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Region of the Mattaponi River, Virginia**

James E. Perry

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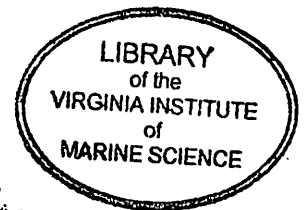
**Final Report Submitted To**

**Malcolm Pirnie, Inc.**

**Submitted By**

**James E. Perry, Ph.D.  
Center for Coastal Management and Policy  
Virginia Institute of Marine Science  
College of William and Mary  
Gloucester Point, Virginia 23062**

**Dec. 1, 1993**



Distribution of Aeschynomene virginica  
in the Scotland Landing Region of the Mattaponi River, Virginia

## INTRODUCTION

The distribution and population densities of a federal listed threatened plant species, the northern joint vetch (Aeschynomene virginica), was determined and mapped in the vicinity of a proposed Mattaponi River water withdrawal structure.

The proposed study was intended to determine the size, limits, and density of extant populations of the northern joint vetch in the project area, and to investigate the possible impacts the project may have on the extant populations. Where necessary, possible mitigation procedures are discussed.

## STUDY AREA

The primary study area was defined as both sides of the Mattaponi River in the vicinity of Scotland Landing (located south of SR637). Mantua Ferry delineate the upstream limit of the study site and just below Scotland Landing the downstream limit. Total length of the primary study area was approximately 0.6 miles (Figure 1). A secondary study area was the remainder of the tidal freshwater zone of the Mattaponi River (Figure 2).

## SITE DESCRIPTION

The proposed water withdrawal site at Scotland Landing is located in King William County, approximately 4.8 river miles downstream of Walkerton, Virginia (Figure 1). The river at Scotland Landing is approximately 250 m. wide, 5 m. deep in the deepest section (average depth is approximately 2.0 m.). Mean tidal range at Walkerton is 1.2 m. (3.9 ft, largest range in the Chesapeake Bay) and the spring tide range is 1.4 m. (U.S. Dept. Comm., 1991). Salt is not an important parameter in the project area as the farthest upstream that the 1 parts per thousand salinity halocline is known to travel in the Mattaponi River is 21 k. upstream from West Point, thus approximately 25 k. downstream of Walkerton (Brooks, 1983).

The shore on both sides of the river is populated with freshwater hydrophytes. The populations represented three distinct ecotones: submerged to immersed vegetated zone (dominated by Nuphar luteum); emergent zone (dominated by a large diversity of herbaceous species); and a low bank zone dominated by trees and shrubs.

Submerged to Immersed Zone: Dominated by yellow spatter dock (Nuphar luteum), the zone extends from the mean tide line to spring low water. It varies in width from a few meters on the west side of the river to nearly a kilometer on the east side. Other species found in this zone, albeit in very small numbers, included Pontederia cordata, Polygonum punctatum, Scirpus americanus, and Zizania aquatica. Both Cardamine longii and Eriocaulon parkeri populations reached their lower waterward limit at the landward edge of this zone.

Emergent Zone: The zone extends from the mean tide line to the mean high tide mark. The zone was dominated by mixed herbaceous and/or graminoid vegetation. The south shore was dominated by Zizania aquatica, Juncus effusus, Pontederia cordata, and Scirpus americana. Large populations of Eriocaulon parkeri, Eleocharis parvula, and Sagittaria subulata form extensive mats throughout the zone. Other species present, but not dominant, included Boehmeria cylindrica, Helenium autumnale, Polygonum punctatum, Cinna arundinacea, Acorus calamus, Impatiens capensis, Lobelia cardinalis, Orontium aquaticum; Ludwigia palustris, and Pilea pumila. The substrate was a clayey-sand with large amounts of gravel. Organics were present in the soil and stained the fingers when the soil was rubbed between them.

Low Bank Zone: Zone above mean high tide. Dominated by shrubs and trees. Soil of the zone was a clayey-loam. The dominant trees were Platanus occidentalis and Salix nigra. The dominant shrub was Alnus serrulata. Also present were Acer rubrum, Betula nigra, Cephalanthus occidentalis, and Liquidambar styraciflua. This zone partially shaded the emergent zone on the west side of the river.

## METHODS

Historical data concerning A. virginica was reviewed for the study area. A

survey of the entire project area was conducted by boat from August through October, 1993, to visually determine if populations of the A. virginica or any other significant species not historically noted from the area, occurred within the general vicinity of the study area. Specific attention was paid to habitats that were similar to those which contain populations of the significant species. When located, the habitats were further investigated by walking the entire habitat and inspected visually for specimens of A. virginica.

Plant nomenclature follows Gleason and Cronquist, 1991. Species distributions were confirmed with Harvill et al., 1992. Species status was confirmed through personal communications with Mr. John Tate (1992) and Mr. Christopher Ludwig (1993).

#### SPECIES DESCRIPTION

A. virginica is a tall (0.5-2.0 m) annual legume; stems erect, bristly, branched; leaves even-pinnate (a few may be odd-pinnate), 2-12 cm long; leaflets 30-56, 1 nerved, entire, 2-3 mm wide, oblong; pedicels 3-8 mm long, with sessile toothed bractlets about 4 mm long and 2-3 mm wide immediately below flowers; pea-shaped flowers 1-6, yellow with red veins, standard (uppermost petal) 10-15 mm long; legume fruit a legume, 2-7 cm long, stipe 1-1.5 cm long; joints 4-10, sparsely pustulate hairy, breaking into 1-seeded segments (modified from Gleason and Cronquist, 1991; Terwilliger, 1991).

#### HABITAT

Found on sandy or muddy river banks and tidal shores (Hershner and Perry, 1988; Gleason and Cronquist, 1991; Terwilliger, 1991). Usually found associated with grazing or other activities that remove or decrease vegetation cover (Hershner and Perry, 1987; Terwilliger, 1991). Found in areas often dominated by a diverse mixture of emergent macrophytes, including Bidens laevis, Chamaecrista fasciculata var. macrosperma, Hibiscus moscheutos, Leersia oryzoides, Polygonum punctatum, P. arifolium, and Zizania aquatica.

## LIFE HISTORY

Seeds germinate by early June and reach up to 0.5 m by mid-summer. Flowering begins in early August and persist throughout October. Fruits develop in September through October. The legumes break into one seeded segments and are disseminated by flotation. Seed banking appears to be involved as many stands of A. virginica reappear at isolated sites after a period of absence (modified from Terwilliger, 1991). A. virginica prefers grazed, eroded, or otherwise sparsely vegetated areas. Therefore, it is more than likely shade intolerant and/or competes poorly with the many perennial species of the marshes.

## DISTRIBUTION

Southern New Jersey south to Craven County, North Carolina. Has been extirpated from Delaware and Pennsylvania. In our region it has been recorded from the coastal plain in oligohaline and tidal freshwater marshes of the Chickahominy, Mattaponi, Pamunkey, Rappahannock, and Potomac Rivers. The population of A. virginica has declined from over 10,000 plants at one point in the past to about 700 individuals in 1986 (modified from Terwilliger, 1991). Specimens of A. virginica have been recorded within the study area. Historical records also show that the species was present in other wetlands within an approximately 1 k. radius of the proposed project area (Hershner and Perry, 1988), but not within the proposed project area.

## STATUS

Globally and state ranked as very rare and imperiled with 6 to 12 occurrences or few remaining individuals; or because of some factor(s) making it vulnerable to extinction (G2, S2, respectively) (Appendix 1). It has recently been assigned federal **Threatened** status under Section 4(a)(1) of the endangered Species Act (16 U.S.C. 1531 et seq.) and federal regulations (50 CFR part 424) (see Federal Register, Vol. 57, No. 98, May 20, 1992, pg. 21569-21574, 50 CFR part 17) (see Appendix 2 for definitions of state and federal status terms).

## RESULTS

A. virginica has been recorded along the Mattaponi River from as far downstream as the Wakema/Gleason Marsh area and as far upstream as Walkerton (Figure 2). Historical populations have been reported from the Garnetts Creek Marsh area directly across from the study site (Hershner and Perry 1988).

Eight site visits were made in August through October, 1993, each lasting approximately eight hours (Table 1). Although numerous examples of A. virginica habitat were located in the Scotland Landing and Garnetts Creek areas during this study (Figure 3), no extant populations of A. virginica were found within the primary study area during the search period.

## POTENTIAL IMPACTS AND RECOMMENDATIONS

No specimens of Aeschynomene virginica were located in the primary study area during this study, and it appears that no existing plant will be impacted within the primary or secondary study areas by the proposed project. Approximately 1 hectare of A. virginica habitat was located in the primary study area. Impact to the area could occur through construction activities. We have no information on seed bank availability of the species. Thus, the potential for loss of propagule source due to construction activities is unknown. However, since the construction area is narrow and relatively well defined, any propagule loss as well as damage to A. virginica habitat could be kept to a minimum by: 1) locating work staging areas away from the wetlands, 2) using strict sedimentation control measures at all times, and 3) avoiding compaction and disturbance of wetland soils. If work in A. virginica habitat becomes necessary, the seed bank should be removed, stored, and replaced at the proper elevation upon completion of construction.

## LITERATURE CITED

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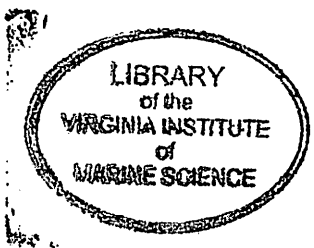
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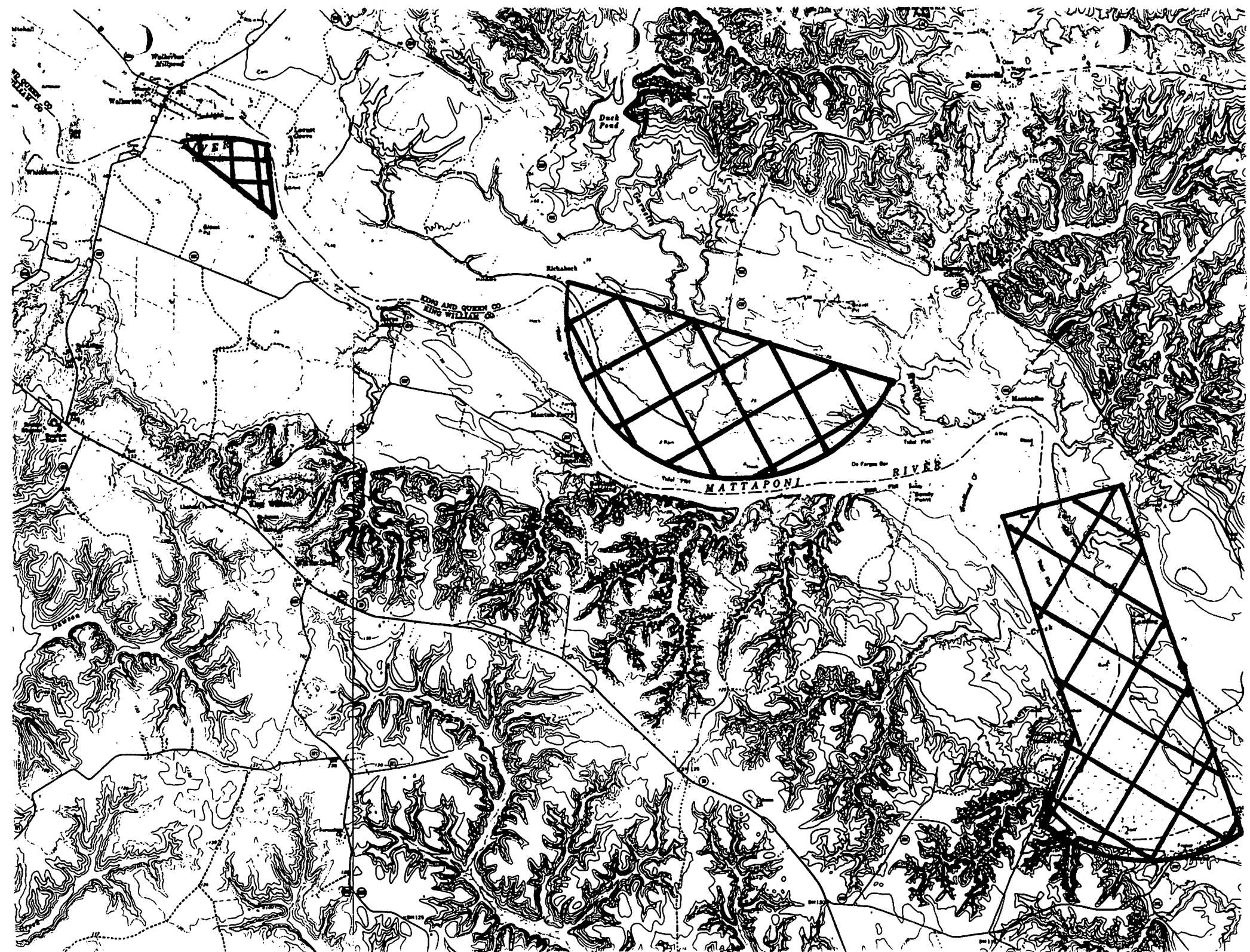


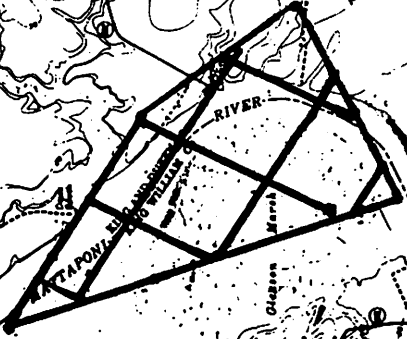
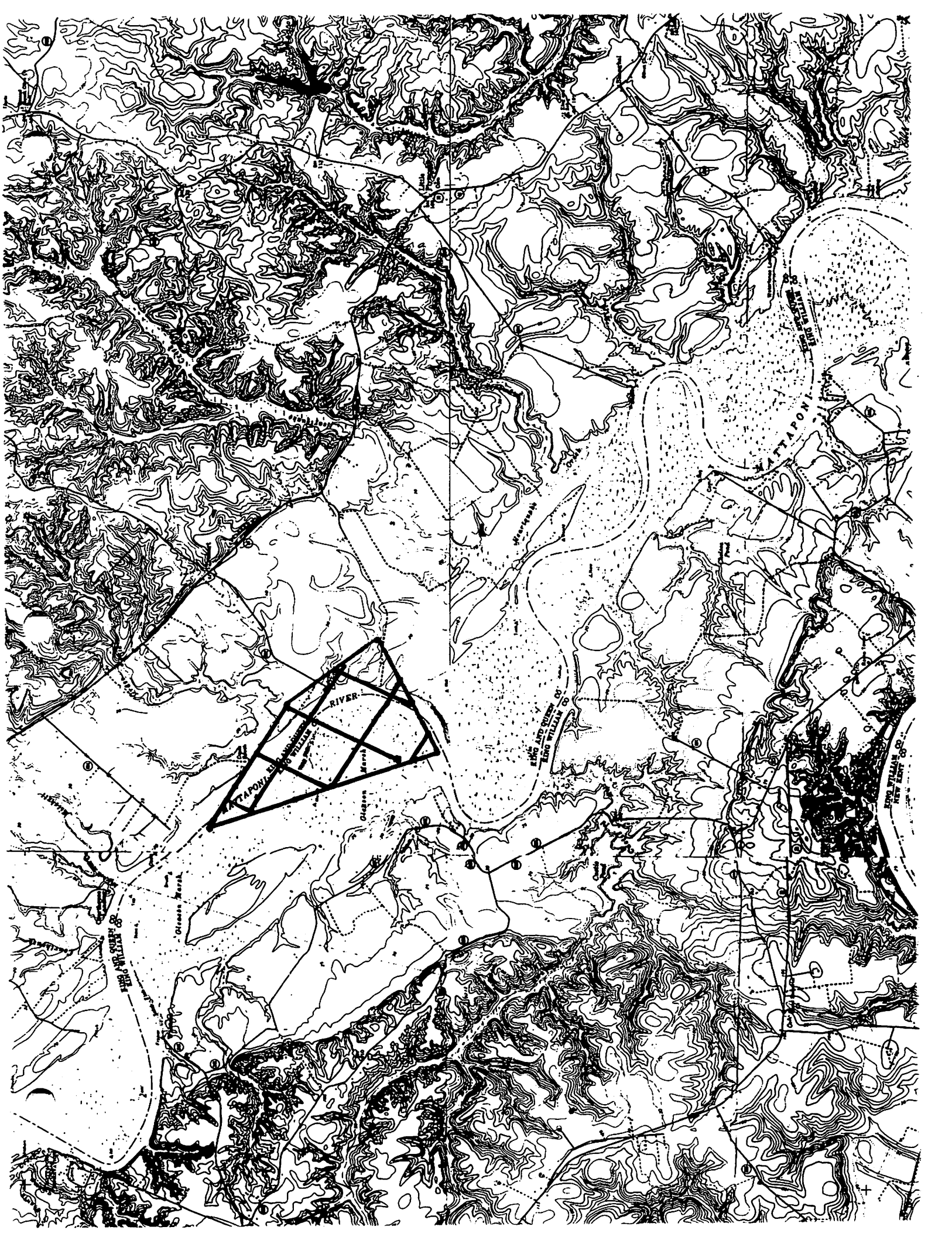
Figure 1. Project location map. Study corridor is marked by heavy lines and extended a minimum of 100 m. upstream and downstream of proposed project.



Figure 2. Historical distribution of Aeschynomene virginica on the Mattaponi River (two maps).







TAPPAN RIVER

LONG AND QUINN CO.  
TAPPAN CO.

NEW YORK CO.

LONG AND QUINN CO.  
TAPPAN CO.

Glenns Ferry

TAPPAN RIVER

Figure 3. Distribution of Aeschynomene virginica habitat within the primary study site.



ING AND QUEEN CO  
ING WILLIAM CO

MATTAPONI RIVER

De Farges Bar

Sandy Point

Rickahock

Mantua Ferry

White Oak Landing

Scotland Landing

Mantapi

Dargens Corner

Hook Creek

Wood Creek

Gravel Pit

Blood Point

Mantapi

Hillsboro

Hock

Rain

Hook

130

620

633

632

637

659

632

Table 1. Dates of site visits to Scotland Landing region of the Mattaponi River. All visits were made in a small boat.

DATES	INVESTIGATORS
Aug. 16	Perry
Aug. 30	Perry, Fox
Sept. 3	Perry
Sept. 11	Perry, Fox
Sept. 20	Perry, Fox
Sept. 30	Perry
Oct. 12	Perry, Bourgard
Oct. 18	Perry



**APPENDIX 1**

**Explanation of rare plant RANK and STATUS codes.**

**(from Ludwig, 1992)**

## LIST FORMAT

The rare plant list and the watchlist are ordered alphabetically by scientific name. Each listing has an identical format which presents six fields: scientific name, common name, global rank, state rank, federal status, and state status. To aid in the interpretation of the list, a brief explanation of each field follows:

### Column 1. Scientific name:

In all but a few cases, nomenclature follows J.T. Kartesz, A Synonomized Checklist of the Vascular Flora of the United States (in press). Since the user may not have access to this reference, a line is provided below the scientific name. This line provides the user with a synonymy when other names are used in popular regional botanical references including the 2nd edition of the Atlas of the Virginia Flora by A.M. Harvill, Jr., T.R. Bradley, C.E. Stevens, T.F. Wieboldt, D.M.E. Ware, and D.W. Ogle, 1986. The synonymy field is also used to give other pertinent taxonomic information, and note when the nomenclature does not follow Kartesz.

### Column 2. Common name:

A common name is provided for the convenience of the user. Common names for plants are not standardized and many taxa have no entirely satisfactory common name.

### Column 3. Global rank:

Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, and The Nature Conservancy to designate a rarity rank based on the rangewide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of a taxon's rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors including number of occurrences, numbers of individuals, and severity of threats.

G1 = Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it vulnerable to extinction.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.

G4 = Common and apparently secure globally, though it may be rare in parts of its range, especially at the periphery.

G5 = Very common and demonstrably secure globally, though it may be rare in parts of its range, especially at the

periphery.

GH = Formerly part of the world's biota with expectation that it may be rediscovered.

GX = Believed extinct throughout its range with virtually no likelihood of rediscovery.

GU = Possibly rare, but status uncertain and more data needed.

G? = Unranked, or, if following a ranking, rank uncertain (ex. - G3?).

G\_Q = the taxon has a questionable taxonomic assignment, such as a G3Q.

G\_T = signifies the rank of a subspecies or variety. For example, a G5T1 would apply to a subspecies of a species that is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.

#### Column 4. State rank:

State ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Virginia. For example, whereas a plant which is endemic to Virginia (found nowhere else) will have the same global and state ranks, a plant which may be common in the northeastern United States, but only known from a few occurrences in Virginia will have different global and state ranks. By comparing the global and state ranks, the status, rarity, and the urgency of conservation needs can be ascertained.

S1 = Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals in Virginia; or because of some factor(s) making it especially vulnerable to extirpation in Virginia.

S2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals in Virginia; or because of some factor(s) making it vulnerable to extirpation in Virginia.

S3 = Rare to uncommon in Virginia with between 20 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia.

S4 = Common and apparently secure with more than 100 occurrences; may have fewer occurrences with numerous large populations.

S5 = Very common and demonstrably secure in Virginia.

SH = Formerly part of the Virginia biota with expectation that it may be rediscovered.

SX = Believed extirpated from Virginia with virtually no likelihood of rediscovery.

SE = Exotic; not believed to be a native component of Virginia's flora.

SR = Reported for Virginia, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.

SU = Possibly rare, but status uncertain and more data needed.

S\_? = Rank uncertain, for example a S2? denotes a species or variety which may range from S1 to S3, another example

is SE?, meaning a taxon may or may not be native to Virginia.

Column 5. Federal Status:

Federal Status is determined by the U. S. Fish and Wildlife Service. This includes all species and varieties which are listed as endangered or threatened by the U. S. government and receive protection under the federal Endangered Species Act. The list also notes those taxa which are proposed for listing or assigned to categories 1, 2, or 3.

- LE = Listed Endangered. A taxon is threatened with extinction throughout all or a significant portion of its range.
- LT = Listed Threatened. A taxon is likely to become endangered in the foreseeable future.
- PE = Proposed Endangered. A taxon is proposed for listing as endangered.
- PT = Proposed Threatened. A taxon is proposed for listing as threatened.
- C1 = Candidate, Category 1. There is enough available information to propose the taxon for listing, but listing is "precluded by other pending proposals of higher priority". The U.S. Fish and Wildlife Service is "directed to make prompt use of the emergency listing if the well-being of any such species is at significant risk."
- C2 = Candidate, Category 2. The taxon is possibly rare, but there are not enough data available to support listing.
- 3A = A taxon for which there is evidence of extinction.
- 3B = A taxon name which is not valid under current taxonomic understanding.
- 3C = The taxon has proven to be abundant, widespread, and/or unthreatened so that listing is currently inappropriate.
- \* = An \* following the status denotes that the species or variety is possibly extinct.

Column 6. State Status:

State status indicates those plants which are listed as state endangered or threatened under the authority of the Virginia Department of Agriculture and Consumer Services. The Department of Agriculture and Consumer Services is currently developing a recommended list of legally endangered and threatened species based upon the recommendations derived from a 1989 Virginia Endangered Species Symposium, and the Division of Natural Heritage. This list will be presented to its Board for consideration at a later date. The Board's actions will likely result in numerous changes to the current list.

- LE = Listed Endangered
- LT = Listed Threatened
- PE = Proposed Endangered
- PT = Proposed Threatened
- C = Candidate for listing as threatened or endangered.

**APPENDIX 2**  
**Definitions of state and federal STATUS terms**  
**(from Terwilliger, 1992)**

### Definitions of Virginia legal status and candidate categories.

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Endangered	Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the class Insecta deemed to be a pest and whose protection under the provisions of the article (§3.1-1021) would present an overriding risk to the health or economic welfare of the Commonwealth.
Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Protected	All wild animals under the jurisdiction of the Virginia Department of Game and Inland Fisheries, except as otherwise permitted.
Special Concern	Any species which is restricted in distribution, uncommon, ecologically specialized, or threatened by other imminent factors.
Candidate Species	A species formally recommended by the Director of the Department of Conservation and Recreation or other reliable data sources in writing to and accepted by the Commissioner for presentation to the Board of Agriculture and Consumer Services for listing under the Virginia Endangered Plant and Insect Act.

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Definitions are from Code of Virginia § 3.1-1029, § 29.1-521, and § 29.1-563; VR 325-01, § 14.

### Definitions of federal legal status and candidate categories.

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Endangered	Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary (of Interior) to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.
Threatened	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Category 1	Taxa for which substantial information exists to support proposal to list the taxon as endangered or threatened.
Category 2	Taxa for which information exists to support proposal to list the taxon as endangered or threatened, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules.
Category 3	Taxa that were once being considered for listing as endangered or threatened, but are not currently receiving such consideration.
Subcategory 3A	Taxa for which persuasive evidence of extinction is available. If rediscovered, such taxa might warrant high priority for addition to the List of Endangered and Threatened Wildlife.
Subcategory 3B	Taxonomic names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the legal definition of species in the Endangered Species Act. Future investigation could lead to re-evaluation of the listing qualifications of such entities.
Subcategory 3C	Taxa that are now considered to be more abundant and/or widespread than previously thought. Should new information suggest that any such taxon is experiencing a numerical or distributional decline, or is under a substantial threat, it may be considered for transfer to category 1 or 2.

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Definitions of "endangered" and "threatened" from Endangered Species Act of 1973, as amended through the 100th Congress. Definitions of candidate categories condensed from 50 CFR 17 as reported in *Federal Register* volume 54 (4:January 6, 1989), pp. 554-555.