but colonies are frequently active from February through July. Nests are typically rickety stick platforms, with average clutch sizes of three or four. Primary foods for herons and egrets are small fish, amphibians, and crustaceans, which they obtain when wading. Therefore, both herons and egrets require large areas of relatively shallow water for optimal foraging (Center for Conservation Biology 1998). The presence of a heron rookery in close proximity to a productive Bald Eagle nest is further indication of the high quality nesting and foraging habitat on and around Jamestown Island. The heronry continues to increase annually in both size and productivity (Center for Conservation Biology 1998). Although Great Blue Heron individuals are not an element, breeding colonies of 50 or more nests are tracked and smaller colonies are watchlisted. Colonies do not have a G-rank or an S-rank.

At the western end of Jamestown Island, in the field portion of the site, periodically wet sections both north and south of the Swamp support a population of at least 120 individuals of the state rare plant gaping panic grass (*Steinchisma hians*), a tufted perennial (Figure 8). The field on the north had not been recently mowed and a full assessment of the colony on the north side could be made: approximately 60 plants were scattered within a 413 m^2 area. On the south side, however, the drier section of the field is mowed more frequently while an adjoining more saturated section is less often mowed so the gaping panic grass could only be assessed in a narrow unmowed zone at the upper end of the wetter area. Approximately 60 plants were scattered along a 166 meter by 1 meter line zone. It is likely to be present in the recently mowed drier zone too. Some associated species in the sections of the fields supporting gaping panic grass include the watchlist species big carpet grass (*Axonopus furcatus*), Florida paspalum (*Paspalum floridanum*), pasture flatsedge (*Kyllinga gracillima*), panic grass (*Panicum anceps*), a flatsedge (*Cyperus flavicomus*), grass leaved rush (*Juncus biflorus*), forked rush (*Juncus dichotomus*), fall witchgrass (*Panicum dichotomiflorum*), and Virginia buttonweed (*Diodia virginiana*). This site represents the only

recently documented occurrence of gaping panic grass in Virginia. Other historical records for gaping panic grass in Virginia are from the late 1930's and early 1940's in the southern Coastal Plain and Piedmont (DCR-DNH data base).

Boundary Justification

The boundary includes all of the tidal marsh habitats, the plant and animal rarities, the significant vegetation community, and adjacent uplands within the watershed (Figure 4). Considerations specific to each element are discussed in further detail below.

Sensitive joint-vetch: The delineation of the boundary was guided by the three factors cited in the Sensitive Joint-Vetch Recovery Plan (Davison and Bruderle 1984): 1.) on-site protection of the marsh where the plant occurs, 2.) protection of water quality and quantity, and 3.) protection of an adequate upland buffer. Inclusion of the entire marsh unit north of Back River is warranted due to the need to control common reed within the larger site. Protection of the upland buffer will aid in protecting the watershed and thus water quality and quantity, but obviously impacts in the larger watershed beyond this site can potentially affect this population and are difficult to impossible to control. As the Recovery Plan notes, "*A. virginica* is probably susceptible to the cumulative effects of many large and small development-related activities that may slowly degrade the species habitat. Many of these activities may occur a considerable distance away from a given *A. virginica* population" (US Fish and Wildlife Service 1995). This boundary will also be inadequate to protect the sensitive joint-vetch from the potential effects of large scale climate changes such as global warming.

Bald eagle: The conservation site boundary encompasses all three nest sites and also includes a 750 ft (229 m) buffer around each nest. This is defined as the primary management zone per the Bald eagle protection guidelines outlined by the USFWS and VDGIF (2001).

Great blue heron colony: The conservation site boundary includes the heron rookery, as well as suitable buffer habitat that would allow for expansion of the rookery on Jamestown Island. Foraging habitat is available in the conservation site boundary as well.

Gaping panic grass: The boundary includes all of the known locations for the plant rarity, some adjacent areas, currently mowed, that are likely to support additional plants, and adjacent uplands within the watershed in order to protect the hydrology of the site. Downstream areas on the Pitch and Tar Swamp have also been included as modifications to the swamp such as beaver damming could have an affect on the upstream areas.

Tidal oligohaline marsh: The conservation boundary includes all of the significant marshes. It also includes adjacent uplands within the watershed to aid in protecting the water quality, however, factors affecting the watershed beyond this site may alter the habitat and are difficult or impossible to control.

Threats

Parts of the conservation site are subject to heavy visitor use as part of the CNHP. This includes vehicle and foot traffic along roads and paths, however the marshes are not subject to these uses. The waters surrounding Jamestown Island, the James River to the south and the Back River and The Thorofare to the north, are often subject to moderate to heavy recreational and commercial boating traffic. A major marina is located about 1.6 km northwest of the site. Threats specific to each element are discussed in detail below.

Sensitive Joint-vetch: Creation of a passive recreation trail in the vicinity of the old ferry road berm has been under consideration in 2001, and threats to the sensitive joint-vetch population are being evaluated within a Biological Assessment that is in progress (S. Erdle and K. Heffernan, 2001.). The presence of the exotic plant common reed (*Phragmites australis*) is noteworthy. It becomes established in disturbed habitats and can then quickly out-compete native vegetation and form thick homogenous stands with little wildlife value. It is unknown if muskrats (*Ondatra zibethicus*) pose a threat to sensitive joint-vetch; their activity may, in fact, be beneficial (see above). According to the Sensitive Joint-Vetch Recovery Plan, muskrats, along with white tailed-deer, have been reported as predators on sensitive joint-vetch, but the validity of these reports is unknown (US Fish and Wildlife Service 1995). The normal diet of muskrats consists of bulrushes and cattails, however they could damage or destroy some sensitive joint-vetch stems incidental to their normal diet. Also, they could alter the microhabitat by tunneling and digging enough to impact the sensitive joint-vetch. However, research is needed to test these hypotheses concerning possible impacts of muskrats, as well as deer predation, on sensitive joint-vetch. The non-native rodent nutria (*Myocastor coypus*), noted in the Recovery Plan as being more of a threat than muskrat to sensitive joint-vetch, has not been documented in this part of Virginia (Virginia Department of Game and Inland Fisheries 2001). It is unclear to what extent fuel spills from the boat traffic along Back River could negatively affect the sensitive joint-vetch when such spills might be transported into the interior of the marsh at high tide; an oily sheen was observed on the water in the vicinity of the sensitive joint-vetch in October 2000. Due to sensitive joint-vetch's tolerance of a narrow range of salinity levels (Rouse and Belden 1995), changes in salinity levels brought about by sea level rise, a consequence of global warming, will likely negatively affect the long-term survival of sensitive joint-vetch at this site.

Bald eagle: The most serious threats to the Bald eagles in the JI400 Project Area include disturbance of foraging and nest sites, and loss of habitat. Although different pairs of eagles show different degrees of sensitivity to human activity, all Bald eagles are vulnerable to human disturbance, especially if normal human activity patterns to which eagles have become habituated are suddenly changed or increased (Bradshaw, pers. comm. 2001; Davis, pers. comm. 2001). Breeding eagles are most sensitive to disturbance when nest building, and immediately after laying eggs (Bradshaw, pers. comm. 2001; Watts, pers. comm. 2001). In Virginia, this is generally from around November 15th through January 30th. During this time eagles are especially intolerant of disturbance, and may readily abandon a newly built or readied nest or a nest with eggs. After breeding Bald Eagles have committed to a nesting location, and young are hatched, adults are vigilant parents until young eagles (eaglets) are on their own. Fledging usually occurs from around June 1 through July 15th. Immediately prior to fledging (from May 15 through July 15th) eaglets are very skittish and sensitive to disturbance. During this sensitive

time, eaglets have been known to leap from nests when startled or harassed (Bradshaw, pers. comm. 2001; Watts, pers. comm. 2001), resulting in death, injury, or exposure to predation and elements. Other threats to the Bald eagle may include loss of habitat, biocide contamination, and shooting.

Great blue heron colony: Threats to the great blue heron colony are low because of the inaccessibility of the marsh. Disturbance from boaters comprise the largest threat to successful reproduction at the colony. It is possible that helicopters, planes or other air traffic may also negatively impact the colony. For nesting, Great blue herons require large trees in a substantial, remote woodland close to the water. Habitat alteration and destruction may cause nest failure or nest abandonment.

Gaping panic grass: Although the maintenance of the fields within this site by means of mowing provides the open habitat for this species, mowing that is too frequent or that is done before the rare plant has an opportunity to flower and set seed would be detrimental to the long term-persistence of this plant in the fields. Proposed alternatives being discussed for future development on Jamestown Island in conjunction with the 400th anniversary of the settling of Jamestown do not appear to directly affect this area, but precise plans were not available to review (Association for the Preservation of Virginia Antiquities and the U.S. Department of the Interior, National Park Service 2001). The western portions of the field on the north side is dominated by the invasive alien Bermuda grass (*Cynodon dactylon*), and the invasive alien eulalia or Japanese stiltgrass (*Microstegium vimineum*) is growing in the more shaded upslope sections on the northern field. Some Bermuda grass was noted in the southern field also. Although not considered an invasive alien species (Virginia Department of Conservation and Recreation 1999), creeping bent grass (*Agrostis stolonifera*), another non-native species, was prominent in a zone between the area with gaping panic grass and the Pitch and Tar Swamp. Minor amounts were also growing in the section where gaping panic grass was found.

Tidal oligohaline marsh: The presence of *Phragmites australis* is a threat to this marsh community. It becomes established in disturbed habitats and can then quickly out-compete native vegetation and form dense, nearly monospecific stands with little wildlife value.

Management Recommendations

Sensitive joint-vetch: The sensitive joint-vetch population should be monitored yearly. Additional visits to the location of this rare plant population should be limited to avoid soil compaction and accidental trampling of the sensitive joint-vetch. Muskrat activity should be monitored, with attention paid to indications that their activities either negatively impact the sensitive joint-vetch population or positively enhance the sensitive joint-vetch habitat by providing germination sites. Further, the disappearance of muskrats from the area could be detrimental if germination sites for sensitive joint-vetch are reduced or even lost. Use of the marsh by deer and possible negative effects of boat traffic in Back River (such as fuel spills) should be investigated to determine to what extent they may be a threat to the sensitive joint-vetch. Implementing best management practices in the uplands should help assure that the hydrology and water quality of the immediate area will remain constant. Habitat alteration, such as dredging, filling, or construction may impact the habitat by compacting the soils, or allowing

common reed to overrun the marsh thus creating an unsuitable habitat for the persistence of sensitive joint-vetch. The status of the common reed in this site should be closely monitored and control measures taken, if necessary, to prevent significant expansion of this invasive plant within the marsh.

Bald eagle: Management recommendations for the Bald eagle are clearly stated in the Bald eagle Protection Guidelines (USFWS and VDGIF 2001). These include the establishment of primary and secondary management zones within which certain activities (such as logging, construction, hiking etc) are restricted during the nesting season. Management actions might also include the use of visual screening and distance buffers from human activity to encourage Bald eagle reproductive and foraging success (Bradshaw, pers. comm. 2001; Byrd 1991; Davis, pers. comm. 2001). The USFWS and VDGIF should be consulted when activities within these management zones are planned.

Great blue heron colony: Air and boat traffic should be minimized during the breeding season (primarily March – May, but there may be activity any time between February and July). Similarly, human disturbance from beach use or trails should be discouraged during this time period.

Gaping panic grass: Upslope activities that could introduce sediment or pollutants into the fields should be restricted or at least closely monitored. Mowing should be timed for late in the growing season (no earlier than late October) to allow for the rare plant species to flower and produce seeds. If possible, a larger section of the field on the south side of Pitch and Tar Swamp should be left unmowed for the growing season to enable a more accurate assessment of the population numbers of gaping panic grass in this section and possibly expansion of the population. The status of the invasive alien plant species noted within the site should be monitored to determine if they are expanding. It is not clear what factor(s) account for the sharp division in the northern field between the low zone with Bermuda grass and the taller, more diverse vegetated zone that supports the gaping panic grass but an understanding of this pattern of distribution would aid in management of the site.

Tidal Oligohaline Marsh: *Phragmites australis* should be monitored to determine whether it is expanding and displacing natural communities. If the impacts of the *P. australis* are determined to be significant, control methods with little impact on the surrounding communities should be implemented.

Protection Recommendations:

Sensitive joint-vetch: Protection measures should include the implementation of management recommendations and consultation with DCR-DNH when changes in land use or management practices are contemplated. Such consultations with DCR-DNH do not take the place of the consultations between the USFWS and NPS that will be necessary whenever actions are proposed that could be detrimental to the federally listed sensitive joint-vetch.

Bald eagle: Monitoring of the Bald eagle nests should be done on an annual basis. Activities and disturbances within the primary management zone during the nesting and breeding season

should be kept at a minimum. The USFWS and VDGIF should be consulted prior to any changes in the use or structure of the surrounding habitat.

Great blue heron colony: Monitoring of the colony is recommended to track population size, and detect changes the nesting site. Activities and disturbances during the nesting and breeding season should be kept at a minimum.

Gaping panic grass: Protection measures should include the implementation of management recommendations and consultation with DCR-DNH when changes in land use or management practices are contemplated. Activities in the upslope areas managed by Colonial National Historical Park, currently dominated by the parking lot, could affect Subpopulation A, therefore protection efforts will require cooperation between APVA and NPS.

Tidal oligohaline marsh: These communities should be protected from any activities that disturb marsh vegetation or its substrate. Such activities include excavation, filling, excessive recreational use, herbicide or pesticide application, land clearing, and development. When such activities are conducted upon nearby uplands, care should be taken to prevent sediments and pollutants from reaching the marshes.

References:

Association for the Preservation of Virginia Antiquities and the U.S. Department of the Interior, National Park Service. 2001. Jamestown Project Newsletter. April 2001, Issue 2. 11 pp.

Byrd, M. A. 1991. Birds. *In* K. Terwilliger (coord.), Virginia's Endangered Species pp. 497-499. McDonald and Woodward Publishing Co., Blacksburg, VA.

Chazal, A. C. and N. E. Van Alstine. 2001. A natural heritage inventory at Neck O Land, Colonial National Historical Park. Natural Heritage Technical Report 01-05. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to Colonial National Historical Park. March 2001. 20 pp.

Clark K. H. and C. D. Rafkind. 1998. Conservation planning for the natural areas of Colonial National Historical Park, Virginia. Natural Heritage Technical Report 98-14. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 100 pages plus appendices.

Center for Conservation Biology. 1998. Bald Eagle/Heron survey report for Colonial National Historical Park. Unpublished report for Colonial National Historical Park. 15 pp.

Davison, S.E. and L.P. Bruderle. 1984. Element stewardship abstract for *Aeschynomene virginica*--sensitive joint-vetch. The Nature Conservancy. Arlington, VA. 5 pp.

Erdle, S. Y. and K. E. Heffernan. 2001. Biological assessment for new construction and increased visitor use impacts at the Jamestown Island 400 site. Department of Conservation and Recreation, Division of Natural Heritage, unpublished report prepared for National Park Service, Northeast Region, Philadelphia, PA. 35 pages plus appendices.

Fernald, M.L. 1940. A century of additions to the flora of Virginia. Rhodora 42: 355-530.

Fleming, G. P., P. P. Coulling, D. P. Walton, K. M. McCoy, and M. R. Parrish. 2001. The natural communities of Virginia: classification of ecological community groups. First approximation. Natural Heritage Technical Report 01-1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 76 pp.

North, G.B. 1984. Floristic and Vegetational Status of Pitch and Tar Swamp, Jamestown Island, Yorktown, Virginia: U.S. Department of the Interior, National Park Service, Colonial National Historical Park, MAR-6. 23 pp.

Rouse, G. D. and A. Belden, Jr. 1995. 1995 inventory for new populations of *Aeschynomene virginica* (L.) BSP. in Virginia. Natural Heritage Technical Report 95-16. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 9 pp. plus appendix.

US Fish and Wildlife Service. 1995. Sensitive joint-vetch (*Aeschynomene virginica*) Recovery Plan. Hadley, Massachusetts. 55 pp.

US Fish and Wildlife Service and Virginia Department of Game and Inland Fisheries. 2001. Bald eagle protection guidelines for Virginia. Unpublished report. USFWS, Gloucester, VA. 6 pp.

Virginia Department of Conservation and Recreation. 1999. Invasive Alien Plant Species in Virginia. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond VA. 4 pp.

Virginia Department of Game and Inland Fisheries. 2001. Virginia occupied Bald Eagle nests and productivity, 1977-2001. Unpublished data.

Weber, J.T., and P.P. Coulling. 2002. Ecological communities of the Jamestown Island 400th Anniversary Planning Project Area, Colonial National Historical Park, Virginia. Natural Heritage Technical Report 02-07. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 42 pp. plus appendices.

MILL CREEK MARSHES

Size: approximately 504 acres **Biodiversity Rank:** B3

Locality: James City County, VA

Quadrangle: Hog Island **Quadrangle Code:** 3707626
Surry 3707627

Location: The south end of this site includes the mouth of Mill Creek and the small fringe tidal marsh just to the west (Figure 10). It extends north and northwest (approximately 4.0 river km) to include most of the marshes along Mill Creek, ending just south of Lake Powell and Rt. 618. The southern end is along the Colonial Parkway and is owned by Colonial National Historical Park.

NATURAL HERITAGE RESOURCES SUMMARY TABLE

Scientific Name	Common Name	Global Rarity Rank	State Rarity Rank	USFWS Status	VA Legal Status	Element Occurrence Rank
Animals:						
Problema bulenta	Rare skipper	G2G3	S1	-	-	AB

Site Description: This site contains a small, fringe oligohaline tidal marsh along the north shore of The Thorofare. Emergent vegetation in this small section includes arrow-arum (*Peltandra virginica*), narrow-leaved cattail (*Typha angustifolia*), giant cord grass (*Spartina cynosuroides*), and pickerelweed (*Pontederia cordata*). Along the edge of the marsh on the upland side are several swamp milkweeds (*Asclepias incarnata*). The conservation site extends along Mill Creek and includes the marshes along its shores; however, this section was not inventoried. Based on the surrounding marshes, the vegetation composition may include giant cordgrass (*Spartina cynosuroides*), wild rice (*Zizania aquatica*), dotted smartweed (*Polygonum punctatum*), halberd-leaf tearthumb (*Polygonum arifolium*), Walter's barnyard grass (*Echinochloa walteri*), bull-tongue arrowhead (*Sagittaria lancifolia*), arrow-arum (*Peltandra virginica*), and other species. Further upstream as the water becomes less saline, the community may become a freshwater tidal marsh dominated by wild rice (*Zizania aquatica*). The invasive common reed (*Phragmites australis*) is present in a few dense stands and as scattered young plants. The uplands within the watershed of the marshes were not explored.

The Colonial Parkway bisects the site at the southern end, just above the small fringe marsh. The road is along a raised, grassy berm which is mowed regularly to the edge of the marsh.

A population of the rare skipper (*Problema bulenta*), which is globally rare, was discovered in 2001 in the small fringe marsh just west of the mouth of Mill Creek (Figure 11). The area within which the Rare skippers were observed is approximately 6.4 acres. Several visits were made to the site between 15 August and 13 September. The highest population count occurred on 22

August when 138 individuals were observed south of Colonial Parkway and one individual was observed on the north side. A majority (106) of those seen on 22 August were observed nectaring on swamp milkweed (about 20 – 30 flower heads). Later in the season the flower heads appeared to have been browsed by white-tailed deer (*Odocoileus virginianus*). This is only the second known population of the Rare skipper in Virginia and is approximately 24 air kilometers south of the previously known site on the Chickahominy River (Covell and Straley 1973; Nicolay 1979; Pague 1991; Hobson 1999).

Boundary Justification: The boundary includes all of the marsh habitat along Mill Creek, the adjacent uplands within the watershed, and the small fringe marsh along The Thorofare where the Rare skippers were observed (Figure 10). The delineation of the boundary was based upon the need to protect the marsh habitat including the nectar sources and larval host plants (i.e. big cordgrass and wild rice) of the butterfly (Moore 1980; Cromartie and Schweitzer 1993). Inclusion of the entire marsh unit at this site is warranted due to the need to control common reed within the larger site. Protection of the upland buffer will aid in protecting the watershed and thus water quality and quantity, but obviously impacts in the larger watershed beyond this site can potentially affect this population and are difficult to impossible to control.

Threats: The presence of the invasive common reed (*Phragmites australis*) is noteworthy. It becomes established in disturbed habitats and can quickly out-compete native vegetation and form dense monotypic stands with little wildlife value (Havens et al. 1997; Rice et al. 2000) . Any changes in salinity levels brought about by sea level rise, a consequence of global warming, will likely negatively affect the long-term vegetation composition at this site. Deer browse, mowing, and the close proximity to a road have unknown effects on the Rare skipper population.

Management Recommendations: The Rare skipper population should be monitored yearly. Use of the marsh by deer and possible negative effects of boat traffic in Back River (such as fuel spills) should be investigated to determine the extent to which they may be threats to the Rare skipper. Implementing best management practices in the uplands should help assure that the hydrology and water quality of the immediate area will remain constant. Habitat alteration, such as dredging, filling, or construction may impact the habitat by compacting the soils, or allowing common reed to overrun the marsh, thus creating an unsuitable habitat for the persistence of the Rare skipper. The status of common reed in this site should be closely monitored and control measures taken, if necessary, to prevent significant expansion of this invasive plant within the marsh.

Protection Recommendations:. Protection measures should include the implementation of management recommendations and consultation with DCR-DNH when changes in land use or management practices are contemplated. The Conservation Planning Boundary should be formally incorporated into the planning and management documents for Colonial National Historical Park.

References:

Covell, A.H. and G. B. Straley. 1973. Notes on Virginia butterflies with two new state records. J. Lepid. Soc. 27:144-154

Cromartie, W. J. and D. F. Schweitzer. 1983. Biology of the rare skipper (Hesperiidae), in southern New Jersey. J. Lepidopterists' Soc. 47(2):125-133.

Havens, K.J., W. I. Priest III, and H. Berquist. 1997. Investigation and long-term monitoring of *Phragmites australis* within Virginia's constructed wetland sites. Environ. Mangt. 21:599-605.

Hobson, C. S. 1999. Status survey for the Rare skipper (*Problema bulenta*) in Eastern Virginia, 1999. Natural Heritage Technical Report 99-22. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. 12 November 1999. 20 pp.

Moore, K.A. 1980. James City County tidal marsh inventory. Virginia Institute of Marine Science, School of Marine Science, College of William and Mary. Gloucester Point, Virginia.

Nicolay, S.S. 1979. *Problema bulenta* (Boisduval and LeConte). Pp. 173-174 in D. W. Lindzey (editor), Endangered and threatened plants and animals of Virginia. Blacksburg: Virginia Polytechnic and State University.

Pague, C. A. 1991. Rare skipper *Problema bulenta* (Boisduval and LeConte). Pp. 238-240 in : K. Terwilliger (coordinator), Virginia's Endangered Species. McDonald and Woodward Publishing Company. Blackburg Virginia.

Rice, D., J. Rooth, and J. C. Stevenson. 2000. Colonization and expansion of *Phragmites australis* in upper Chesapeake Bay tidal marshes. Wetlands 20:280-299.

LITERATURE CITED

Association for the Preservation of Virginia Antiquities and the U.S. Department of the Interior, National Park Service. 2001. Jamestown Project Newsletter. April 2001, Issue 2. 11 pp.

Belden, A. Jr. and N.E. Van Alstine. 1998. 1998 inventory for new populations of *Aeschynomene virginica* (L.) BSP. in Virginia. Natural Heritage Technical Report 98-16. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. November 1998. 11 pp. plus appendix.

Belden, A. Jr. 2000. 2000 inventory for new populations of *Aeschynomene virginica* (L.) BSP. In Virginia. Natural Heritage Technical Report 00-15. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. November 2000. 6 pp. plus appendices.

Chazal, A. C. and N. E. Van Alstine. 2001. A natural heritage inventory at Neck O Land, Colonial National Historical Park. Natural Heritage Technical Report 01-05. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report submitted to Colonial National Historical Park. March 2001. 20 pp.

Clark, K. H. and C. D. Rafkind. 1998. Conservation planning for the natural areas of Colonial National Historical Park, Virginia. Natural Heritage Technical Report 98-14. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 100 pp. plus appendices.

Covell, A.H. and G. B. Straley. 1973. Notes on Virginia butterflies with two new state records. J. Lepid. Soc. 27:144-154

Cromartie, W. J. and D. F. Schweitzer. 1983. Biology of the rare skipper (Hesperiidae), in southern New Jersey. J. Lepidopterists' Soc. 47(2):125-133.

Davis, W. E. 1986. The use of tape-recorded calls to count Virginia rails and soras. Wilson Bulletin 98(2):303-306.

Davison, S.E. and L.P. Bruderle. 1984. Element stewardship abstract for *Aeschynomene virginica*--sensitive joint-vetch. The Nature Conservancy. Arlington, VA. 5 pp.

Fernald, M.L. 1940. A century of additions to the flora of Virginia. Rhodora 42: 355-530.

Glassberg, J. 1999. Butterflies through binoculars: the east. Oxford University Press, New York NY. Page 184.

Havens, K.J., W. I. Priest III, and H. Berquist. 1997. Investigation and long-term monitoring of *Phragmites australis* within Virginia's constructed wetland sites. Environ. Mangt. 21:599-605.

Hobson, C. S. 1999. Status survey for the Rare skipper (*Problema bulenta*) in Eastern Virginia, 1999. Natural Heritage Technical Report 99-22. Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. 12 November 1999. 20 pp.

Kartesz, J. T. 1999. A Synonymized Checklist and Atlas with Biological Attributes for the Vascular Flora of the United States, Canada, and Greenland. First Edition. In: Kartesz, J. T., and C.A. Meacham. Synthesis of the North American Flora, Version 1.0. North Carolina Botanical Garden, Chapel Hill, NC.

Ludwig, J.C., K.A. Buhlmann, C. A Pague. 1993. A natural heritage inventory of mid-Atlantic Region National Parks in Virginia: Colonial National Historical Park. Natural Heritage Technical Report 93-6. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 62 pp. plus appendices.

McDiarmid, R. W. 1994. Preparing amphibians as scientific specimens IN: Measuring and monitoring biological diversity: standard methods for amphibians. Heyer et al. eds. Smithsonian Institution Press, Washington DC. Pp.289-297.

Moore, K.A. 1980. James City County tidal marsh inventory. Virginia Institute of Marine Science, School of Marine Science, College of William and Mary. Gloucester Point, Virginia.

Nicolay, S.S. 1979. *Problema bulenta* (Boisduval and LeConte). Pp. 173-174 in D. W. Lindzey (editor), Endangered and threatened plants and animals of Virginia. Blacksburg: Virginia Polytechnic and State University.

North, G.B. 1984. Floristic and Vegetational Status of Pitch and Tar Swamp, Jamestown Island, Yorktown, Virginia: U.S. Department of the Interior, National Park Service, Colonial National Historical Park, MAR-6. 23 pp.

Pague, C. A. 1991. Rare skipper *Problema bulenta* (Boisduval and LeConte). Pp. 238-240 in : K. Terwilliger (coordinator), Virginia's Endangered Species. McDonald and Woodward Publishing Company. Blacksburg Virginia.

Rice, D., J. Rooth, and J. C. Stevenson. 2000. Colonization and expansion of *Phragmites australis* in upper Chesapeake Bay tidal marshes. Wetlands 20:280-299.

Roble, Steven M. 1996. Natural heritage resources of Virginia: Rare animal species. Natural Heritage Technical Report 96-11. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 23 pp. plus appendices.

Roble, Steven M. 2001. Natural heritage resources of Virginia: Rare animal species. Natural Heritage Technical Report 01-16. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond. 33 pp. plus appendices.

Rouse, G. D. and A. Belden, Jr. 1995. 1995 inventory for new populations of *Aeschynomene virginica* (L.) BSP. in Virginia. Natural Heritage Technical Report 95-16. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. 9 pp. plus appendix.

The Nature Conservancy. 1997. Designing a Geography of Hope: Guidelines for Ecoregion-Based Conservation in The Nature Conservancy. 84 pp.

Townsend, J.F. 2001. Natural Heritage Resources of Virginia: Rare Vascular Plants. Natural Heritage Technical Report 01-11. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA. Unpublished report. March 2001. 30 pp. plus appendices.

U.S. Fish and Wildlife Service. 1995. Sensitive joint-vetch (*Aeschynomene virginica*) Recovery Plan. Hadley, Massachusetts. 55 pp.

U. S. Fish and Wildlife Service and Virginia Department of Game and Inland Fisheries. 2000. Bald eagle protection guidelines for Virginia. USFWS, Virginia Field Office, Gloucester, Virginia. 6 pp.

Virginia Department of Conservation and Recreation. 1999. Invasive Alien Plant Species in Virginia. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond VA. 4 pp.

Virginia Society of Ornithology. 1989. Virginia's breeding birds: An atlas workbook. William Byrd Press. Richmond, Virginia.

Wright, R. A. S. 1990. Unpublished field survey for DCR-DNH.