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Investigation of Potential Distribution of Aeschynomene virginica in the Tidal Wetlands of Ware Creek, Virginia

Final Report Submitted To

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Dec. 1, 1993

Investigation of Potential Distribution of Aeschynomene virginica in the Tidal Wetlands of Ware Creek, Virginia

INTRODUCTION

The distribution and population densities of a federal listed threatened plant species, the northern joint vetch (Aeschynomene virginica), was determined in the vicinity of the proposed Ware Creek Reservoir site in James City County and New Kent County, Virginia.

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 study area was the tidal emergent wetlands on both sides of Ware Creek (Figure 1). The upstream border was defined as the portion of France Swamp (on the southwest) and Ware Creek (on the west) where emergent wetlands end and forested wetlands dominate. The confluence of Ware Creek and the York River represented the downstream (east) limit.

SITE DESCRIPTION

The tidal marshes of Ware Creek are populated with brackish and freshwater hydrophytes. The populations represented two distinct zones: emergent oligohaline zone (dominated by Spartina species) and emergent tidal freshwater zone (dominated by a large diversity of herbaceous species).

Emergent Oligohaline Zone: The zone extends from the mean tide line to the mean high tide mark on the downstream portion of the study area. Spartina alterniflora dominated the mean tide zone and S. cynosuroides the high marsh zone. Marsh soils were an organic peat with greater than 90% organic content.

Emergent Tidal Freshwater Marsh Zone: The zone extends from the mean tide

line to the mean high tide mark on the upstream portion of the study area. The zone was dominated by mixed herbaceous and/or graminoid vegetation. The center portions of the marshes were dominated by Zizania aquatica, Juncus effusus, Pontederia cordata, and Scirpus americana. 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. Soil was a mucky-peat.

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 Cronquest, 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

Aeschynomene 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).

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.

HABITAT

Found on sandy or muddy river banks and tidal shores (Hershner and Perry, 1988; Perry and Hershner, 1989; Gleason and Cronquest, 1991; Terwilliger, 1991). Usually found associated with grazing or other activities that remove or decrease vegetation cover (Hershner and Perry, 1988; 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.

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). No specimens of A. virginica were present within the study corridor during this study nor do any historical records place this species within the study corridor. (Hershner and Perry, 1988).

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 not been recorded within the Ware Creek wetlands. Historical populations have been reported from the Pamunkey River from as far downstream as Sweet Hall Marsh and as far upstream as White House and the Pamunkey Indian Reservation (Hershner and Perry 1988). Numerous examples of A. virginica habitat were located in Ware Creek during this study (Figure 2). Ten site visits were made to the Ware Creek wetlands from August through October, each taking approximately six hours each (Table 1). However, no extant populations of A. virginica were located.

POTENTIAL IMPACTS AND RECOMMENDATIONS

Aeschynomene virginica: No specimens were located in the study corridor during this study. Therefore, it appears that no existing plant will be impacted by the proposed project. Approximately 5 hectares of A. virginica habitat upstream of the proposed site of the reservoir would be lost due to either construction or inundation. Impact on downstream habitat (approximately 1 hectare) could occur through construction activities. Downstream impacts could be minimized by locating work staging areas away from the downstream wetlands. Strict sedimentation control measures should be used at all times. We have no information on seed bank availability of the species. Thus, the potential for loss of propagule source due to construction and flooding activities is unknown.

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Figure 1. Project location map. Study area is marked by heavy lines.

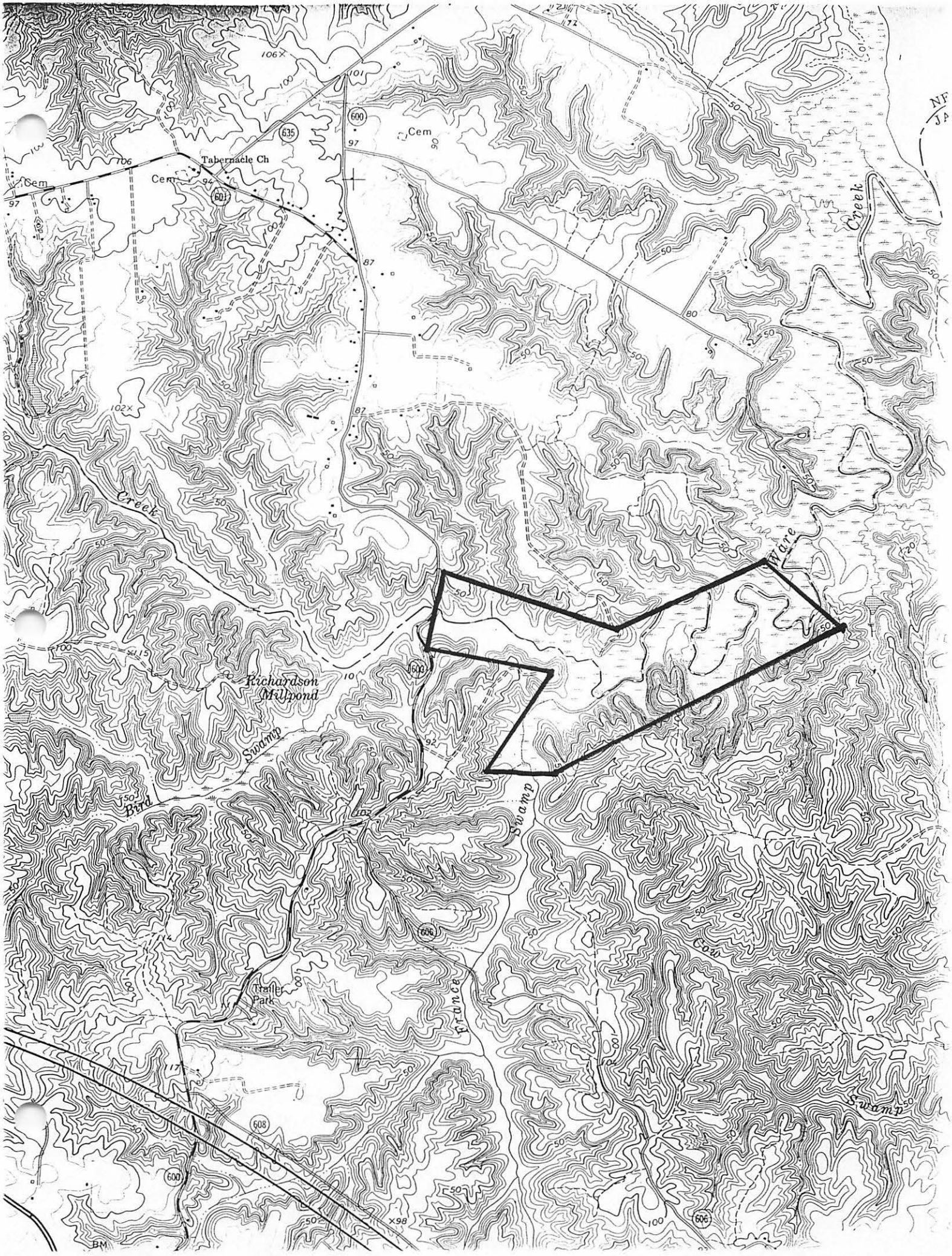
Tabernacle Ch
Cem
Cem
Cem
Creek
Creek
Ware
Richardson
Millpond
Swamp
Bird
Swamp
Trailer
Park
France
Cow
Swamp
Swamp
635
601
600
610
606
608
600
606

Figure 2. Aeschynomene virginica habitat in Ware Creek located during this study (indicated by hatched lines).

Ware
Creek
Ware
Swamp
Cow
80
600
606

Table 1. Dates of site visits to Ware Creek wetlands. All visits were made by small boat.

DATES	INVESTIGATORS
Aug. 16	Perry
Aug. 19	Perry, Marcase
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
Oct. 25	Perry, Fox

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.

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.

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.

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 forseeable 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.

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.