A Summary of the Inventory for Important Biological Resources in the Chickahominy River Watershed

FINAL REPORT
Natural Heritage Technical Report 18-13

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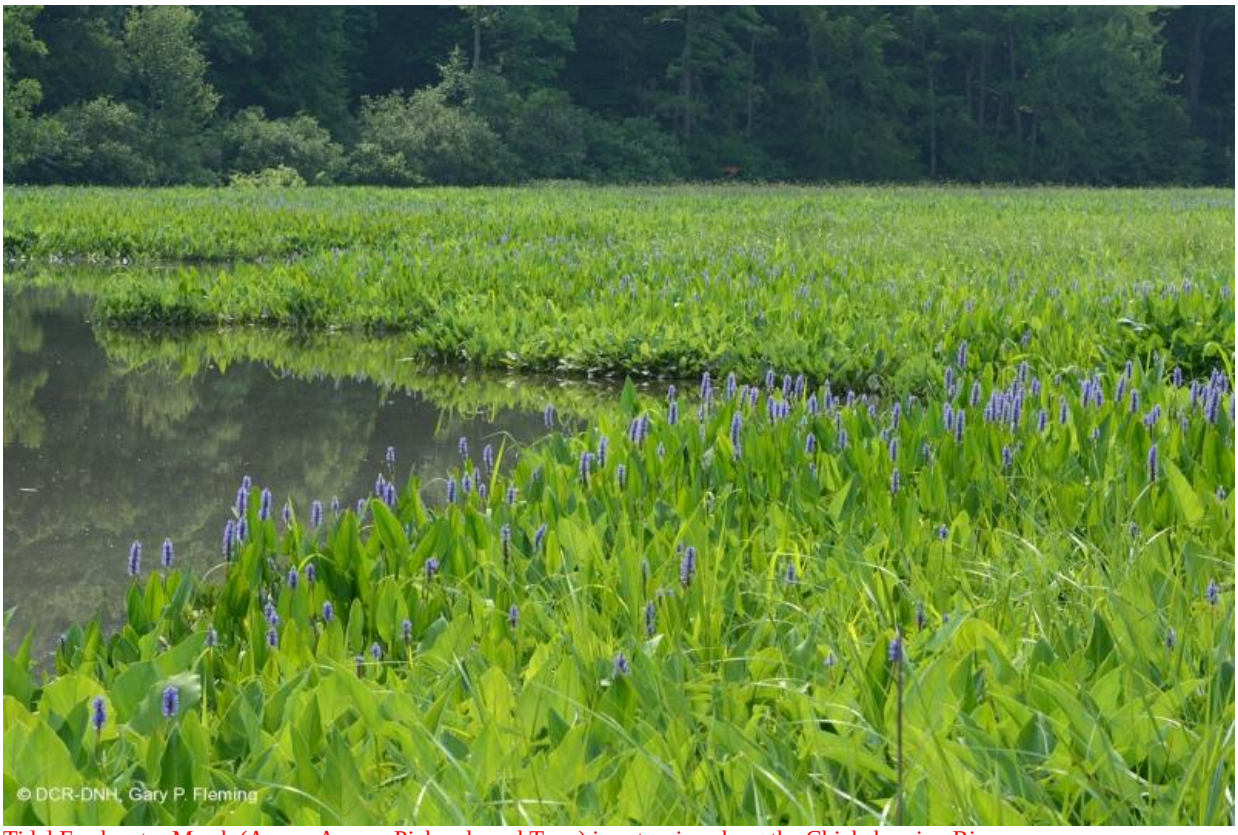
INTRODUCTION

The lower Chickahominy watershed (10-digit HUC – 0208020606) is recognized for harboring some of the most biologically diverse and ecologically significant areas in the Coastal Zone of Virginia. The Coastal VEVA classifies much of this region's 3 counties (James City, Charles City, and New Kent) and especially the Lower Chickahominy corridor itself as very high to outstanding ecological significance. In 2016, The Virginia Coastal Zone Management Program (CZM) provided a Section 309 Coastal Zone Management Program Grant (task 93.02) for the Virginia Department of Conservation and Recreation - Division of Natural Heritage (DCR-DNH) to inventory important biological resources in this watershed in order to fill biological resource data gaps.

The biological resources to be inventoried included habitat for populations of federally listed threatened or endangered species, habitat for populations of proposed candidate species for federal listing, and habitat for populations for other rare plant and animal species monitored by DCR-DNH. Significant terrestrial community occurrences were also included and combined these resource collectively are known as Natural Heritage Resources. To maximize impact, only older (1995 or previous) Natural Heritage Resource occurrences were included as updating these were most important to inform conservation priorities.

In addition to conducting surveys for these Natural Heritage Resource occurrences, this grant funded the collection of aquatic community information through the collection of fish community data and instream habitat data at 40 stream locations within the Chickahominy watershed. Using the fish community and instream habitat data, a Healthy Waters rank for each stream reach (100 -250m) sampled will be computed. If any streams sampled meet the criteria for Healthy Waters, a watershed catchment will then be delineated. This will also provide the Coastal Zone Management Program geospatial datasets used in the creation and calculation of the Index of Terrestrial Integrity for use internally or externally.



Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type) is extensive along the Chickahominy River

METHODOLOGY

Staff of DCR-DNH approach Natural Heritage resource inventories in a systematic and prioritized manner. The inventory of the lower Chickahominy watershed's 3 priority counties was conducted through the five basic stages listed below. Although a natural areas inventory can logically be broken into these steps, in actuality the work proceeds in multiple directions simultaneously and is often iterative.

1) Gathering existing information. Published and unpublished information on elements and natural areas was collected and assimilated in conjunction with review of map data for the survey area. Maps of lands within the survey area were gathered, DCR-DNH databases were accessed, and the known distribution of Natural Heritage Resources was examined. Lists of potential element occurrences were developed and used for further planning.

2) Review of aerial photographs. Aerial photographs of the survey area were reviewed in detail to identify sites to be studied in the subsequent stages. To aid in their interpretation, the photographs were compared with topographic and geologic maps.

3) Planning for field survey. Based on preceding efforts and the creation of GIS projects combing topographic maps, digital SSURGO soil maps, element occurrences, and land tracts, field plans were developed to maximize the productivity of the limited field time. Among the factors considered were: when the survey can best be conducted; which staff scientist(s) should be involved (i.e., what is the potential for rare plants, rare animals or exemplary communities); and how much time should be budgeted for completing the survey. County tax maps were consulted to determine landownership and many landowner contacts were made in order to arrange for field surveys.

4) Field survey. During this stage, detailed information was collected on the rare species and exemplary natural communities present within the study area. In determining location, points and polygons are gathered using a Global Positioning System (GPS) unit in conjunction with the ESRI Collector app. Portions of a site not visited on foot or by boat were evaluated on the basis of aerial photographs and other information. When a resource of interest is found, occurrence data were transcribed and entered into DCR-DNH databases.

Throughout this stage of concentrated field inventory, continual communication between DCR-DNH project team members (botanists, zoologists, and ecologists) was emphasized to ensure that all significant natural areas were visited by appropriate specialists. In addition, some flexibility was built into the process so that priorities could be adjusted when unexpected elements were encountered.

5) Compilation of results and preparation of reports. As fieldwork was completed, DCR-DNH biologists reviewed the information gathered and provided a summary of the results in this report, including maps of occurrence boundaries. All results will be incorporated into the Natural Heritage data system during the winter of 2017-2018.

Botanical Inventory Methods

For purposes of this study, rare plants are defined as the rarest known species in the Commonwealth. They include species with global ranks of G1, G2, and G3, and state ranks of S1, S1S2, S2, S2S3, SH, and SX. Data on these species are summarized annually on a master list of Virginia's rare plants. See Appendix A for an explanation of the Natural Heritage ranking system. Target populations of rare plants were determined by examining existing information and consulting with other botanists. These occurrences are listed in the results section.

Records of rare plant populations contained in DCR-DNH databases are partly based on information gathered from botanical literature and from examination of specimen 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.

Fieldwork took place in 2017. In addition to the DCR-DNH botanists, the DCR-DNH field ecologists also contributed to the rare plant surveys. During the botanical investigation, field data were recorded during each site survey and were coordinated with data collected from the same site by ecologists and zoologists. 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 rare plant occurrences were 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 populations were also noted. Voucher specimens were collected when necessary to verify the identity of rare species and where this could be done without harming the population as a whole. Each occurrence was ranked on the basis of all available data.

Zoological Inventory Methods

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, S2S3, SH, SX, and SU. Data on these species are maintained in DCR-DNH data bases and summarized regularly on a master list of Virginia's rare animals. Target species populations are listed in the results section.

Records of rare animal populations contained in DCR-DNH databases are partly based on information gathered from zoological literature and from examination of specimen 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.

Field work was conducted in 2017. Zoological inventory methodologies included the following:

<u>Hand collection and visual surveys</u> - Reptiles, amphibians, and some invertebrates were searched for and captured by hand in terrestrial and aquatic habitats, where various cover objects were overturned in search of cryptic species.

<u>Minnow traps</u> - Standard wire-mesh minnow traps were used in an attempt to capture a variety of zoological taxa including targeted resources. Traps were baited and set between 24 and 48 hours in shallow water.

<u>Sweep nets</u> – Lepidopterans, odonates, tiger beetles, and other flying invertebrates were sampled in terrestrial and aquatic habitats using sweep nets.

All invertebrates collected during the study were preserved using standard methods (Martin 1977). Most of these 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 the DCR-DNH. Some identifications and/or confirmations of invertebrate collections are pending. All vertebrates that were captured were identified and released at the capture location.

Community Inventory Methods

The need to protect indigenous biotic communities and ecosystems has become a major focus of conservation efforts by federal, state, and private organizations in recent years. Community classification,

inventory, and protection should be regarded as an essential complement to rare species inventories. Natural communities represent functioning units of the landscape which: support myriad life forms too cryptic or poorly known to be catalogued and prioritized individually; provide the nurturing environment for both rare and common species; contribute to the maintenance of larger ecosystems; and possess unique intrinsic scientific, educational, and aesthetic values. It is therefore important to locate, classify, and evaluate these features as part of any comprehensive inventory of Natural Heritage Resources.

For purposes of this study, significant communities are defined to include both outstanding examples of common community types (e.g., old-growth mixed hardwood forest) and all examples of rare community types (e.g., certain seepage-influenced, fire-maintained wetlands). Community nomenclature follows the Natural Communities of Virginia by Fleming et al. 2001, and is modeled after the Classification of the Natural Communities of North Carolina (Schafale and Weakley 1990). As the NVC becomes populated with descriptions, these assemblages and the individual plots will be cross-walked to associations in the NVC (Grossman et al. 1998).

Standard information was collected for each site visited by ecologists and was coordinated with data collected by botanists and zoologists when necessary. When significant communities were located, additional data were collected on occurrence size, condition, boundaries, biotic and abiotic factors, floristics, evidence of disturbance, successional trends, and immediate or long-term threats. Community occurrences were ranked primarily by their quality and size.

Aquatic sampling methods

Within prioritized HUCs of the Chickahominy, probabilistic study reaches for stream sampling were selected for potential fieldwork through a statistically powerful, stratified (by stream order) randomizing protocol. Within geo-referenced reaches (150-500 m), fishes were sampled quantitatively using electrofishing equipment (Smith-Root backpacks, tote barge units, boats) and standard methods. Backpack and tote barge sampling was performed throughout the entire reach in a single pass. Boat electrofishing included additional sampling effort depending on stream width and habitat variability. Electrofisher settings (e.g. output voltage, waveform, etc.) for each sampling event were set to optimize sampling efficiency and minimize fish mortality based on ambient conditions and operator experience. Electrofishing settings and total effort (seconds of generator output) were recorded for each sampling event, along with any other relevant information. All fishes were identified to species in the field, checked for anomalies, and released. A synoptic assessment for instream habitat quality (EPA Rapid Habitat Assessment, RHA) was also performed at each site with the appropriate metrics for high *versus* low gradient. A total of 40 stream reaches were visited for this project during 2017.

RESULTS

Prior to field surveys, 65 Natural Heritage Resources occurrences and 40 stream reach sampling locations were identified.

The Natural Heritage Resource occurrences included 48 plant populations, 3 animal populations, and 14 significant natural communities. These are given below:

Element name (plants)	Common Name	Last Seen	County
Aeschynomene virginica	Sensitive Joint-vetch	1936	Charles City
Aeschynomene virginica	Sensitive Joint-vetch	1938	Charles City
Aeschynomene virginica	Sensitive Joint-vetch	1939	Charles City
Aeschynomene virginica	Sensitive Joint-vetch	1939	Charles City
Aeschynomene virginica	Sensitive Joint-vetch	1939	New Kent
Asclepias purpurascens	Purple Milkweed	1985	James City
Bacopa caroliniana	Blue water-hyssop	1970	Charles City
Bacopa rotundifolia	Round-leaf water-hyssop	1941	Charles City
Cuscuta cephalanthi	Buttonbush dodder	1970	New Kent
Cuscuta coryli	Hazel Dodder	1985	Charles City
Dichanthelium consanguineum	Blood panic grass	1966	New Kent
Didiplis diandra	Water-purslane	1940	Charles City
Eriocaulon decangulare var. decangulare	Ten-angled pipewort	1949	James City
Eriocaulon parkeri	Parker's Pipewort	1939	Charles City
Eriocaulon parkeri	Parker's Pipewort	1977	New Kent
Eriocaulon parkeri	Parker's Pipewort	1990	James City
Eriocaulon parkeri	Parker's Pipewort	1990	New Kent
Helenium brevifolium	Short-leaf sneezeweed	1949	James City
Helenium brevifolium	Short-leaf sneezeweed	1953	James City
Heteranthera multiflora	Mud plantain	1974	James City
Isoetes hyemalis	Winter Quillwort	1992	Charles City
Isotria medeoloides	Small Whorled Pogonia	1929	New Kent
Isotria medeoloides	Small Whorled Pogonia	1929	New Kent
Isotria medeoloides	Small Whorled Pogonia	1941	James City
Juncus caesariensis	New Jersey Rush	1941	James City
Juncus caesariensis	New Jersey Rush	1990	James City
Lachnocaulon anceps	Common bog-buttons	1974	James City
Lysimachia radicans	Trailing Loosestrife	1939	Charles City
Micranthemum micranthemoides	Nuttall's Micranthemum	1941	Charles City
Micranthemum micranthemoides	Nuttall's Micranthemum	1941	Charles City
Micranthemum micranthemoides	Nuttall's Micranthemum	1941	Charles City
Micranthemum micranthemoides	Nuttall's Micranthemum	1941	Charles City
Micranthemum micranthemoides	Nuttall's Micranthemum	1941	Charles City
Penstemon australis	Southern beard-tongue	1949	New Kent
Penstemon australis	Southern beard-tongue	1951	James City
Potamogeton spirillus	Spiral Pondweed	1941	Charles City
Sabatia campanulata	Slender Marsh Pink	1949	James City
Sarracenia purpurea	Northern pitcher plant	1941	James City
Scutellaria incana	Hoary Skullcap	1990	James City
Stewartia ovata	Mountain Camellia	1954	James City
Stewartia ovata	Mountain Camellia	1967	James City

Stewartia ovata	Mountain Camellia	1978	James City
Trillium pusillum var. virginianum	Virginia Least Trillium	1974	Charles City
Trillium pusillum var. virginianum	Virginia Least Trillium	1994	New Kent
Trillium pusillum var. virginianum	Virginia Least Trillium	1990	James City
Utricularia striata	Fibrous Bladderwort	1975	New Kent
Verbena scabra	Rough vervain	1974	James City
Xyris curtissii	Curtiss' yellow-eyed grass	1962	New Kent

Element name (animals)	**Common Name**	**Last Seen**	**County**
Macrobrachium ohione	Ohio River Shrimp	1952	Charles City
Regina rigida	Glossy Crayfish Snake	1992	New Kent
Satyrium kingi	King's Hairstreak	1964	New Kent

Element name (communities)	**Common Name**	**Last Seen**	**County**
Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum / Osmundastrum cinnamomeum - Woodwardia areolata Forest	Coastal Plain / Outer Piedmont Acidic Seepage Swamp	1990	New Kent
Nuphar advena - Peltandra virginica Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Common Spatterdock - Arrow-Arum Mud Flat Type)	1991	Charles City
Peltandra virginica - (Pontederia cordata) Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type)	1991	James City
Peltandra virginica - (Pontederia cordata) Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type)	1991	James City
Peltandra virginica - (Pontederia cordata) Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type)	1991	James City
Peltandra virginica - (Pontederia cordata) Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type)	1991	James City
Peltandra virginica - (Pontederia cordata) Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Arrow-Arum - Pickerelweed Type)	1995	Charles City
Quercus alba - Quercus falcata - (Carya pallida) / Gaylussacia frondosa Forest	Coastal Plain Mixed Oak / Heath Forest	1990	New Kent
Quercus phellos - Acer rubrum - Liquidambar styraciflua / Vaccinium (formosum, fuscatum) Forest	Coastal Plain Depression Swamp (Willow Oak - Red Maple - Sweetgum Type)	1990	New Kent
Spartina alterniflora - Spartina cynosuroides Tidal Herbaceous Vegetation	Riverine Salt Marsh (Saltmarsh Cordgrass - Big Cordgrass Type)	1991	James City
Taxodium distichum - Nyssa biflora - Fraxinus profunda / Peltandra virginica - (Bignonia capreolata) Tidal Forest	Northern Coastal Plain Tidal Bald Cypress Woodland	1990	Charles City
Spartina cynosuroides Tidal Herbaceous Vegetation	Tidal Oligohaline Marsh (Big Cordgrass Type)	1991	James City

Zizania aquatica - Pontederia cordata - Peltandra virginica - Persicaria punctata Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Wild Rice - Mixed Forbs Type)	1991	James City
Zizania aquatica - Pontederia cordata - Peltandra virginica - Persicaria punctata Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Wild Rice - Mixed Forbs Type)	1991	James City

Extensive beds of globally-rare Narrow-leaved Spatterdock are found on the Chickahominy River.

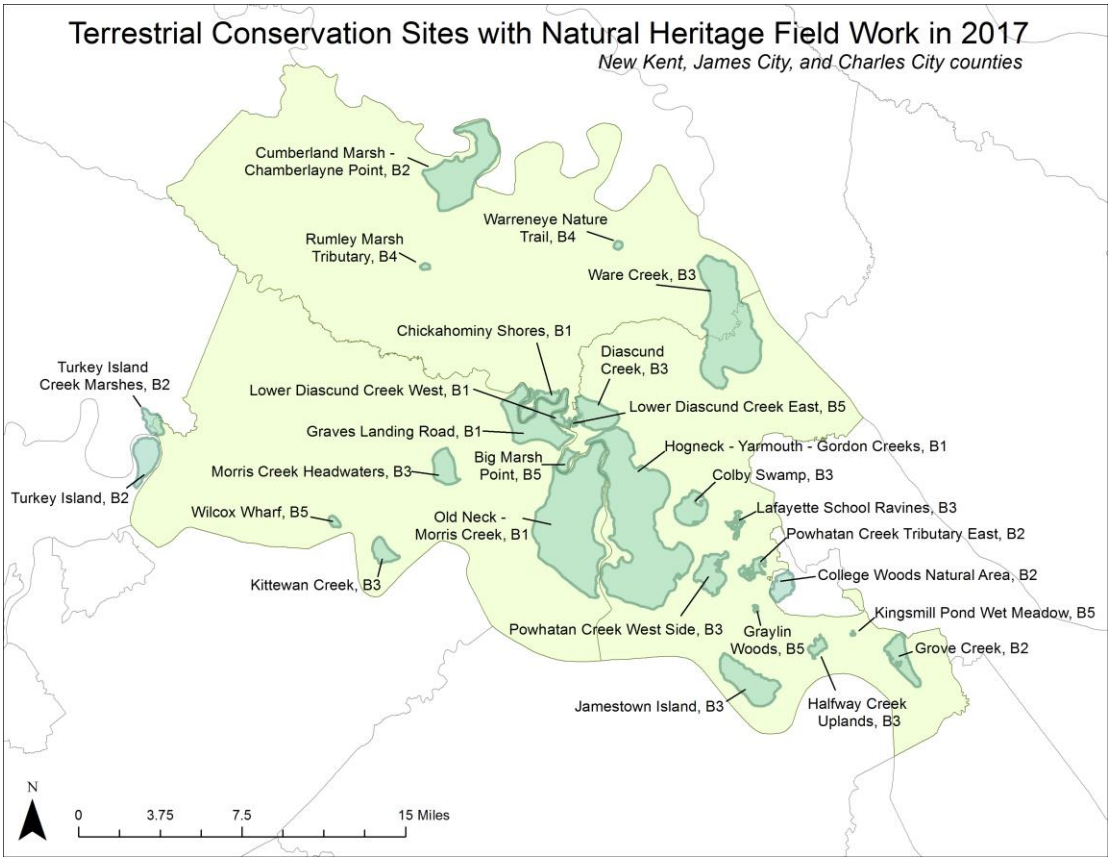
In 2017, Division of Natural Heritage Ecologists, Botanists, and Zoologists completed field inventory of 39 of the Natural Heritage Resource occurrences listed above. These 39 occurrences were all where landowner permission could be obtained to allow access. During these surveys, 16 of the 39 near-historic occurrences listed above (3 plants and 13 communities) were relocated. In addition 5 new occurrences (2 plants and 3 communities) were found and updates were made to 1 additional community and 17 plant occurrences. In total 39 occurrences were found during field work in 2017 as seen in the following table:

Significant natural community occurrences found in 2017:	
Acer rubrum - Fraxinus pennsylvanica / Packera aurea - Pilea fontana - (Carex bromoides, Bidens laevis) Forest	Coastal Plain Calcareous Seepage Swamp
Carya pallida / Quercus margarettae / Vaccinium arboreum / Piptochaetium avenaceum Woodland	Coastal Plain Xeric Fluvial Terrace Woodland

Carya pallida / Quercus margarettae / Vaccinium arboreum / Piptochaetium avenaceum Woodland	Coastal Plain Xeric Fluvial Terrace Woodland
Fagus grandifolia - Acer floridanum - Quercus muehlenbergii / Sanguinaria canadensis Forest	Coastal Plain Calcareous Ravine Forest
Fagus grandifolia - Acer floridanum - Quercus muehlenbergii / Sanguinaria canadensis Forest	Coastal Plain Calcareous Ravine Forest
Fagus grandifolia - Quercus (alba, montana, rubra) / Kalmia latifolia Forest	Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest
Fagus grandifolia - Quercus (alba, rubra) - Liriodendron tulipifera / (Ilex opaca) / Polystichum acrostichoides Forest	Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest
Hibiscus moscheutos - Persicaria punctata - Peltandra virginica - (Typha angustifolia, Spartina cynosuroides) Tidal Herbaceous Vegetation	Tidal Oligohaline Marsh (Mixed Forbs Type)
Nuphar sagittifolia Permanently Flooded Tidal Herbaceous Vegetation	Tidal Freshwater / Oligohaline Aquatic Bed (Narrow-Leaved Spatterdock Type)
Nyssa biflora - Fraxinus profunda - (Fraxinus pennsylvanica) / Ilex verticillata / Persicaria arifolia Tidal Forest	Freshwater Tidal Hardwood Swamp
Quercus alba - Quercus rubra - Carya (tomentosa, ovata) / Cercis canadensis Forest	Southern Piedmont Basic Oak - Hickory Forest
Quercus muehlenbergii - Carya cordiformis / Cercis canadensis / Dichanthelium boscii - Erigeron pulchellus Forest	Coastal Plain Dry Calcareous Forest
Quercus muehlenbergii - Carya cordiformis / Cercis canadensis / Dichanthelium boscii - Erigeron pulchellus Forest	Coastal Plain Dry Calcareous Forest
Spartina alterniflora - Spartina cynosuroides - Bolboschoenus robustus Tidal Herbaceous Vegetation	Riverine Salt Marsh (Saltmarsh Cordgrass - Saltmarsh Bulrush Type)
Taxodium distichum - (Nyssa biflora, Fraxinus pennsylvanica) / Pontederia cordata Tidal Forest	Northern Coastal Plain Tidal Bald Cypress Forest
Zizania aquatica - Pontederia cordata - Peltandra virginica - Persicaria punctata Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Wild Rice - Mixed Forbs Type)
Zizania aquatica - Pontederia cordata - Peltandra virginica - Persicaria punctata Tidal Herbaceous Vegetation	Tidal Freshwater Marsh (Wild Rice - Mixed Forbs Type)
Rare plant occurrences found in 2017:	
Aeschynomene virginica	Sensitive Joint-vetch
Aeschynomene virginica	Sensitive Joint-vetch
Bacopa innominata	Tropical Water-hyssop
Boltonia asteroides var. glastifolia	Eastern doll's-daisy
Cuscuta coryli	Hazel Dodder
Desmodium ochroleucum	Cream-flowered tick-trefoil
Eriocaulon parkeri	Parker's Pipewort
Fleischmannia incarnata	Pink Thoroughwort
Isoetes hyemalis	Winter Quillwort
Isotria medeoloides	Small Whorled Pogonia
Isotria medeoloides	Small Whorled Pogonia

Juncus caesariensis	New Jersey Rush
Nuphar sagittifolia	Narrow-leaved Spatterdock
Pityopsis graminifolia var. tenuifolia	Narrowleaf silk-grass
Pityopsis graminifolia var. tenuifolia	Narrowleaf silk-grass
Rudbeckia laciniata var. bipinnata	Northeastern cutleaf coneflower
Rudbeckia laciniata var. bipinnata	Northeastern cutleaf coneflower
Trichostema setaceum	Narrow-leaf blue curls
Tridens chapmanii	Chapman's purpletop
Tridens chapmanii	Chapman's purpletop
Trillium pusillum var. virginianum	Virginia Least Trillium
Verbena scabra	Rough vervain

When the 39 occurrences listed above were found, complete geo-referenced occurrence data were recorded. Field work concluded in October 2017 and all collected information is now entered into the DCR – Natural Heritage data system known as Biotics. The occurrence data were used to develop and update "conservation sites" within Biotics. Conservation sites form the public face of sensitive Natural Heritage resource information and conservation measures are recommended within these sites to protect their biological resources. The figure below shows all of the sites where Natural Heritage Resource were found during 2017.



All conservation sites maintained within Biotics are given a significance rank of 1-5 with 1 considered outstanding and 5 considered of general conservation interest. These B-ranks are derived by the rarity and quality of the Natural Heritage Resource occurrences found within the site and are defined below:

- **B1 – Outstanding:** This site has outstanding significance, such as the only known occurrence of any Element, the best or an excellent (A-ranked) occurrence of a G1 Element, or a concentration (4+) of high-ranked (A- or B-ranked) occurrences of G1 or G2 Elements. Site should be viable and defensible for targeted Elements and ecological processes contained.
- **B2 - Very high:** This site has very high significance, such as one of the most outstanding occurrences of any community Element (regardless of its Element rank). Also includes areas containing any other (B-, C- or D-ranked) occurrences of a G1 Element, a good (A- or B-ranked) occurrence of a G2 Element, an excellent (A-ranked) occurrence of a G3 Element, or a concentration (4+) of B-ranked G3 or C-ranked G2 Elements.
- **B3 – High:** This site has high significance, such as any other (C- or D-ranked) occurrence of a G2 Element, a B-ranked occurrence of a G-3 Element, an A-ranked occurrence of any community, or a concentration (4+) of A- or B-ranked occurrences of (G4 or G5) S1 Elements.
- **B4 – Moderate:** This site has moderate significance, such as a C-ranked occurrence of a G3 Element, a B-ranked occurrence of any community, an A- or B-ranked or only state (but at least a C-ranked) occurrence of a (G4 or G5) S1 Element, an A-ranked occurrence of an S2 Element, or a concentration (4+) of good (B-ranked) S2 or excellent (A-ranked) S3 Elements.
- **B5 - General interest/open space:** This site is of general biodiversity interest or open space.

Note that there are 5 conservation sites found within the lower Chickahominy River watershed that are designated as B1 with outstanding significance. During 2017, ecologists and botanists conducting field work noted that the tidal freshwater wetland communities were among the highest quality remaining along Virginia's tidal rivers.

Tidal freshwater marsh dominated by wild rice (Zizania aquatica var. aquatica), along Gordon Creek, a tributary of the Chickahominy River in James City County. The lower Chickahominy River has 5 outstanding conservation sites.

Virginia Commonwealth University field staff completing sampling all 40 stream reaches by November of 2017. Access to many streams was impossible due to the large number of impoundments and large tidal streams in the lower Chickahominy. To overcome this difficulty, VCU staff conducted boat electrofishing sites on several Chickahominy tributaries.

Chickahominy Streams Survey 2017

Stream	Date Sampled	Boat/Wade
Pelham Swamp	7-21	Wade
Big Swamp	7-14	Wade
Edwards Swamp	7-21	Wade
Mill Creek	7-21	Wade
Bradley Run	7-14	Wade
Barrows Creek (upper)	5-31	Wade
Stony Run	6-8	Wade
Mill Creek (upper)	5-31	Wade
Tomahund Creek	6-8	Wade
Collins Run	6-8	Wade
Morris Creek (upper)	5-31	Wade
UT Chickahominy River	7-14	Wade
Colby Swamp	9-11	Wade
Gordon Creek	9-11	Wade
Parsons Creek	9-11	Wade
Yarmouth Creek (upper wade)	9-15	Wade
Yarmouth Creek (lower wade)	9-15	Wade
UT Diascund Creek	9-15	Wade
Barrows Creek (lower)	9-8	Boat
Sandy Gut	9-8	Boat
Mill Creek (lower)	9-8	Boat
Schiminoe Creek (lower)	8-25	Wade
Wahrani Swamp	8-28	Wade
Beaverdam Creek	3-24	Wade
Rumley Marsh	3-24	Wade
UT Diascund	4-2	Wade
UT Diascund	4-2	Wade
Schiminoe Creek (upper)	11-22	Wade
Dockman Swamp	11-22	Wade
Mill Creek (lower)	11-17	Boat
Diascund Creek (upper)	11-17	Boat
Diascund Creek (lower)	11-17	Boat
Uncles Neck Creek	11-16	Boat
Little Creek	11-1	Boat
Yarmouth Creek (lower boat)	11-1	Boat
Yarmouth Creek (upper boat)	11-16	Boat
Possum Creek	11-22	Wade
Beaverdam Creek	3-24	Wade
UT Diascund	3-29	Wade
UT Diascund	3-24	Wade
Rumley Swamp	3-24	Wade

DISCUSSION

Field work funded through this grant resulted in a significant update of the biological resources for the Chickahominy watershed in 2017. All data from the Natural Heritage surveys are now available within Biotics, the Virginia Natural Heritage database system that contains all data on the occurrence of Natural Heritage Resources in Virginia.

The data obtained through the VCU stream sampling are under analysis to quantitatively determine the relative quality of the stream reaches. Preliminary results indicate that a number of stream reaches are of high quality and will meet the criteria for designation as Healthy Waters. A Healthy Waters designation will result in mapping the reach as a significant aquatic community and will be included within a Stream Conservation Unit mapped by the Virginia Natural Heritage Program and included in Biotics.

Surprisingly, there is not an existing digital data subscription between DCR-DNH and CZM allowing for sharing the Biotics dataset. Development of a subscription is recommended to allow for sharing of all Coastal Zone occurrence data, not just data collected in 2017 through this grant. If this is not possible, DCR-DNH will work to extract only the 2017 Chickahominy data. For either of these scenarios, it is recommended that this is done after the 2017 Chickahominy VCU stream data is in biotics (latest is December of 2018).

In addition to providing an update to Biotics, the information collected through this grant is being utilized as an input data set in an update of a Natural Landscape Assessment for the entire Coastal Zone of Virginia. This update will be completed in December in 2018. This update is needed as an input to the next planned revision of the Coastal Virginia Ecological Value Assessment (VEVA), a comprehensive integration of conservation datasets and priorities developed to guide land use and conservation planning at the local government and planning district levels.

LITERATURE CITED

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