



Supplemental Draft Environmental Impact Statement and Updated Draft Section 4(f) Evaluation

APPENDIX H

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**I-495 & I-270 Managed Lanes Study
Montgomery & Prince George's County, Maryland**
Rare, Threatened, and Endangered Plant Survey Report

Prepared for:
Maryland Department of Transportation State Highway Administration

Under Contract to:
RKK
700 East Pratt Street, Suite 500
Baltimore, Maryland 21202

July 2019

Prepared by:



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TABLE OF CONTENTS

A.	Introduction.....	1
B.	Site Description.....	1
C.	Species Descriptions	3
D.	Methodology	4
E.	Results	4
F.	Conclusions	5
G.	References.....	7

LIST OF FIGURES

Figure 1 – Site Location Map	2
Figure 2 – Targeted Species Survey Location Map.....	6

APPENDICES

Appendix A –DNR-WHS Correspondence

Appendix B – Photographs

A. Introduction

The I-495 & I-270 Managed Lanes Study is being conducted to address major traffic congestion problems within the National Capital Region. As part of the environmental review process for the Maryland portion of the I-495 & I-270 Managed Lanes Study, coordination was initiated with the Maryland Department of Natural Resources, Wildlife and Heritage Service (DNR-WHS) regarding the potential presence of state-listed rare, threatened, or endangered (RTE) species within the corridor study boundary (CSB). The DNR-WHS sent a response letter dated July 17, 2018 that identified various potential RTE species within or adjacent to the CSB. The DNR-WHS then submitted a follow up letter dated September 11, 2018 that provided more detail about the potential RTE species within or adjacent to the study area with a recommendation that habitat suitability and targeted species surveys be completed for six state-listed plant species potentially occurring within the Potomac River floodplain and adjacent forested habitat. The DNR-WHS response letters are included in **Appendix A**. The six RTE plant species referenced in the DNR-WHS letter included the following:

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

A meeting was then held with the DNR-WHS on September 14, 2018 to further discuss the recommended survey approach for the Maryland portion of the Potomac River floodplain and adjacent forested slopes.

This report summarizes the results of the RTE habitat assessment and targeted species survey for the above referenced species conducted by Coastal Resources, Inc. (CRI) within the Maryland portion of the I-495 & I-270 Managed Lanes Study.

B. Site Description

The limits of the RTE habitat assessment and targeted species survey were restricted to the I-495 & I-270 Managed Lanes Study corridor study boundary within forested habitat on terraces and slopes immediately above the Potomac River floodplain, the forested Potomac River floodplain itself, and the rocky shoreline of the Potomac River (**Figure 1, Site Location Map**).

Land use classifications within and adjacent to this portion of the study area include parkland, residential, forest, transportation, and wetlands. The study area occurs within the Potomac River MDE 8-digit watershed, along the fall line between the Atlantic Coastal Plain and Piedmont physiographic provinces. Within this area, several terrace levels occur above the Potomac River, rising to over 100 feet in elevation. The study area includes a portion of Plummerville Island south of the American Legion Bridge and a small stream known as Rock Run Culvert. Exposed bedrock occurs on Plummerville Island. Large boulders occur along the shoreline of the river.

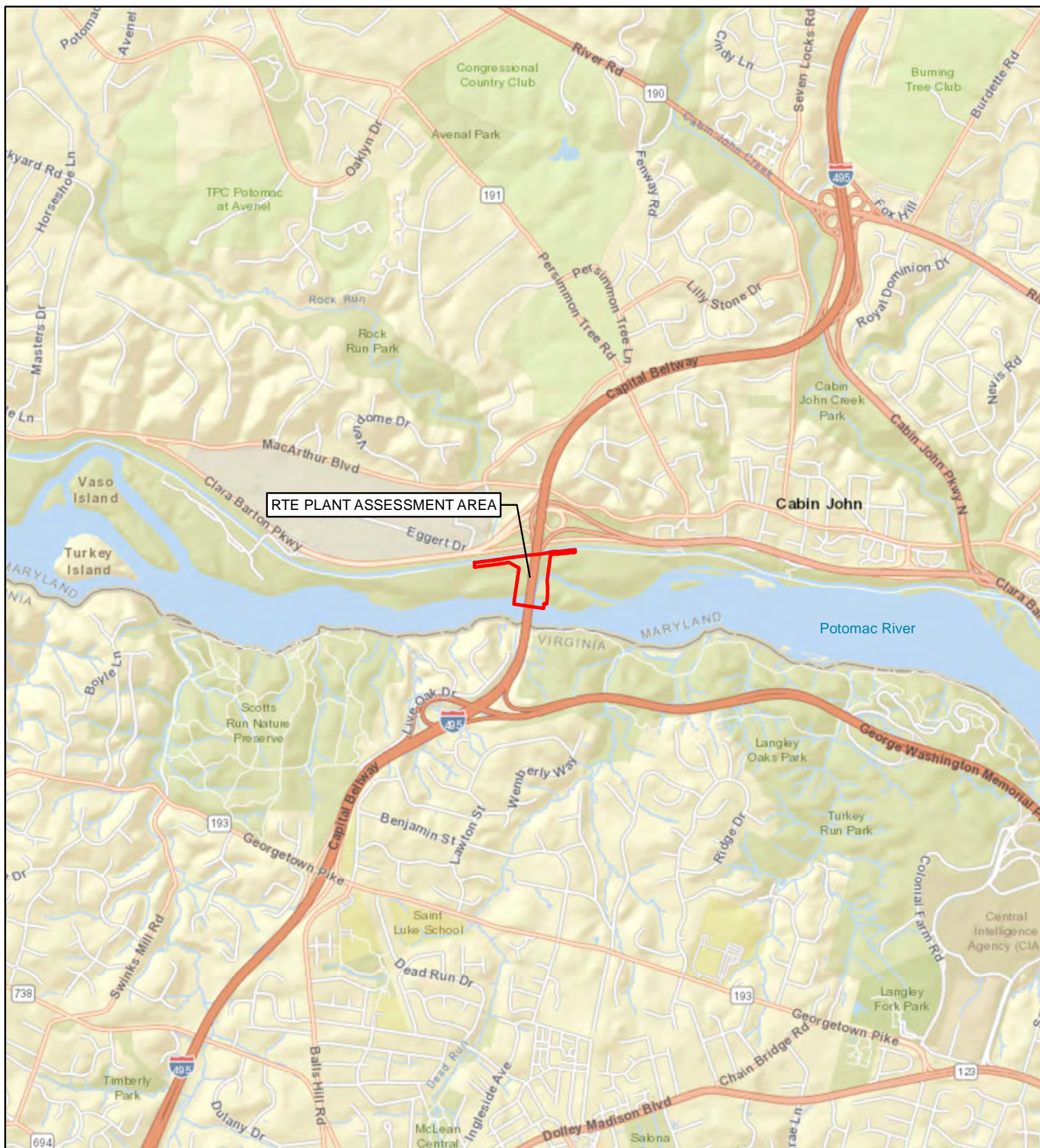
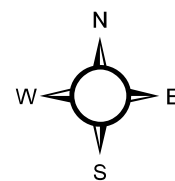


Figure 1
I-495 & I-270 Managed Lanes Study
Rare, Threatened, and Endangered Species Survey
Site Location Map

Montgomery County, MD
 July 2019



1 in = 0.5 miles

C. Species Descriptions

***Rumex altissimus* Alph. Wood** – Tall dock is a perennial herbaceous plant with a long tap root that grows up to 2 m tall. Leaves occur primarily along the stem, are ovate or oblong lanceolate, and grow to 15 cm long. Flowers are born on spikelike racemes up to 30 cm long. Habitat includes frequently flooded zones along rivers in sandy to gravelly alluvium. They can also occur within forested wetlands in muck soils. Their flowering period is from May to June or rarely July. The plants typically go to seed in August.

***Paspalum fluitans* (Elliott) Kunth** – Horse-tail paspalum is an aquatic annual. Stems are soft and spongy and grow to a meter long. Plants submerged in water have elongate stems that are little branched. Plants that are growing more terrestrially often form mats. Leaves are lanceolate, up to 35 cm by 2 cm in size, and taper at both ends. Flowering spikelets occur in open panicles with up to 70 branches. Upper florets are white. Habitat includes floodplain seeps and pools with muck soils or seasonally exposed rocky stream channels. The flowering/fruiting period is late August through September or early October.

***Matelea obliqua* (Jacq.) Woodson** – Climbing milkweed or angle-pod is a perennial herbaceous vine. Stems are hairy. Leaves are rounded with a pointed tip and a base that is somewhat heart shaped, growing up to 15 cm in length and 13 cm in width. The inflorescence is branched, often compound, and 10 to 50 flowered. Flowers are somewhat star shaped with purplish petals. Habitat includes bedrock scour and terrace woodlands in rich alluvium, upland forests, barrens, glades, clearings, and roadsides over limestone or shale substrates. The plants typically flower from June to July and are in fruit in September.

***Baptisia australis* (L.) R. Br.** – Blue wild indigo is a perennial herb with ascending branches that can grow to over 1.5 m tall. Leaflets are small (3 cm by 7 cm), oblong, and have entire margins. Flower racemes are erect, terminal, and loosely flowered, growing to 40 cm tall. Flowers are blue and seed pods are pointed, somewhat inflated, and contain many small seeds. Habitat includes prairie-like scour bars and riverside prairies in rich alluvium. Flowering occurs in May and fruits are present from June to August.

***Coreopsis tripteris* L.** – Tall tickseed is a perennial herb with long or short rhizomes. Stems are stout and up to 3 m tall. Leaves are numerous, grow mostly along the stem, and are divided into three to five leaflets. Flowers are yellowish and become tinted purple or deep red. Habitat includes bedrock scour bars and riverside prairies in rich alluvium. Flowering occurs in September and fruits are present from September through October.

***Phacelia covillei* S. Watson** – Buttercup scorpionweed is a short, hairy annual or biennial. Stems are weak, spreading, and up to 20 cm long. The oblong leaves are pinnate and deeply divided into one to six segments, the terminal segment often with three lobes. The inflorescence is also sparsely hairy and is comprised of five blue petals. Seed capsules are 4-6 mm in diameter, rounded, and contain four seeds. Habitat includes rich floodplain and terrace and ravine forests and mesic upland woods. Flowering typically occurs from late March to April with fruits present in May.

D. Methodology

The survey entailed both background research and field investigations. The objective of the survey was to assess the presence or absence of suitable habitat for the subject species within the study area and to attempt to locate those target species possibly visible during the time of the survey. Background research included review of standard botanical references to determine identifying and habitat characteristics of targeted species. References used included Brown and Brown (1984), Gleason and Cronquist (1991), Holmgren (1998), and Weakley et al. (2012).

Two qualified observers traversed the study area described above looking for the presence of suitable habitat for the target species. The observers also searched for evidence of the six target species, though the buttercup scorpionweed may have already senesced by the time of the survey and the horse-tail paspalum is a late summer species. Survey time was recorded in fifteen-minute increments. For any confirmed element occurrences, population limits were surveyed using a handheld Global Positioning System (GPS). GPS survey locations were recorded around the perimeter of each population cluster, and the numbers of individual plants of the identified targeted species were counted or estimated for each population encountered.

E. Results

The field investigation was conducted on June 25 and July 10, 2019. The total time of the field survey was 9 hours. None of the targeted RTE plant species were found during the field survey. Suitable habitat for some of the RTE plant species was observed within the study area and are depicted on **Figure 2, Photo Location & Suitable Habitat Area Map**. The following is a brief description of the suitable habitat areas identified during the field survey.

Upland Terrace Forest

Mesic upland terrace forest habitat was present throughout much of the study area. This habitat lies along the proposed access areas abutting the C & O Canal Towpath and along the eastern and western sides of the American Legion Bridge. While DNR-WHS identified this habitat as being suitable to support the climbing milkweed and buttercup scorpionweed, most of the upland terrace forest habitat within the study area was comprised of a dense invasive groundcover, vine, and shrub layer that degrades the habitat sufficiently to render it unsuitable for these species. Common invasive shrub, vine, and understory plants included bush honeysuckle (*Lonicera* sp.), Asian bittersweet (*Celastrus orbiculatus*), Japanese stilt grass (*Microstegium vimineum*) and ground ivy (*Glechoma hederacea*).

One small area of upland terrace forest south of the C & O Canal Towpath east of I-495 and a larger area just west of the American Legion Bridge had a sparse native understory and mature canopy layer and was identified as being suitable habitat for the two RTE plants (**Figure 2**). Common canopy trees within the suitable habitat area along the C & O Canal Towpath included white oak (*Quercus alba*) and common hackberry (*Celtis occidentalis*). Common canopy trees within the other suitable habitat area included American sycamore (*Platanus occidentalis*), pignut hickory (*Carya glabra*), and tuliptree (*Liriodendron tulipifera*). Common saplings and shrubs within both habitat areas included common pawpaw (*Asimina triloba*). Common groundcover plants within the habitat adjacent to the C & O Canal Towpath included partridge-berry (*Mitchella repens*). Common groundcover plants within the area west of the American Legion Bridge

included Pennsylvania sedge (*Carex pensylvanica*) and kidney-leaf white violet (*Viola renifolia*). Invasive groundcover was absent within the smaller habitat area adjacent to the C & O Canal Towpath. Invasive groundcover comprised about 25 percent of the habitat west of the American Legion Bridge. Invasive species present included Japanese stilt grass, Asian bittersweet, and garlic-mustard (*Alliaria petiolate*).

Bedrock Scour Bar and Riverside Outcrop Barrens

Small areas of bedrock scour bar habitat were present along the shoreline of the Potomac River beneath the American Legion Bridge and downstream to the edge of the CSB (**Figure 2**). These areas occurred with riverside outcrop barren habitat that was present on large boulders along the shoreline. Most of the scour bar areas were rocky and had very little soil. However, a few areas along the river edge had enough soil for vegetation growth. According to the DNR-WHS, this habitat is suitable for blue wild indigo, tall tickseed, tall dock, and perhaps horse-tail paspalum. Within the CSB, this habitat was observed to support various seedling trees, including ash-leaf maple (*Acer negundo*), silver maple (*Acer saccharinum*), and American sycamore. Few herbaceous plants were observed, the most common being common morning-glory (*Ipomoea purpurea*). Sparse herbaceous vegetation occurred on the riverside outcrop barrens habitat, including sapling American sycamore and sticky goldenrod (*Solidago racemose*). While this area was considered marginally suitable habitat for some of the listed plant species, the apparent higher frequency of flooding in this location makes it less likely to support these species.

F. Conclusions

Field surveys were conducted in late June and early July to assess the potential presence of suitable habitat for six state-listed plant species documented along and adjacent to the Potomac River near the I-495 & I-270 Managed Lanes Study CSB. Based on flowering phenology, a targeted species survey was also completed for four of the six species, including tall dock, climbing milkweed, tall tickseed, and blue wild indigo. Marginally suitable habitat for the climbing milkweed and the buttercup scorpionweed was found within upland terrace forest in two locations within the CSB, one just south of the C & O Canal Towpath and the other just west of the American Legion Bridge. Neither of these species were observed during the field survey. Marginally suitable habitat was also found for tall dock, tall coreopsis, wild blue indigo, and horse-tail paspalum within bedrock scour bar/riverside outcrop barrens habitat, though the scour areas appear to be too frequently disturbed and the outcrop barrens devoid of sufficient soil to support these plants. None of these four species were found during the survey.

The proposed I-495 & I-270 Managed Lanes Study limits of disturbance for Alternatives 8/9/10/13B/13C slightly overlap these marginally suitable habitat areas. However, it is not likely that these areas support any of the listed RTE species, as none were found during the targeted field survey and the habitats along the Potomac River do not exactly match those described for the species. The buttercup scorpionweed is a weak plant that flowers in early spring. It likely would not still be visible during the late June and early July survey period. A followup survey during spring may be necessary to completely rule out the potential presence of this species within the upland terrace forest habitat areas.





MD Map 6-Inch Imagery (2017)









Figure 2
I-495 & I-270 Managed Lanes Study
Rare, Threatened, and Endangered Plant
Habitat Assessment & Targeted Species Survey
Photo Location & Suitable Habitat Area Map

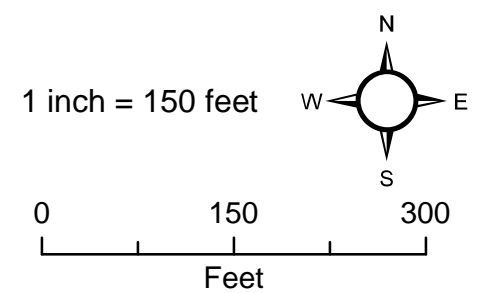
Montgomery County, MD
 July 2019

SUITABLE HABITAT AREA

-  BEDROCK SCOUR BAR & RIVERSIDE OUTCROP BARRENS
-  UPLAND TERRACE FOREST

-  RTE PLANT SURVEY PHOTO POINTS
-  RTE PLANT ASSESSMENT AREA
-  C&O CANAL TOWPATH
-  100-YEAR FLOODPLAIN

-  NHD STREAMS
-  2FT CONTOURS



G. References

- Brown, M. L. and R. G. Brown. 1984. *Herbaceous Plants of Maryland*. Port City Press, Baltimore, Maryland.
- Gleason, H. A. and A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*. The New York Botanical Garden, Bronx, New York.
- Holmgren, N.H. 1998. *The Illustrated Companion to Gleason and Cronquist's Manual*. The New York Botanical Garden, Bronx, New York.
- Weakley, A. S., J. C. Ludwig, and J. F. Townsend. 2012. *Flora of Virginia*. Bland Crowder, ed. Foundation of the Flora of Virginia Project Inc., Richmond. Fort Worth: Botanical Research Institute of Texas Press.

Appendix A

MDNR Correspondence



Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Mark Belton, Secretary
Joanne Throwe, Deputy Secretary

July 17, 2018

MEMO

To: Gwen Gibson, IPR

From: Lori Byrne, WHS

RE: Environmental Review for I-270/I-495 Managed Lane Study - AW073A11 Montgomery & Prince George's Counties

The Wildlife and Heritage Service has determined that there are the following areas of concern in regard to potential impacts to rare, threatened or endangered species, in the study corridor that you have provided:

In the area of the project route crossing of the Potomac River, there are records for these RT&E species occurring within close proximity where they may be directly impacted by this project:

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

Near Sellman Road there is a meadow habitat within a powerline right-of-way that is known to support occurrences of state-listed threatened Sundial Lupine (*Lupinus perennis*) and state-listed endangered Long's Rush (*Juncus longii*). The Lupine occurs in open sandy soils within the powerline corridor and the Long's Rush is found in seepage areas in the same corridor.

Just south of the intersection of Powder Mill Road with I-95, there are wetlands associated with Little Paint Branch that are designated in state regulations as NTWSSCs, and are regulated by MDE, due in part to the presence of these species: Long's Rush, state-listed threatened Long-stalk Greenbrier (*Smilax pseudochina*) and state rare Pink Milkwort (*Polygala incarnata*). Impacts to this wetland should be avoided as much as possible.

Where the project route crosses Little Paint Branch in the area of Cherry Hill, there are records for the state-listed threatened American Brook Lamprey (*Lethenteron appendix*) and the Acuminate Crayfish (*Cambarus acuminatus*), a species with In Need of Conservation status in Maryland. Maintaining good water quality and hydrology is important to these species.

Adjacent to the Greenbelt Metro Station, a stream system associated with Indian Creek supports a population of state-listed endangered Trailing Stitchwort (*Stellaria alsine*). Impacts to the floodplain should be avoided and all appropriate BMPs for sediment and erosion control should be stringently enforced.

On the northeast side of the project route where Indian Creek crosses there are records for state rare Laura's Clubtail (*Stylurus laurae*) and state-listed threatened Selys' Sundragon (*Helocordulia selysii*) occurring downstream in Beaverdam Creek where the wetland is designated as a NTWSSC. These odonate species have an aquatic larval stage that is very susceptible to changes in water quality.

Where the project route overlaps Bald Hill Branch, there are records for these species in close proximity to the project route, downstream in Western Branch. Maintaining good water quality and hydrology is important to these species, especially the fish.

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Arundinaria tecta</i>	Switch Cane	Rare
<i>Lethenteron appendix</i>	American Brook Lamprey	Threatened
<i>Etheostoma vitreum</i>	Glassy Darter	Threatened
<i>Percina notogramma</i>	Stripeback Darter	Endangered

Thank you for the opportunity to review and comment. We look forward to further coordination as project details become available. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

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Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Mark Belton, Secretary
Joanne Throwe, Deputy Secretary

September 11, 2018

MEMO

To: Gwen Gibson, IPR

From: Lori Byrne, WHS

RE: Follow-Up to Environmental Review for I-270/I-495 Managed Lane Study - AW073A11
Montgomery & Prince George's Counties

Regarding the need for RT&E species surveys, please see the additional comments after each section. The Wildlife and Heritage Service has determined that there are the following areas of concern in regard to potential impacts to rare, threatened or endangered species, in the study corridor that you have provided:

In the area of the project route crossing of the Potomac River, there are records for these RT&E species occurring within close proximity where they may be directly impacted by this project. We recommend that surveys for these species be conducted in areas of appropriate habitat that may fall within proposed limits-of-disturbance for this project.

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

Based on a compilation of Maryland records, habitat info and flowering/fruiting info for these species is described as:

Rumex altissimus Polygonaceae (Smartweed Family)

Habitat: Frequently flooded zones along rivers in sandy/gravelly alluvium; also forested wetlands in muck soils.

Flw: May-Jun (July); Fr: Aug.

Paspalum fluitans Poaceae (Grass Family)

Habitat: Floodplain seeps and pools in muck soils; seasonally exposed rocky stream channels.

Flw/Fr: late Aug-Sept (Oct).

Matelea obliqua Apocynaceae (Dogbane Family)

Habitat: Bedrock scour and terrace woodlands in rich alluvium, upland forests, barrens, glades, clearings, and roadsides over limestone or shale substrates.

Flw: Jun-Jul; Fr: Sept.

Baptisia australis Fabaceae (Legume Family)

Habitat: Prairie-like scour bars, depositional bars, rocky alluvial flats.

Flw: May; Fr: late Jun-Aug.

Coreopsis tripteris Asteraceae (Aster Family)

Habitat: Bedrock scour bars and riverside prairies, in rich alluvium.

Flw: Sept; Fr: Sept-Oct.

Phacelia covillei Boraginaceae (Borage Family)

Habitat: Rich floodplain and terrace and ravine forests, mesic upland woods.

Near Sellman Road there is a meadow habitat within a powerline right-of-way that is known to support occurrences of state-listed threatened Sundial Lupine (*Lupinus perennis*) and state-listed endangered Long's Rush (*Juncus longii*). The Lupine occurs in open sandy soils within the powerline corridor and the Long's Rush is found in seepage areas in the same corridor. *If either of these suitable habitats occurs in proposed limits-of-disturbance for this project, we recommend that surveys be conducted for these species. Based on a compilation of Maryland records, habitat info and flowering/fruiting info for these species is described as:*

Lupinus perennis Fabaceae (Legume Family)

Habitat: Dry sandy soils of inland dunes and sand ridge woodlands, sandy powerline meadows, dry rocky slopes and outcrops.

Flw: May-early Jun; Fr: late Jun-early Jul.

Juncus longii Juncaceae (Rush Family)

Habitat: Open-canopied seepage wetlands, roadside seeps, powerlines.

Just south of the intersection of Powder Mill Road with I-95, there are wetlands associated with Little Paint Branch that are designated in state regulations as NTWSSCs, and are regulated by MDE, due in part to the presence of these species: Long's Rush, state-listed threatened Long-stalk Greenbrier (*Smilax pseudochina*) and state rare Pink Milkwort (*Polygala incarnata*). Impacts to this wetland should be avoided as much as possible. *If impacts to this NTWSSC are unavoidable, we may ask for the extent of these populations to be delineated so that impacts can be evaluated.*

Where the project route crosses Little Paint Branch in the area of Cherry Hill, there are records for the state-listed threatened American Brook Lamprey (*Lethenteron appendix*) and the Acuminate Crayfish (*Cambarus acuminatus*), a species with In Need of Conservation status in Maryland. Maintaining good water quality and hydrology is important to these species. *We would not recommend surveys for these aquatic species, but instead would want to emphasize the need for stringent sediment and erosion control during all work in this area.*

Adjacent to the Greenbelt Metro Station, a stream system associated with Indian Creek supports a population of state-listed endangered Trailing Stitchwort (*Stellaria alsine*). Impacts to the floodplain should be avoided and all appropriate BMPs for sediment and erosion control should be stringently enforced. *Recent surveys have indicated that this population still exists within the braided stream floodplain to the southwest of I-95/495, therefore we would not recommend more surveys, but instead would want to emphasize the need for stringent sediment and erosion control during all work in this area.*

On the northeast side of the project route where Indian Creek crosses there are records for state rare Laura's Clubtail (*Stylurus laurae*) and state-listed threatened Selys' Sundragon (*Helocordulia selysii*) occurring downstream in Beaverdam Creek where the wetland is designated as a NTWSSC. These odonate species have an aquatic larval stage that is very susceptible to changes in water quality. *We would not recommend surveys for these aquatic species, but would want to emphasize the need for stringent sediment and erosion control during all work in this area.*

Where the project route overlaps Bald Hill Branch, there are records for these species in close proximity to the project route, downstream in Western Branch. Maintaining good water quality and hydrology is important to these species. *We would not recommend surveys for these aquatic species, but would want to emphasize the need for stringent sediment and erosion control during all work in this area.*

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Arundinaria tecta</i>	Switch Cane	Rare
<i>Lethenteron appendix</i>	American Brook Lamprey	Threatened
<i>Etheostoma vitreum</i>	Glassy Darter	Threatened
<i>Percina notogramma</i>	Stripeback Darter	Endangered

Thank you for the opportunity to review and comment. We look forward to further coordination as project details become available. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

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Cc: K. McCarthy, DNR

Appendix B

Photographs

Attachment B: Photograph Log
I-495 & I-270 Managed Lanes Study
Rare Threatened, and Endangered Plant Survey



Photo 1: Looking east at forested habitat area with relatively sparse native groundcover & fewer invasive plants



Photo 2: Looking east at disturbed forested habitat area with dense invasive groundcover



Photo 3: Looking east at disturbed forested habitat area with dense invasive groundcover



Photo 4: Looking northwest at emergent wetland habitat area dominated by invasive reed canary grass



Photo 5: Looking east at rocky scour bar habitat area along Potomac River shoreline



Photo 6: Looking southwest at rocky scour bar habitat along Potomac River shoreline



Photo 7: Looking south at hilltop rocky habitat area with sparse native groundcover



Photo 8: Looking southwest at top of bank of Rock Run Culvert forested habitat area with dense invasive groundcover



Photo 9: Looking south at forested habitat area with dense invasive shrub and groundcover layers

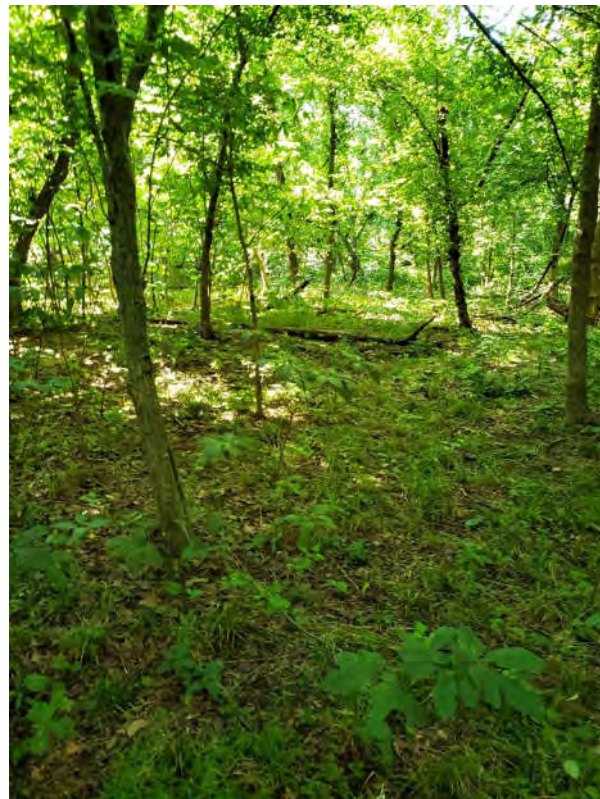


Photo 10. Looking southeast at suitable mesic upland terrace forest

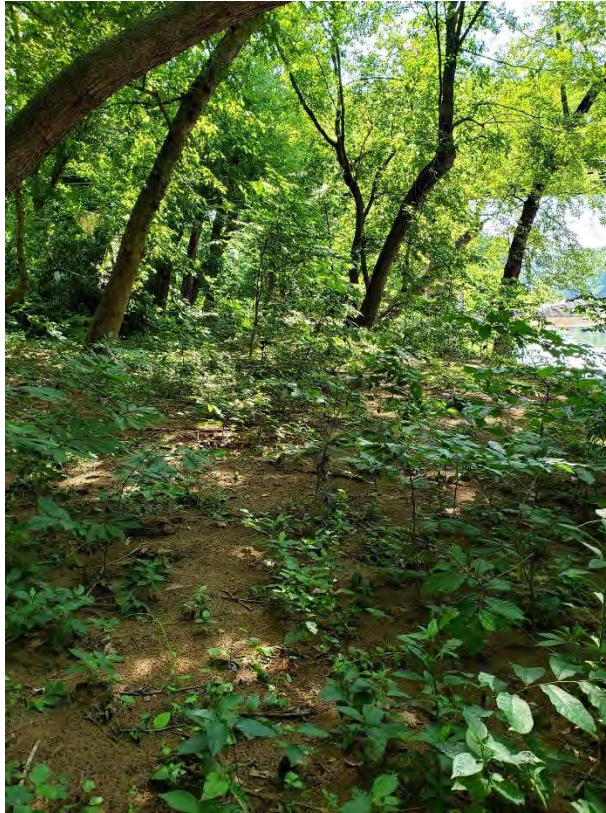


Photo 11. Looking east at Potomac River floodplain habitat

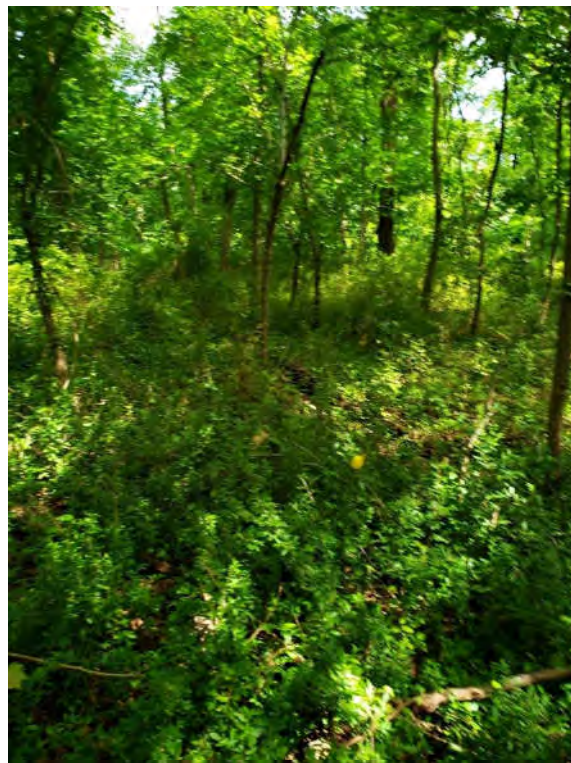


Photo 12. Looking northwest at forested habitat with dense invasive groundcover and shrub layer

Rare, Threatened, and Endangered Plant Survey Report

I-495 & I-270 Managed Lanes Study Montgomery and Prince George's Counties, Maryland & Fairfax County, Virginia

Prepared for:

Maryland Department of Transportation State Highway Administration

Under Contract to:

Rummel Klepper & Kahl



November 2020

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TABLE OF CONTENTS

Introduction.....	1
Site Description.....	4
Methodology.....	11
Results.....	11
Conclusions.....	17
References.....	19

LIST OF TABLES

Table 1. RTE plant species targeted for survey within the Potomac River Gorge portion of the I-495 & I-270 MLS.....	5
Table 2. RTE plant species targeted survey effort.	11

LIST OF FIGURES

Figure 1 . Corridor Study Boundary and Limits of Disturbance	2
Figure 2. Rare, Threatened, and Endangered Plant Survey Limits.....	10
Figure 3. Rare, Threatened, and Endangered Plant Species Maps	13

APPENDICES

Appendix A – Agency Correspondence

Appendix B – RTE Plant Species Descriptions

Appendix C – Photographs

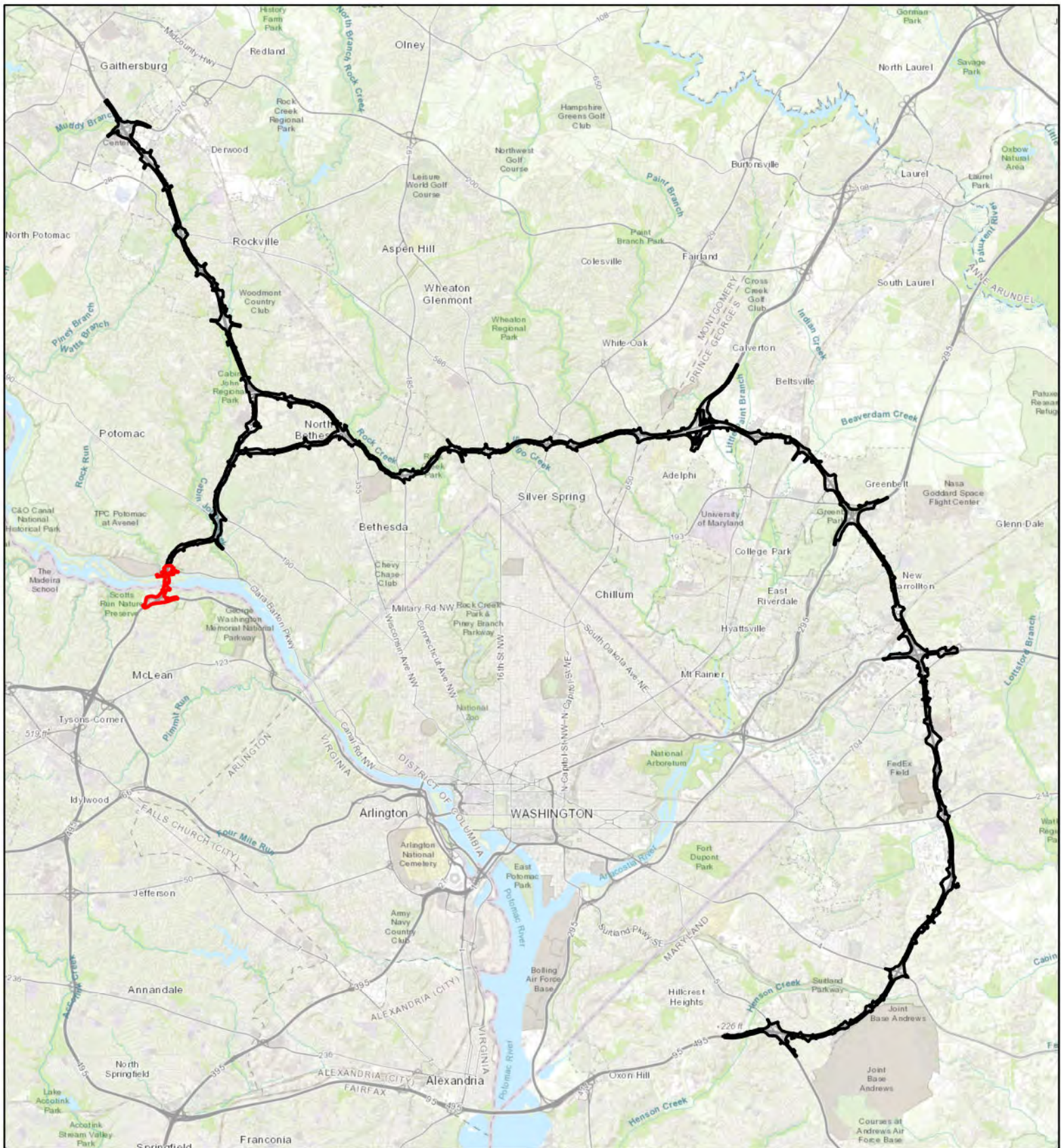
Introduction

The Maryland Department of Transportation State Highway Administration (MDOT SHA) and Federal Highway Administration (FHWA) have initiated a highway improvements study of the I-495 and I-270 corridors. This study, referred to as the I-495 & I-270 Managed Lanes Study (MLS), is evaluating potential transportation improvements to portions of the I-495 and I-270 corridors in Montgomery and Prince George's Counties, Maryland, and Fairfax County, Virginia. As part of the initial environmental review process for the MLS, coordination was initiated in 2018 with state and federal regulatory agencies regarding the potential presence of listed rare, threatened, or endangered (RTE) species within the corridor study boundary (CSB). The CSB is shown in **Figure 1 – Corridor Study Boundary and Limits of Disturbance**.

The Maryland Department of Natural Resources (MDNR) sent a response letter in July of 2018 with a list of RTE species potentially affected by the proposed project. In a follow-up meeting with the MDNR in mid-September 2018, the MDNR indicated that the greatest area of concern with respect to potential impacts to RTE plants was where the CSB crosses the Potomac River Gorge. The MDNR provided a list of six threatened or endangered plant species for which they recommended conducting targeted surveys within suitable habitat within the project limits of disturbance (LOD). The MDNR correspondence is included in **Appendix A**. The six species included the following:

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status (MD)</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

Permission from the National Park Service (NPS) to access the Chesapeake and Ohio Canal (CHOH) Unit of the Potomac River Gorge within the CSB was granted in July 2019 and a habitat assessment and targeted species survey was completed for these species. Because of the mid-summertime period of the survey, one species, Buttercup Scorpion-weed (*Phacelia covillei*) could not be surveyed, as it is an early season plant that does not persist beyond the spring. However, the presence of potential habitat for this species was noted during the mid-summer habitat assessment and targeted species surveys. The results of this survey indicated that suitable habitat does exist within the CSB for all six species. However, targeted surveys within the appropriate flowering times and habitat of all the species, except buttercup scorpion-weed as mentioned above, did not result in the identification of populations of these plants within the CSB. The project team provided these results to the MDNR in a July 2019 summary report. The project team also agreed to conduct follow-up surveys within suitable habitat for the buttercup scorpion-weed during spring 2020. The MDOT SHA provided the NPS with a copy of the targeted Potomac River Gorge plant species report in the early fall of 2019 (MDOT SHA 2019).



Rare, Threatened, & Endangered Plant Species Targeted Survey I-495/I-270 Managed Lanes Study

Figure 1. Corridor Study Boundary
and Limits of Disturbance

Montgomery County, MD; Fairfax County, VA
November 2020



RTE Plant Survey Limit
 Corridor Study Boundary

0 3 6
miles

After reviewing the report, the NPS sent the MDOT SHA an email dated November 12, 2019 expressing concern that the MDNR RTE list did not accurately reflect the potential threat to plant species of conservation concern within the project LOD. The NPS noted that their agency maintains a list of RTE species beyond what the MDNR does. In that email, the NPS listed 15 species of RTE plants with a state status or rank previously documented to occur on CHOH lands within the MLS LOD, including three that were already on the MDNR list. A copy of the email is included in **Appendix A**. The list included the following:

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status/Rank¹</u>
<i>Arabis patens</i>	Spreading Eared Rockcress	S3
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened/S2
<i>Clematis viorna</i>	Vasevine	S3
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered/S1
<i>Erigenia bulbosa</i>	Harbinger-of-Spring	S3
<i>Galactia volubilis</i>	Downy Milk-Pea	S3
<i>Helianthus occidentalis</i>	Few-Leaf Sunflower	Endangered/S1
<i>Hibiscus laevis</i>	Halberd-Leaf Rose-Mallow	S3
<i>Hybanthus concolor</i>	Eastern Green-Violet	S3
<i>Lipocarpha micrantha</i>	Small-Flower Halfchaff Sedge	Endangered/S1
<i>Monarda clinopodia</i>	White Bergamot	S3S4
<i>Phacelia covillei</i>	Buttercup Scorpion-Weed	Endangered/S2
<i>Phaseolus polystachios</i>	Thicket Bean	S3
<i>Polygala polygama</i>	Racemed Milkwort	Threatened/S1
<i>Sida hermaphrodita</i>	Virginia Fanpetals	Endangered/S1

¹State Rank: S1=Critically Imperiled/Highly State Rare, S2=Imperiled/State Rare, S3=Vulnerable/Watchlist, S4=Apparently Secure

Additionally, the NPS referenced many more RTE species that are known to occur nearby or with location uncertain that could be present within the MLS LOD within suitable habitat. They suggested that surveys be done for these 15 plant species when going back to look for buttercup scorpion-weed in 2020. The Virginia Department of Conservation and Recreation (VDCR) notified the MDOT SHA of three additional plant species of concern known to occur on NPS lands of the George Washington Memorial Parkway (GWMP) Unit within the Virginia portion of the Potomac River Gorge. The VDCR correspondence is included in **Appendix A**. These three included:

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status/Rank (VA)¹</u>
<i>Arabis shortii</i>	Short's Rockcress	S1
<i>Maianthemum stellatum</i>	Starry False Solomon's-Seal	S1S2
<i>Silene nivea</i>	Snowy Catchfly	S1

¹State Rank: S1=Critically Imperiled/Highly State Rare, S2=Imperiled/State Rare

In preparation for conducting the follow-up targeted plant surveys during the 2020 growing season, the MDOT SHA submitted a request to the NPS for research permits to authorize the work and allow access to NPS lands within the GWMP Unit and CHOH Unit. During this permitting process,

the NPS provided feedback by email on the list of targeted plant species. For the CHOH Unit in Maryland, the NPS requested that, in addition to the original list of 15 RTE plant species, another 52 species that have been documented within 500 meters of the current I-495 centerline be added to the survey list. For the GWMP Unit in Virginia, the NPS requested that an additional 15 plant species known from nearby Turkey Run and Potomac Heritage Trail be added to the survey list. A copy of the email is included in **Appendix A**. A conference call with the NPS to discuss the expanded plant list was convened on March 27, 2020. Following the call, MDOT SHA agreed to add the additional species to the survey protocol, but that focused surveys would only cover those species that were state listed threatened or endangered. An exception was made for one species, *Boechnera dentata*, that has a state rank in Virginia and Maryland of rare. This species was included on the VDCR list of RTE plants for which MDOT SHA had already agreed to survey. All other species with a state rank of rare would be noted in the field if encountered but would not be specifically targeted. Therefore, this report updates the original survey protocol to include targeted field surveys for the original 15 species, *Boechnera dentata*, plus an additional 25 species that are state listed endangered or threatened. **Table 1** presents the expanded list of 41 potential RTE plants, their rank and status within each state, suitable habitat, recommended survey season, and known localities where previously, if available. Detailed descriptions of each of the 41 targeted species are included in **Appendix B**.

Site Description

The limits of the RTE plant species targeted survey were restricted to the LOD of the I-495 & I-270 MLS within the Potomac River Gorge adjacent to the American Legion Bridge (ALB) (**Figure 2, RTE Plant Survey Limits**). This survey area includes the forested habitat on terraces and slopes above the Potomac River floodplain out to the I-495/George Washington Memorial Parkway interchange on the Virginia side and out to the Clara Barton Parkway on the Maryland side. The survey area also includes the forested Potomac River floodplain itself and the rocky shoreline of the Potomac River in both Maryland and Virginia.

Land use classifications within and adjacent to this portion of the survey area include national parkland, residential, forest, transportation, and wetlands. The survey area occurs within the Potomac River MDE 8-digit watershed, along the fall line between the Atlantic Coastal Plain and Piedmont physiographic provinces. Within this survey area, several terrace levels occur above the Potomac River, rising to over 100 feet in elevation. The survey area includes a portion of Plimmers Island south of the ALB and a small channel known as Rock Run Culvert. Exposed bedrock occurs on Plimmers Island in Maryland. Large boulders occur along the shoreline on both sides of the river. A large north facing rock outcrop occurs on the eastern side of I-495 in Virginia.

Table 1. RTE plant species targeted for survey within the Potomac River Gorge portion of the I-495 & I-270 MLS

<i>Scientific Name</i>	Common Name	Rank/Status¹	State	Flowering/Fruiting	Habitat	Survey Period	Documented Location
<i>Arabis patens</i>	Spreading Rockcress	S3G3/ S1G3	MD/VA	Apr-May	Crevice/thin soils on outcrops/River floodplain forest	Early May	Turkey Run Park
<i>Astragalus canadensis</i>	Canadian Milk-Vetch	S1G5 Endangered	MD	Flw: Jul; Fr: late Jul-Aug	Scoured bedrock terraces, rocky dry woodlands	Jul	Unknown
<i>Baptisia australis</i>	Blue Wild Indigo	S2G5 Threatened	MD	May-Jun	Flood scoured rocky/gravelly bars/outcrops along rivers	May	Unknown
<i>Boechera dentata</i>	Short's Rockcress	S3G5/ S1G5	MD/VA	Mar-Jun	Rich, well-drained floodplain and river bluff forests	Late Mar- Early Apr	Unknown
<i>Bromus latiglumis</i>	Early-leaf Brome	S1G5 Endangered	MD	Flw/Fr: late Aug-mid Sep	Floodplain forests and river bluffs, often over calcareous (limestone, shale, shell-marl?) substrates.	Sep	Unknown
<i>Carex careyana</i>	Carey's Sedge	S1G4G5 Endangered/ S3G4G5	MD/VA	Flw/Fr: late Apr-May (Jun)	Rich upland or floodplain woods, often over limestone	May	Turkey Run & Great Falls Parks
<i>Carex hitchcockiana</i>	Hitchcock's Sedge	S1G5 Endangered	MD	Flw/Fr: (late Apr)/May-early Jun	Upland forests over calcareous substrates (limestone, shell-marl), less commonly in rich alluvium	May	Unknown
<i>Clematis viorna</i>	Vasevine	S3G5	MD	May-Jun	Rocky forests/Outcrops/Rocky River Shores-Calciphile	Jul	Unknown
<i>Corallorhiza wisteriana</i>	Spring Coralroot	S1G5 Endangered	MD	Flw: late Apr-early May: Fr: Jun.	Descriptions tend to the general, e.g., "rich woods" corresponding on occasion to basic mesic forests over limestone or coastal shell-marl deposits	May	Unknown

<i>Scientific Name</i>	Common Name	Rank/ Status¹	State	Flowering/ Fruiting	Habitat	Survey Period	Documented Location
<i>Coreopsis tripteris</i>	Tall Tickseed	S1G5 Endangered	MD	Aug-Sep	Riverside prairie/Outcrops-Calciphile	Sep	Unknown
<i>Cuscuta polygonorum</i>	Smartweed Dodder	S1G5 Endangered/ S1G5	MD/ VA	Jul-Sep	Riverine marsh, oxbows.	Sep	Unknown
<i>Diplazium pycnocarpon</i>	Glade Fern	S2G5 Threatened	MD	Aug-Sep	Rich, mesic ravines (shell-marl), steep rocky “seepy” slopes in mesic mixed forests, often over mafic substrates.	Sep	Unknown
<i>Erigenia bulbosa</i>	Harbinger-of-Spring	S3G5/ S3G5	MD/ VA	Feb-May	Floodplain and mesic slope forests	Late Mar- Early Apr	Great Falls and Turkey Run Parks
<i>Erythronium albidum</i>	Small White Fawn-Lily	S2G5 Threatened/ S2G5	MD/ VA	Flw: late Mar-late Apr: Fr: May	Mature floodplain terrace forests in rich alluvium.	Apr	Turkey Run, Great Falls, & Theodore Roosevelt Island
<i>Galactia volubilis</i>	Downy Milk-Pea	S5G3	MD	Jul-Aug	Dry woodlands, barrens, and clearings	Early-Mid Jul	Unknown
<i>Gentiana villosa</i>	Striped Gentian	S1G4 Endangered	MD	Flw: Sep; Fr: Oct-Nov	Dry, sandy edges of pine forests, dry forest over serpentine. Plants often along rights-of-way.	Sep	Unknown
<i>Geum aleppicum</i>	Yellow Avens	S1G5 Endangered/ SHG5	MD/ VA	Flw: summer	High elevation seepage swamps. Floodplain forests, and mesic or alluvial shaded clearings. Rare, n. mountains and n. Piedmont; no specimens have been collected in Virginia since 1945.	Jul	Unknown

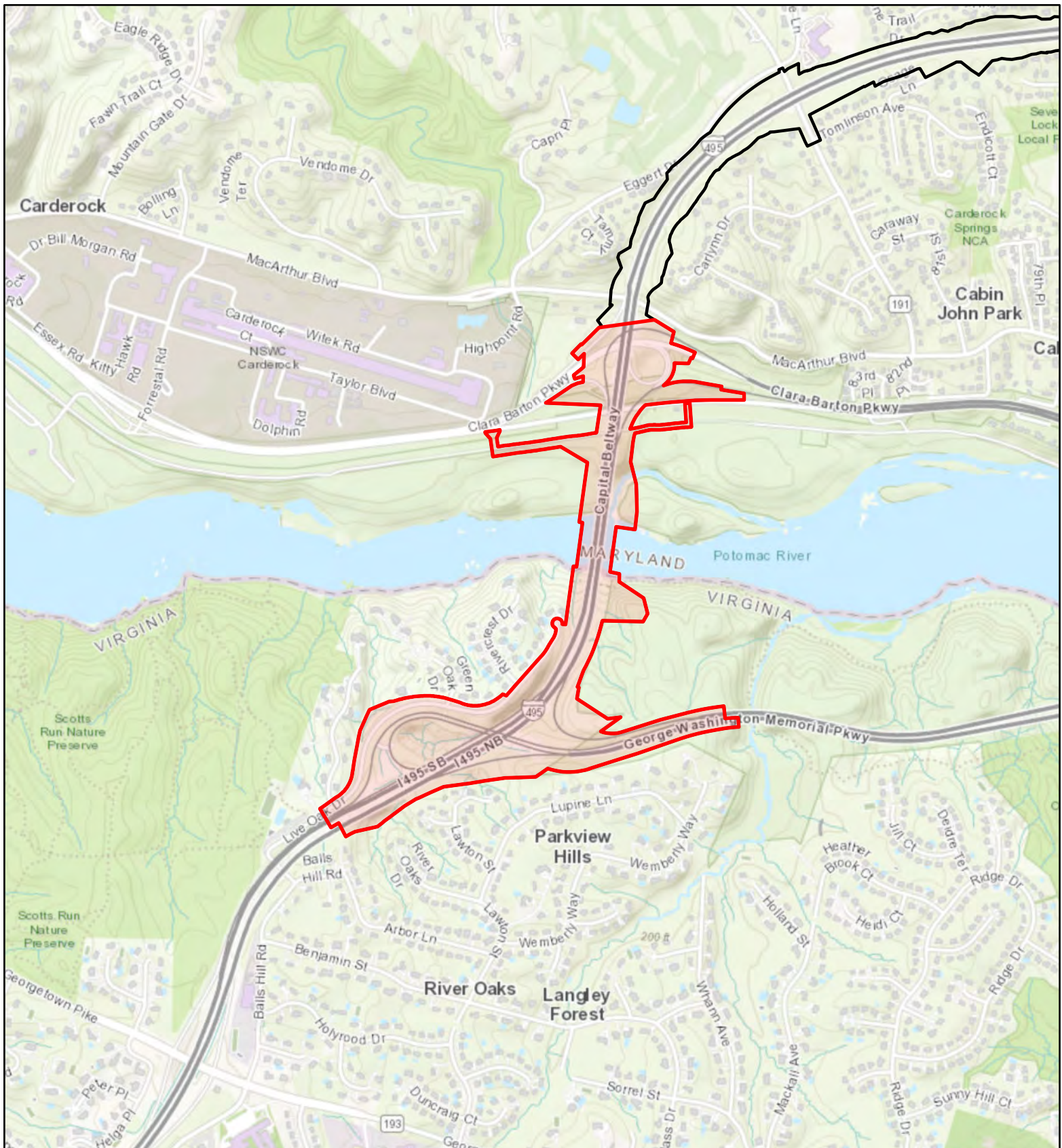
<i>Scientific Name</i>	Common Name	Rank/ Status¹	State	Flowering/ Fruiting	Habitat	Survey Period	Documented Location
<i>Helianthus occidentalis</i>	Few-leaf Sunflower	S1G5 Threatened/ S1G5T5	MD/ VA	Aug-Oct	Riverside prairies/Outcrops	Sep	Unknown
<i>Hibiscus laevis</i>	Halberd-leaf Rose-Mallow	S3G5	MD	July-Sep	Depositional bars, river shores, canals, ditches, ponds	Early-Mid Jul	Unknown
<i>Hybanthus concolor</i>	Eastern Green-Violet	S3G5	MD	May-Jun	Mesic slope forests, dry rocky forests-Calciophile	May	Unknown
<i>Iresine rhizomatosa</i>	Juda's-Bush	S1 G5 Endangered	MD	Aug-Sep/ Sep-Dec	Deep pockets of alluvial silt and sand along flood channels and riverbanks	Sep	Potomac Gorge
<i>Lipocarpa micrantha</i>	Small-flower Halfchaff Sedge	S1G5 Endangered/ S2G5	MD/ VA	Aug-Oct	Seasonally exposed shores and bars on large rivers; riparian shorelines in muddy/sandy soils exposed during low-flow periods	Sep	Montgomery County
<i>Maianthemum stellatum</i>	Starry False Solomon's-Seal	S1S2 Endangered/ S2G5	MD/ VA	Apr-Sep	Riverside sand and rock bars, rich floodplain forests, seepage swamps	Late Mar- Early Apr	Turkey Run & Great Falls Parks
<i>Matelea obliqua</i>	Climbing Milkweed	S1/S2 G4? Endangered	MD	Jun- Jul/Sep	Bedrock scour and terrace woodlands in rich alluvium, upland forests, barrens, glades, clearings, and roadsides over limestone or shale substrates	Jul	Montgomery County
<i>Mecardonia acuminata</i>	Axil-Flower	S2G5 Endangered	MD	Late Aug- Early Sep	Roadsides, sandpits, utility rights-of-way, rocky pools and seeps	Sep	Unknown
<i>Monarda clinopodia</i>	White Bergamot	S3S4G5	MD	Jun-Jul	Rich alluvial soils of streams and rivers	Early-Mid Jul	Potomac River
<i>Paspalum fluitans</i>	Horse-tail Paspalum	S2G5 Endangered	MD	Late Aug- Sep	Floodplain seeps/pools in muck soils; seasonally exposed rocky stream channels	Sep	Unknown

<i>Scientific Name</i>	Common Name	Rank/ Status¹	State	Flowering/ Fruiting	Habitat	Survey Period	Documented Location
<i>Phacelia covillei</i>	Buttercup Scorpion-Weed	S2 Endangered/ S1	MD/ VA	Apr-May	Rich, well-drained floodplain and adjacent slope forests	Late Mar- Early Apr	Clara Barton and Turkey Run Parks
<i>Phaseolus polystachios</i>	Thicket Bean	S3G5	MD	Jul-Sep	Rocky ravines, scoured bedrock terrace forests, forest edges and hedgerows	Early-Mid Jul	Unknown
<i>Polygala polygama</i>	Racemed Milkwort	S1G5 Threatened	MD	Jun-Jul	Dry, rocky or gravelly barrens, bedrock scour bars and woodlands	Late May	Montgomery County
<i>Potamogeton foliosus</i>	Leafy Pondweed	S2G5 Endangered	MD	Jul-Oct	Ponds and coastal streams in tidal and nontidal reaches	Sep	Unknown
<i>Pycnanthemum verticillatum</i>	Whorled Mountain-Mint	S1G5 Endangered	MD	Late Jun-Jul	Circumneutral seepage wetlands, dry to mesic calcareous meadows and glades	Jul	Unknown
<i>Rumex altissimus</i>	Tall Dock	S1G5 Endangered	MD	May-Jun	Frequently flooded zones along rivers in sandy/gravelly alluvium; also forested wetlands in muck soils	May	Unknown
<i>Sagittaria rigida</i>	Sessile-fruit Arrowhead	S1G5 Endangered/ S1G5	MD/ VA	Jul-Sep	Delmarva Bays; spring-fed seepage ponds in the mountains; historical habitats may have included vernal pools in the Piedmont and Ridge and Valley	Sep	Unknown
<i>Salix exigua</i>	Sandbar Willow	S1G5 Endangered/ S1G5TNR	MD/ VA	Feb-Jun	Rocky scour bars and scrub-woodlands along the Potomac River	Apr-Oct	Potomac River
<i>Senecio suaveolens</i>	False Indian-Plantain	S1G4 Endangered/ S2G4	MD/ VA	Flw: Aug; Fr: Sep-Oct	A variety of open to lightly-shaded habitats along river banks, light-gaps on the floodplain, side channels and pond and pool margins.	Sep	Turkey Run & Great Falls Park

<i>Scientific Name</i>	Common Name	Rank/ Status¹	State	Flowering/ Fruiting	Habitat	Survey Period	Documented Location
<i>Sida hermaphrodita</i>	Virginia Fanpetals	S1G3 Endangered/ S1G3	MD/ VA	Jul-Oct	Frequently scoured gravel bars and river island shorelines	Early-Mid Jul	Potomac River shore near Spout Run
<i>Silene nivea</i>	Snowy Catchfly	S1G4? Endangered/ S1G4?	MD/ VA	May-Aug	Mature floodplain and terrace forests over rich alluvial soils	Late May	Unknown
<i>Solidago racemosa</i>	Rand's Goldenrod	S1G3T3 Threatened/ S1G3?	MD/ VA	Early-Mid Jun	Cliff faces and crevices with shell deposits; riverside woodlands, prairies, outcrops, and rocky bars	Jul	Turkey Run Park and Gulf Branch
<i>Triphora trianthophoros</i>	Threebirds	S1G3G4 Endangered/ S1G3G4T3T4	MD/ VA	Mid-Late Aug-Early Sep	Rich, humid hardwood forests	Sep	Presumed extirpated from the Gold Mine Tract, Great Falls
<i>Valeriana pauciflora</i>	Large-flower Valerian	S1G4 Endangered/ S1G4	MD/ VA	Late Apr-Mid May	Rich alluvial soils of mature mesic mixed or bottomland hardwood forests	May	Turkey Run & Great Falls Parks

Source: Townsend 2019, MDNR 2019, Weakley 2012, Brown and Brown 1984

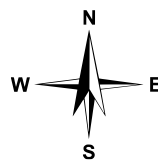
¹State Rank: S1=Critically Imperiled/Highly State Rare; S2=Imperiled/State Rare; S3=Vulnerable/Watchlist; T=Subspecies/Variety Ranked Differently than Species
Global Rank: G3=Vulnerable; G4=Apparently Secure; G5=Secure; ?=Inexact Numeric Rank; NR=Not Ranked



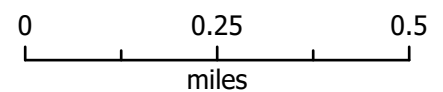
Rare, Threatened, & Endangered Plant Species Targeted Survey I-495/I-270 Managed Lanes Study

Figure 2. RTE Plant Survey Limits

Montgomery County, MD; Fairfax County, VA
October 2020



- RTE Plant Survey Limit
- Corridor Study Boundary



Methodology

The targeted plant survey entailed both background research and field investigations. The objective of the survey was to attempt to locate the target plant species within the season that each species would likely be most visible. Background research included review of various botanical references to determine identifying and habitat characteristics of target species. References used included Brown and Brown (1984), MDNR (2019), and Weakley et al. (2012). Research permits were also obtained from the NPS, one for the CHOH Unit and one for the GWMP Unit, prior to conducting the field surveys. A copy of each permit is included in **Appendix A**.

The 41 species were divided into four survey periods based on peak flowering and fruiting times for each species, when they would be most easily observed and identified. During each survey period, three to four permitted observers traversed the survey area described above looking for the presence of suitable habitat for the target species. Within any habitats identified as potentially suitable, the observers walked parallel transects to search for evidence of the target species. For any confirmed element occurrences, population limits were surveyed using a handheld Global Positioning System (GPS). GPS survey locations were recorded around the perimeter of each population cluster, and the numbers of individual plants of the identified targeted species were counted or estimated for each population encountered. General notes were also recorded on the habitat and common plant associates of any found RTE plant species. Representative photographs were taken of each targeted species and the microhabitat areas where they were found.

Results

The four targeted survey periods referenced above were early April, late May, mid-July, and mid-September. **Table 2** summarizes the survey effort for each targeted survey date within each NPS park unit.

Table 2. RTE plant species targeted survey effort.

NPS Unit	Date	No. Surveyors	Survey Effort (Hr.)
CHOH	2 April 2020	3	8
	19 May 2020	3	8.25
	15 July 2020	4	7.5
	23 July 2020	3	2
	14 September 2020	4	7.5
GWMP	9 April 2020	3	7.5
	27 May 2020	3	8
	23 July 2020	3	2
	16 September 2020	3	3

Habitats surveyed for RTE plants within both NPS units of the Potomac River Gorge included upland terrace forest (mesic forest above the active floodplain; does not flood annually), floodplain forest (floods annually), and bedrock scour bar and riverside outcrop barrens. Within the CHOH Unit in Maryland, this included the entire survey area during each survey visit. Within the GWMP Unit in Virginia, this included the entire survey area out to the southern limit for the April and May surveys, but only included the Potomac shoreline, floodplain, and lower terraces of mesic forest and outcrops during the July and September surveys. The reduced survey area later in the

season resulted from the narrower suitable habitat requirements of the later season targeted RTE plant species in Virginia. These plants were typically associated with scour bars, river floodplains and lower mesic forested habitat.

Seven (7) of the 41 RTE plant species listed in **Table 1** were observed within the Maryland portion of the survey area during the targeted surveys, including:

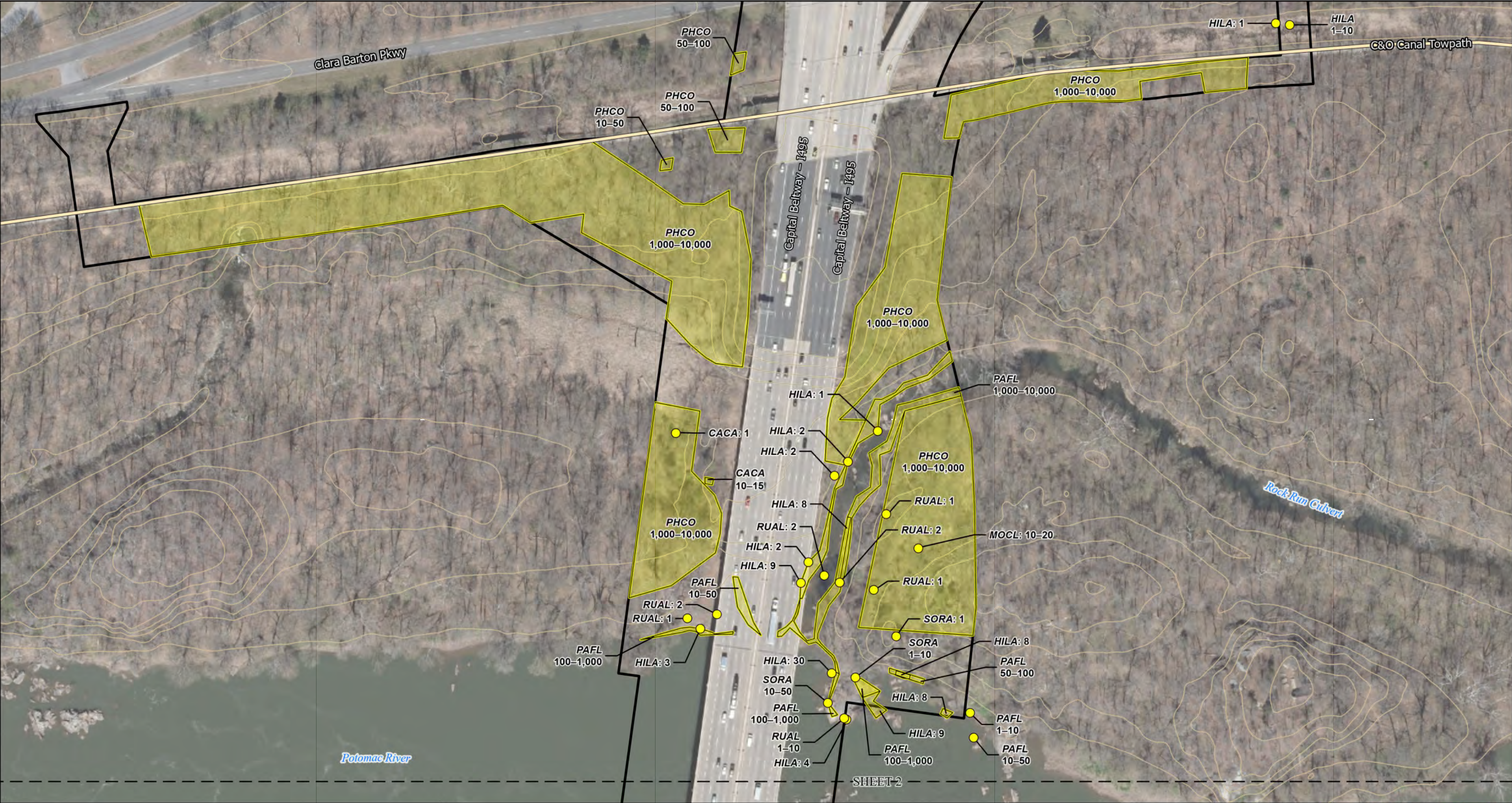
- Buttercup Scorpion-Weed
- Carey's Sedge
- Tall Dock
- Halberd-leaf Rose-Mallow
- White Bergamot
- Rand's Goldenrod
- Horse-tail Paspalum

In the Virginia portion of the survey area, two (2) of the 41 plant species listed in **Table 1** were observed, buttercup scorpion-weed and Carey's sedge. Information about each of the species found within or immediately adjacent to the study area and a brief description of their corresponding habitat and associate plant species is discussed below. The descriptions are separated by NPS park unit for clarity. Map sheets depicting the locations of the RTE species are included in **Figure 3**. Photographs of each species and species habitat are included in **Appendix C**.

CHOH Unit (Maryland)

Several RTE plant species were found throughout the Maryland portion of the survey area (**Figure 3**) within the Chesapeake & Ohio Canal, on mesic upland terraces above the Potomac River, along the active floodplain of the river, and on scour bars and boulders within the river.

Buttercup Scorpion-Weed (*Phacelia covillei* Watson ex A. Gray) – Likely tens of thousands of individuals of this state-endangered plant were found during the April 2nd and May 19th field surveys within the project LOD in Maryland. As shown in **Figure 3**, plants were found extensively throughout the upland terraces on mesic forested slopes from the C&O Canal to just above the active floodplain of the Potomac River. One small patch of 10 to 50 individuals was also found between the C&O Canal and Clara Barton Parkway west of I-495. Some plants were even growing on the interstate embankment up to within a few feet of pavement on both the east- and west-facing sides. The largest patches of buttercup scorpion-weed were growing where the groundcover was not otherwise too dense with other native and non-native plant species. Common groundcover associates growing with buttercup scorpion-weed included garlic-mustard (*Alliaria petiolata*), corn speedwell (*Veronica arvensis*), groundivy (*Glechoma hederacea*), sticky-willy (*Galium aparine*), white avens (*Geum canadense*), Japanese honeysuckle (*Lonicera japonica*) and wine raspberry (*Rubus phoenicolasius*). The shrub/sapling layer was dominated by rambler rose (*Rosa multiflora*), northern spicebush (*Lindera benzoin*), common pawpaw (*Asimina triloba*), and amur honeysuckle (*L. maackii*). The canopy was comprised of American sycamore (*Platanus occidentalis*), tuliptree (*Liriodendron tulipifera*), and pignut hickory (*Carya glabra*) at a density of 95 percent. Photographs 1-2 in **Appendix C** depict this species, as well as its associated microhabitat.



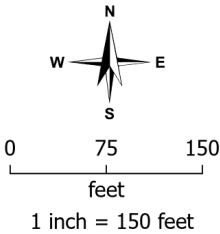
**Rare, Threatened, & Endangered
Plant Species Targeted Survey
I-495/I-270 Managed Lanes Study**

Figure 3.
Rare, Threatened, and Endangered Species Maps
Sheet 1 of 2
Montgomery County, MD
October 2020

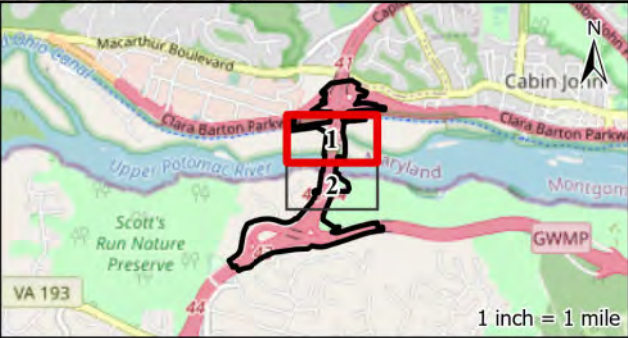
- RTE Survey Boundary
- Sheet Boundary
- 10' Contour
- C&O Canal Towpath
- RTE Species Area*
- RTE Species Point*

*Precise species population counts given when available, otherwise estimated population ranges are provided.

Map Label	Species Name
CACA	<i>Carex careyana</i>
HILA	<i>Hibiscus laevis</i>
MOCL	<i>Monarda clinopodia</i>
PAFL	<i>Paspalum fluitans</i>
PHCO	<i>Phacelia covillei</i>
RUAL	<i>Rumex altissimus</i>
SORA	<i>Solidago racemosa</i>



Map Center, NAD83
38.9709°, -77.1794°





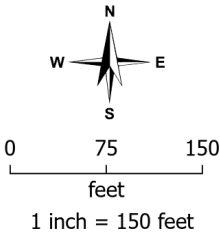
**Rare, Threatened, & Endangered
Plant Species Targeted Survey
I-495/I-270 Managed Lanes Study**

Figure 3.
Rare, Threatened, and Endangered Species Maps
Sheet 2 of 2
Fairfax County, VA
October 2020

- RTE Survey Boundary — RTE Species Area*
- - - Sheet Boundary ● RTE Species Point*
— 10' Contour
— C&O Canal Towpath

*Precise species population counts given when available, otherwise estimated population ranges are provided.

Map Label	Species Name
CACA	<i>Carex careyana</i>
HILA	<i>Hibiscus laevis</i>
MOCL	<i>Monarda clinopodia</i>
PAFL	<i>Paspalum fluitans</i>
PHCO	<i>Phacelia covillei</i>
RUAL	<i>Rumex altissimus</i>
SORA	<i>Solidago racemosa</i>



Map Center, NAD83
38.9674°, -77.1794°



Carey's Sedge (*Carex careyana* Torrey ex Dewey) – This state endangered sedge was found in two locations within mesic forest on the upland terrace west of I-495 during the May 19th and July 15th field surveys. One patch was represented by a single individual plant growing on an eroding slope above a deeply incised tributary stream. This plant is in danger of eroding away as a result of bank sloughing and may not persist in this location. The other patch was comprised of 10-15 individuals growing at the top of the same tributary stream but on the opposite bank. Common groundcover associates growing with Carey's sedge included Japanese stilt grass (*Microstegium vimineum*), garlic mustard, white snakeroot (*Ageratina altissima*), and Asian bittersweet (*Celastrus orbiculatus*) in a moderate covering of about 60 percent. Other shrubs and vines in the area included amur honeysuckle, Japanese honeysuckle, eastern poison ivy (*Toxicodendron radicans*), wine raspberry, and common pawpaw. Canopy cover was about 55 percent comprised of ash-leaf maple (*Acer negundo*) and tuliptree. Photographs 3-6 in **Appendix C** depict this species, as well as its associated habitat.

Tall Dock (*Rumex altissimus*) A. Wood – Approximately eight to ten individuals of this state endangered plant were found within the active floodplain of the Potomac River just upstream of the ALB and along Rock Run Culvert that separates Plummers Island from the mainland, during the May 19th and July 15th field surveys. Another patch of up to 10 plants were found on the scour bar associated with large boulders at the edge of the Potomac River adjacent to Plummers Island. Common groundcover associates growing with tall dock included groundivy, white snakeroot, bristly lady's-thumb (*Persicaria longisetia*), common three-seed-mercury (*Acalypha rhomboidea*), jimsonweed (*Datura stamonium*), and beefsteakplant (*Perilla frutescens*). Photographs 7-8 in **Appendix C** depict this species and its associated microhabitat.

Halberd-leaf Rose-Mallow (*Hibiscus laevis*) Allioni – Dozens of individuals of this Maryland watch list species were found growing within the active floodplain and scour bars along the Potomac River and Rock Run Culvert during the May 19th, July 15th, and July 23rd field surveys. Two additional plants were documented growing within the Chesapeake & Ohio Canal within the project LOD. The largest patch of halberd-leaf rose-mallow was growing on the mud flat between the in-river boulders and the shoreline. Groundcover vegetation was only about 15 percent in this area, including flowering thoroughwort (*Eupatorium serotinum*), beefsteakplant, and grass seedlings later determined to be state endangered horse-tail paspalum (*Paspalum fluitans*) (See below). Shading from shoreline canopy trees, including American sycamore and silver maple (*A. saccharinum*) was about 50 percent. Within the active floodplain of the Potomac River and along Rock Run Culvert, halberd-leaf rose-mallow was observed growing with late-flowering thoroughwort, spotted lady's-thumb (*Persicaria maculosa*), Carolina horse-nettle (*Solanum carolinense*), small-spike false nettle (*Boehmeria cylindrica*), beefsteakplant, seedling horse-tail paspalum, and seedling red maple (*A. rubrum*) and ash-leaf maple. Canopy cover was relatively sparse in these areas, with partial shading occurring primarily along the active floodplain from larger trees farther up the slope. Within the Chesapeake & Ohio Canal, halberd-leaf rose-mallow was growing in an open-canopy, dense herbaceous layer comprised of rice cut grass (*Leersia oryzoides*), broad-leaf cat-tail (*Typha latifolia*), crimson-eye rose-mallow (*H. moscheutos*), and climbing hempvine (*Mikania scandens*). Photographs 9-11 in **Appendix C** depict this species and its associated habitat.

Rand's Goldenrod (*Solidago racemosa*) Green – Two patches of this state threatened goldenrod species were discovered on boulders at the edge of the Potomac River, downstream of the ALB. One patch contained up to 10 individuals and the other patch from 10-50 individuals. All Rand's

goldenrod plants were generally growing sparsely out of cracks or crevices in the boulders with no other plant species. Photographs 12-14 in **Appendix C** depict this species and its associated habitat.

Horse-tail paspalum (*Paspalum fluitans*) (Elliott) Kunth – Thousands of the state endangered horse-tail paspalum plants were observed growing within scour bars and the active floodplain of the Potomac River upstream and downstream of the ALB and within a narrow floodplain zone along Rock Run Culvert. Some plants were even growing beneath the ALB. This grass was observed growing sparsely with large barnyard grass (*Echinochloa crus-galli*), fall panic grass (*Panicum dichotomiflorum*), false daisy (*Eclipta prostrata*), common three-seed-mercury, jimsonweed, annual wormwood (*Artemisia annua*), spiny amaranth (*Amaranthus spinosus*), yellow-seed false pimpernel (*Lindernia dubia*), blue mistflower (*Conoclinium coelestinum*), halberd-leaf rose-mallow, and tall dock. Photographs 15-16 in **Appendix C** depict this species and its associated microhabitat.

White Bergamot (*Monarda clinopodia*) Linnaeus – A patch of 10-20 heavily deer browsed and insect eaten plants, whose vegetative parts matched flowering plants identified as this species observed growing within the GWMP Unit across the Potomac River, were found within mesic forest on the northwest side of Plummerville Island. This Maryland watch list species was growing under a canopy of American elm (*Ulmus americana*) and ash-leaf maple with an estimated cover of 85 percent. The shrub layer was comprised of sparse amur honeysuckle. Groundcover was greater than 85 percent and comprised of groundivy, small-spike false nettle, Indian wood-oats (*Chasmanthium latifolium*), wingstem (*Verbesina alternifolia*), Japanese stilt grass, stinging nettle (*Urtica dioica*), jumpseed (*P. virginiana*), and seedling American elm and ash-leaf maple. While these white bergamot plants could not be conclusively identified to species, white bergamot is the only member of the genus that has been documented within the flora of Plummerville Island, having been documented on 4 July 1982 just east of the current patch of plants (Shelter et al. 2006). Photographs 17-18 in **Appendix C** depict the leaves and stems of the plants and their habitat.

GWMP Unit (Virginia)

Within the Virginia survey area, RTE plant species were only found within the lower upland terrace above the active floodplain of the Potomac River (**Figure 3**).

Buttercup Scorpion-weed (*Phacelia covillei* Watson ex A. Gray) – Thousands of individuals of this state-ranked critically imperiled plant were found within the project LOD in Virginia. As shown in **Figure 3**, plants were found extensively within the lower upland terraces on mesic forested slopes just above the active floodplain of the Potomac River. One small patch of 50 to 100 individuals was also found on the northeast-facing slopes of a narrow tributary stream that drains north to the Potomac River. The largest patches of buttercup scorpion-weed were growing where the groundcover was not otherwise too dense with other native and non-native plant species. Common groundcover associates growing with buttercup scorpion-weed in this area included garlic-mustard, Japanese-knotweed (*Reynoutria japonica*), Virginia bluebells (*Mertensia virginica*), corn speedwell, blunt-leaf waterleaf (*Hydrophyllum canadense*), groundivy, sticky-willy, seedling northern spicebush. The shrub/sapling layer was dominated by northern spicebush and ash-leaf maple. Shrub density was about 45 percent. The canopy cover was estimated at 95 percent and was comprised predominately of American sycamore, tuliptree, eastern cottonwood (*Populus deltoides*), and black walnut (*Juglans nigra*). Vine cover was 35-40 percent and was

comprised of eastern poison ivy, Virginia creeper (*Parthenocissus quinquefolia*), unidentified grape (*Vitis* sp.), and Asian bittersweet. Photographs 19-20 in **Appendix C** depict this species and its associated habitat.

Carey's Sedge (*Carex careyana* Torrey ex Dewey) – In Virginia, Carey's sedge is ranked as state vulnerable. During the May 27, 2020 field surveys, one patch of about 17 plants was found within mesic forest on the upland terrace above the active floodplain and at the base of a rocky slope downstream of the ALB. Common groundcover associates growing with Carey's sedge included richwoods sedge (*C. oligocarpa*), garlic mustard, and Asian bittersweet in a moderate covering of about 60 percent. Canopy cover was about 85 percent. Photographs 21-24 in **Appendix C** depict this species, as well as its associated habitat.

Conclusions

An expanded list of 41 RTE plant species, potentially occurring within the Potomac River Gorge area of the I-495 & I-270 MLS CSB, was obtained from the NPS and VDCR in early 2020. All 41 species were ranked in Maryland or had a status of threatened or endangered. Only 19 of these species were ranked in Virginia. To determine the potential presence of these species within the project LOD, MDOT SHA conducted field surveys during appropriate seasons when the plants would be identifiable. Four survey periods were chosen, including early April, late May, mid-July, and mid-September. At least marginally suitable habitat was present for all 41 species within the Potomac River Gorge portion of the MLS CSB. However, targeted RTE plant surveys documented only seven (7) of 41 species within the CHOH Unit in Maryland and just two (2) of 19 species within the GWMP Unit in Virginia.

The most abundant and widespread RTE species found within the MLS CSB of both NPS units was buttercup scorpion-weed. While this plant is listed as endangered in Maryland and critically imperiled in Virginia, hundreds of thousands of plants likely were present in Maryland and tens of thousands of plants within Virginia. According to MDNR (2019), this species has a very limited range in Maryland, occurring along the Potomac River near the District of Columbia and along Western Branch. Where it occurs, population sizes can vary greatly from year to year, from a few hundred to a million individuals (MDNR 2019). The MDNR has also proposed that this species be downlisted from endangered to threatened (MDNR 2019). The spring of 2020 was clearly a good year for this species, as it was widespread throughout the mesic upper terraces above the Potomac River in a wide variety of aspects with varying amounts of native and invasive shrub and herbaceous cover.

Horse-tail paspalum was another abundant RTE plant (listed as endangered in Maryland, not listed in Virginia) found within the MLS CSB. Thousands of plants were identified along scour bars and the active floodplain of the Potomac River and along the shoreline of Rock Run Culvert that separates Plummerville Island from the mainland. A patch of 10-50 individuals was also found growing beneath the ALB. This species reaches its northern limit in Maryland and has been found in Charles and Montgomery Counties (MDNR 2019). MDNR has also proposed to down-list this species from endangered to threatened (MDNR 2019).

The remaining RTE plant species were identified in much lower numbers and somewhat more widely spaced. Carey's sedge occurred in Maryland in two locations on the mesic terrace above the Potomac River along the top of bank of a deeply incised tributary stream. In Virginia, a small

patch of 15-20 individuals was found within the MLS CSB on the first terrace above the Potomac River downstream of the ALB. Most of the remaining RTE plant species were found along the active shoreline of the Potomac River or Rock Run Culvert or on boulders in the Potomac River. These species included halberd-leaf rose-mallow, tall dock, and Rand's goldenrod. The distribution and abundance of these species within the survey area is likely quite dynamic depending upon the flooding and deposition/scour cycles of the Potomac River. Though halberd-leaf rose-mallow typically grows along the Potomac River shoreline and most identified plants were growing in that landscape setting, two individual plants were found within the MLS CSB within the Chesapeake & Ohio Canal between Lock 10 and Lock 11. One additional RTE plant, white bergamot, was tentatively identified on Plummerville Island. This small population of the state watch list species never flowered during the 2020 season, but appeared identical to confirmed white bergamot plants found flowering just outside the MLS CSB in Virginia. Excessive deer browse likely precluded flowering during 2020.

While less than 20 percent of the targeted RTE plant species were found during the survey, many of those listed species were not known directly from within the MLS CSB but nearby. Also, many of the species records are likely historical, with no known recent records. Evidence of this can be found within the Checklist of the Vascular Plants of Plummerville Island, Maryland published by the Biological Society of Washington (Shelton et al. 2006). This paper documents historic and recent (through 2004) occurrences and distribution of the flora on Plummerville Island and the adjacent mainland, up to the Chesapeake & Ohio Canal Tow Path, and including areas now crossed by I-495. Of the 34 listed plants that were targeted for survey in Maryland that were not found, only one (1) species, large-flower valerian, was documented by the Shelton et al. 2006 paper within the past 20 years, and that record was from the north shore of the middle of Plummerville Island, well outside the MLS CSB. Therefore, MDOT SHA believes that the results of this survey accurately portray the distribution and abundance of RTE plants within the MLS CSB.

References

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- Shelter, S.G., S.S. Orli, E.F. Wells, and M. Beyersdorfer. 2006. Checklist of the Vascular Plants of Plummers Island, Maryland. *Bulletin of the Biological Society of Washington*, 14(1): 1-57.
- Townsend, John F. 2019. *Natural Heritage Resources of Virginia: Rare Plants*. Natural Heritage Technical Report 19-15. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report. March 2019. 57 pages plus appendices
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Appendix A

Agency Correspondence



Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Mark Belton, Secretary
Joanne Throwe, Deputy Secretary

July 17, 2018

MEMO

To: Gwen Gibson, IPR

From: Lori Byrne, WHS

RE: Environmental Review for I-270/I-495 Managed Lane Study - AW073A11 Montgomery & Prince George's Counties

The Wildlife and Heritage Service has determined that there are the following areas of concern in regard to potential impacts to rare, threatened or endangered species, in the study corridor that you have provided:

In the area of the project route crossing of the Potomac River, there are records for these RT&E species occurring within close proximity where they may be directly impacted by this project:

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

Near Sellman Road there is a meadow habitat within a powerline right-of-way that is known to support occurrences of state-listed threatened Sundial Lupine (*Lupinus perennis*) and state-listed endangered Long's Rush (*Juncus longii*). The Lupine occurs in open sandy soils within the powerline corridor and the Long's Rush is found in seepage areas in the same corridor.

Just south of the intersection of Powder Mill Road with I-95, there are wetlands associated with Little Paint Branch that are designated in state regulations as NTWSSCs, and are regulated by MDE, due in part to the presence of these species: Long's Rush, state-listed threatened Long-stalk Greenbrier (*Smilax pseudochina*) and state rare Pink Milkwort (*Polygala incarnata*). Impacts to this wetland should be avoided as much as possible.

Where the project route crosses Little Paint Branch in the area of Cherry Hill, there are records for the state-listed threatened American Brook Lamprey (*Lethenteron appendix*) and the Acuminate Crayfish (*Cambarus acuminatus*), a species with In Need of Conservation status in Maryland. Maintaining good water quality and hydrology is important to these species.

Adjacent to the Greenbelt Metro Station, a stream system associated with Indian Creek supports a population of state-listed endangered Trailing Stitchwort (*Stellaria alsine*). Impacts to the floodplain should be avoided and all appropriate BMPs for sediment and erosion control should be stringently enforced.

On the northeast side of the project route where Indian Creek crosses there are records for state rare Laura's Clubtail (*Stylurus laurae*) and state-listed threatened Selys' Sundragon (*Helocordulia selysii*) occurring downstream in Beaverdam Creek where the wetland is designated as a NTWSSC. These odonate species have an aquatic larval stage that is very susceptible to changes in water quality.

Where the project route overlaps Bald Hill Branch, there are records for these species in close proximity to the project route, downstream in Western Branch. Maintaining good water quality and hydrology is important to these species, especially the fish.

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Arundinaria tecta</i>	Switch Cane	Rare
<i>Lethenteron appendix</i>	American Brook Lamprey	Threatened
<i>Etheostoma vitreum</i>	Glassy Darter	Threatened
<i>Percina notogramma</i>	Stripeback Darter	Endangered

Thank you for the opportunity to review and comment. We look forward to further coordination as project details become available. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

ER# 2018.0981.pg/mo



Larry Hogan, Governor
Boyd Rutherford, Lt. Governor
Mark Belton, Secretary
Joanne Throwe, Deputy Secretary

September 11, 2018

MEMO

To: Gwen Gibson, IPR

From: Lori Byrne, WHS

**RE: Follow-Up to Environmental Review for I-270/I-495 Managed Lane Study - AW073A11
Montgomery & Prince George's Counties**

Regarding the need for RT&E species surveys, please see the additional comments after each section. The Wildlife and Heritage Service has determined that there are the following areas of concern in regard to potential impacts to rare, threatened or endangered species, in the study corridor that you have provided:

In the area of the project route crossing of the Potomac River, there are records for these RT&E species occurring within close proximity where they may be directly impacted by this project. We recommend that surveys for these species be conducted in areas of appropriate habitat that may fall within proposed limits-of-disturbance for this project.

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Rumex altissimus</i>	Tall Dock	Endangered
<i>Paspalum fluitans</i>	Horse-tail Paspalum	Endangered
<i>Matelea obliqua</i>	Climbing Milkweed	Endangered
<i>Baptisia australis</i>	Blue Wild Indigo	Threatened
<i>Coreopsis tripteris</i>	Tall Tickseed	Endangered
<i>Phacelia covillei</i>	Buttercup Scorpionweed	Endangered

Based on a compilation of Maryland records, habitat info and flowering/fruiting info for these species is described as:

Rumex altissimus Polygonaceae (Smartweed Family)

Habitat: Frequently flooded zones along rivers in sandy/gravelly alluvium; also forested wetlands in muck soils.

Flw: May-Jun (July); Fr: Aug.

Paspalum fluitans Poaceae (Grass Family)

Habitat: Floodplain seeps and pools in muck soils; seasonally exposed rocky stream channels.

Flw/Fr: late Aug-Sept (Oct).

Matelea obliqua Apocynaceae (Dogbane Family)

Habitat: Bedrock scour and terrace woodlands in rich alluvium, upland forests, barrens, glades, clearings, and roadsides over limestone or shale substrates.

Flw: Jun-Jul; Fr: Sept.

Baptisia australis Fabaceae (Legume Family)

Habitat: Prairie-like scour bars, depositional bars, rocky alluvial flats.

Flw: May; Fr: late Jun-Aug.

Coreopsis tripteris Asteraceae (Aster Family)

Habitat: Bedrock scour bars and riverside prairies, in rich alluvium.

Flw: Sept; Fr: Sept-Oct.

Phacelia covillei Boraginaceae (Borage Family)

Habitat: Rich floodplain and terrace and ravine forests, mesic upland woods.

Near Sellman Road there is a meadow habitat within a powerline right-of-way that is known to support occurrences of state-listed threatened Sundial Lupine (*Lupinus perennis*) and state-listed endangered Long's Rush (*Juncus longii*). The Lupine occurs in open sandy soils within the powerline corridor and the Long's Rush is found in seepage areas in the same corridor. [If either of these suitable habitats occurs in proposed limits-of-disturbance for this project, we recommend that surveys be conducted for these species.](#) Based on a compilation of Maryland records, habitat info and flowering/fruiting info for these species is described as:

Lupinus perennis Fabaceae (Legume Family)

Habitat: Dry sandy soils of inland dunes and sand ridge woodlands, sandy powerline meadows, dry rocky slopes and outcrops.

Flw: May-early Jun; Fr: late Jun-early Jul.

Juncus longii Juncaceae (Rush Family)

Habitat: Open-canopied seepage wetlands, roadside seeps, powerlines.

Just south of the intersection of Powder Mill Road with I-95, there are wetlands associated with Little Paint Branch that are designated in state regulations as NTWSSCs, and are regulated by MDE, due in part to the presence of these species: Long's Rush, state-listed threatened Long-stalk Greenbrier (*Smilax pseudochina*) and state rare Pink Milkwort (*Polygala incarnata*). Impacts to this wetland should be avoided as much as possible. [If impacts to this NTWSSC are unavoidable, we may ask for the extent of these populations to be delineated so that impacts can be evaluated.](#)

Where the project route crosses Little Paint Branch in the area of Cherry Hill, there are records for the state-listed threatened American Brook Lamprey (*Lethenteron appendix*) and the Acuminate Crayfish (*Cambarus acuminatus*), a species with In Need of Conservation status in Maryland. Maintaining good water quality and hydrology is important to these species. [We would not recommend surveys for these aquatic species, but instead would want to emphasize the need for stringent sediment and erosion control during all work in this area.](#)

Adjacent to the Greenbelt Metro Station, a stream system associated with Indian Creek supports a population of state-listed endangered Trailing Stitchwort (*Stellaria alsine*). Impacts to the floodplain should be avoided and all appropriate BMPs for sediment and erosion control should be stringently enforced. [Recent surveys have indicated that this population still exists within the braided stream floodplain to the southwest of I-95/495, therefore we would not recommend more surveys, but instead would want to emphasize the need for stringent sediment and erosion control during all work in this area.](#)

On the northeast side of the project route where Indian Creek crosses there are records for state rare Laura's Clubtail (*Stylurus laurae*) and state-listed threatened Selys' Sundragon (*Helocordulia selysii*) occurring downstream in Beaverdam Creek where the wetland is designated as a NTWSSC. These odonate species have an aquatic larval stage that is very susceptible to changes in water quality. [We would not recommend surveys for these aquatic species, but would want to emphasize the need for stringent sediment and erosion control during all work in this area.](#)

Where the project route overlaps Bald Hill Branch, there are records for these species in close proximity to the project route, downstream in Western Branch. Maintaining good water quality and hydrology is important to these species. [We would not recommend surveys for these aquatic species, but would want to emphasize the need for stringent sediment and erosion control during all work in this area.](#)

<u>Scientific Name</u>	<u>Common Name</u>	<u>State Status</u>
<i>Arundinaria tecta</i>	Switch Cane	Rare
<i>Lethenteron appendix</i>	American Brook Lamprey	Threatened
<i>Etheostoma vitreum</i>	Glassy Darter	Threatened
<i>Percina notogramma</i>	Stripeback Darter	Endangered

Thank you for the opportunity to review and comment. We look forward to further coordination as project details become available. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

ER# 2018.0981x.pg/mo

Cc: K. McCarthy, DNR

David Smith

From: Maddy Sigrist <msigrist@rkk.com>
Sent: Thursday, December 5, 2019 8:27 AM
To: David Smith
Cc: Sarah Williamson
Subject: FW: [EXTERNAL] I-495 & I-270 Managed Lanes Study - RTE Plant Survey Report

Good morning David,

Please see the email below from Laurel Hammig, NPS, in response to the RTE Plant Survey Report. NPS has identified 15 additional plant species that they would like the project to conduct surveys for in the coming year within the LOD on NPS property. I spoke with Caryn Brookman and she thinks we should accommodate their request. I think it would be a good idea to respond to Laurel and ask her if the survey area would be on both the MD and VA banks of the Potomac on NPS property in the vicinity of the American Legion Bridge or if any of these species has been recorded on other NPS properties within the LOD. Are there other questions you have for Laurel in preparation for the surveys? Also, do you have an idea of the additional effort this would require and whether it can be accommodated by the remaining CRI budget?

Thanks!
Maddy

MADDY SIGRIST, PWS
Project Scientist



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From: Hammig, Laurel <laurel_hammig@nps.gov>
Sent: Tuesday, November 12, 2019 10:14:12 AM
To: Stacy Talmadge <STalmadge@mdot.maryland.gov>
Cc: Tammy_Stidham <tammy_stidham@nps.gov>; Caryn Brookman <CBrookman@mdot.maryland.gov>
Subject: Re: [EXTERNAL] I-495 & I-270 Managed Lanes Study - RTE Plant Survey Report

Stacy,

We have a couple of comments on the report. It appears that the report does not consider that NPS maintains data on rare plants beyond that which DNR does. Within the LOD, NPS has records of 15 species of conservation concern, with many others just outside or with location uncertain but in that general area. There are only 3 of these included in the report. The report also mentions that they may have missed *Phacelia covillei*. This species senesces very early in the year. Just downstream of the demarcated LOD, NPS found 1000's of this species in March 2018. When the contractor returns to

survey in the early spring to target Phacelia, they need to also consider and survey for the aforementioned species to ensure they are not within the LOD.

Arabis patens S3
Baptisia australis S2 Threatened
Clematis viorna S3
Coreopsis tripteris S1 Endangered
Erigenia bulbosa S3
Galactia volubilis S3
Helianthus occidentalis S1 Threatened
Hibiscus laevis S3
Hybanthus concolor S3
Lipocarpa micrantha S1 Endangered
Monarda clinopodia S3S4
Phacelia covillei S2 Endangered
Phaseolus polystachios S3
Polygala polygama S1 Threatened
Sida hermaphrodita S1 Endangered

If you have any questions or need any follow up information, please let me know.

Thank you,
Laurel

Laurel Hammig, AICP | National Park Service
Regional Planner
Region 1 - National Capital Area
1100 Ohio Drive SW
Washington, DC 20242

O: 202-619-6347
C: 202-875-3609

On Thu, Oct 31, 2019 at 9:43 AM Stacy Talmadge <STalmadge@mdot.maryland.gov> wrote:

Good morning,

Caryn Brookman asked that I send you the attached report per NPS request.

If you have any questions or issues with the file, please let me know.

Thank you,

Stacy.

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director



Rochelle Altholz
Deputy Director of
Administration and Finance

Russell W. Baxter
Deputy Director of
Dam Safety & Floodplain
Management and Soil & Water
Conservation

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

July 31, 2019

Catherine Cruz-Ortiz
Rummel, Klepper & Kahl, LLP
2600 Fair Lakes Circle, Suite 300
Fairfax, VA 22033

Re: 14168.26, I-495 and I-270 Managed Lanes Study

Dear Ms. Cruz-Ortiz:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Potomac Gorge Conservation Site is located within the project site. Conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are polygons built around one or more rare plant, animal, or natural community designed to include the element and, where possible, its associated habitat, and buffer or other adjacent land thought necessary for the element's conservation. Conservation sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. The Potomac Gorge Conservation Site has been given a biodiversity significance ranking of B1, which represents a site of outstanding significance. The natural heritage resources of concern at this site are:

<i>Maianthemum stellatum</i>	Starry Solomon's-plume	G5/S1S2/NL/NL
<i>Phacelia covillei</i>	Coville's phacelia	G3/S1/NL/NL
<i>Gomphus fraternus</i>	Midland Clubtail	G5/S2/NL/NL
<i>Boechera dentata</i>	Short's rock cress	G5/S1/NL/NL
<i>Silene nivea</i>	Snowy Campion	G4?/S1/NL/NL
Central Appalachian / Piedmont Low-Elevation Rich Boulderfield Forest		G3G4/S2S3/NL/NL
Coastal Plain / Outer Piedmont Basic Mesic Forest		G4?/ S3/NL/NL

In addition, Tall Thistle (*Cirsium altissimum*, G5/S1/NL/NL), Wild cucumber (*Echinocystis lobata*, G5/SH/NL/NL), Smartweed Dodder (*Cuscuta polygonorum*, G5/S1/NL/NL), Northern rattlesnake-master (*Eryngium yuccifolium* var. *yuccifolium*, G5T5/S2/NL/NL), One-sided shinleaf (*Orthilia secunda*, G5/SH/NL/NL) and Pizzini's Amphipod (*Stygobromus pizzinii*, G3G4/S1S2/NL/NL) have been historically documented within the project site.

Furthermore, according to a DCR biologist, there is potential for the Northern Virginia Well amphipod (*Stygobromus phreaticus*, G1/S1/SOC/NL) and other *Stygobromus* amphipod species to occur within the project site.

By limiting the project footprint as much as possible, DCR recommends avoidance of documented occurrences of natural heritage resources including along the steep bluff on the eastern side in Virginia. Due to the potential for this site to support additional populations of natural heritage resources, DCR also recommends an inventory for the resources within areas proposed for disturbance including stormwater management ponds and equipment staging areas. With the survey results we can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources.

DCR-Division of Natural Heritage biologists are qualified and available to conduct inventories for rare, threatened, and endangered species. Please contact Anne Chazal, Natural Heritage Chief Biologist, at anne.chazal@dcr.virginia.gov or 804-786-9014 to discuss arrangements for fieldwork.

In addition, the proposed project will fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment (<https://www.dcr.virginia.gov/natural-heritage/vaconvisvnl>), one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Ecological Cores are areas of unfragmented natural cover with at least 100 acres of interior that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection and erosion prevention), and air quality (including carbon sequestration and oxygen production), along with the many associated economic benefits of these functions. The cores are ranked from C1 to C5 (C5 being the least ecologically relevant) using many prioritization criteria, such as the proportions of sensitive habitats of natural heritage resources they contain.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species.

Therefore minimizing fragmentation is a key mitigation measure that will preserve the natural patterns and connectivity of habitats that are key components of biodiversity. The deleterious effects of fragmentation can be reduced by minimizing edge in remaining fragments; by retaining natural corridors that allow movement between fragments; and by designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns).

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please re-submit a completed order form and project map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

A fee of \$150.00 has been assessed for the service of providing this information. Please find attached an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, **DCR - Division of Natural Heritage, 600 East Main Street, 24th Floor, Richmond, VA 23219.** Payment is due within thirty days of the invoice date. Please note the change of address for remittance of payment as of July 1, 2013. Late payment may result in the suspension of project review service for future projects.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis/> or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

Should you have any questions or concerns, please contact me at 804-225-2429. Thank you for the opportunity to comment on this project.

Sincerely,

A handwritten signature in cursive script, reading "Tyler Meader".

Tyler Meader
Natural Heritage Locality Liaison

CC: Troy Andersen, USFWS

David Smith

From: Maddy Sigrist <msigrist@rkk.com>
Sent: Tuesday, March 24, 2020 1:47 PM
To: David Smith
Subject: FW: [EXTERNAL] RE: REVISED Survey Protocol

Hi David,

I hope you're doing okay amidst all of this craziness!

I checked-in again with the MLS managers to see if they had resolved the permit issues with MLS for the upcoming surveys. Caryn received the email below from Laurel Hammig, NPS. Please see the email below Laurel's from CHOH regarding the plant survey. It looks like they are now suggesting a full inventory of flora be conducted within the LOD. Is this how you understand their email? Are you still hoping to start next Monday or has the pandemic slowed or stopped your ability to conduct fieldwork? I assume doing a full inventory of all flora would take substantially longer than the survey you were proposing previously. What are your thoughts?

Thanks!
Maddy

MADDY SIGRIST, PWS
Project Scientist



700 East Pratt Street, Suite 500
Baltimore, MD 21202

410.728.2900 P | 410.462.9125 D | 410.812.4249 C
www.rkk.com

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From: Caryn Brookman (Consultant) <CBrookman.consultant@mdot.maryland.gov>
Sent: Tuesday, March 24, 2020 11:20 AM
To: Maddy Sigrist <msigrist@rkk.com>; Justin Reel <jreel@rkk.com>; Karen Kahl <kkahl@rkk.com>
Cc: Erron Ramsey <eramsey@rkk.com>
Subject: FW: [EXTERNAL] RE: REVISED Survey Protocol

We'll need to discuss this week.

From: Hammig, Laurel D <Laurel_Hammig@nps.gov>
Sent: Tuesday, March 24, 2020 11:07 AM
To: Caryn Brookman (Consultant) <CBrookman.consultant@mdot.maryland.gov>; Karen Kahl <kkahl@rkk.com>
Subject: Re: [EXTERNAL] RE: REVISED Survey Protocol

Hi Caryn and Karen,

Hope you all are doing okay during this crazy time! Sorry for the delay. I thought I'd sent this info already. So sorry.

For the bat survey, work with Diane Pavsek diane_pavsek@nps.gov to obtain a research permit. You can cc me on any communication.

For the tree survey, the permit contacts are: GWMP- peter_mccallum@nps.gov, NACE- jamese_hemsley@nps.gov and CHOH- mary_gentile@nps.gov and cc me on communications.

Below is feedback from C&O and GWMP on the plant survey. For the plant survey, please work with the original permit contacts and include Andrew Landsman, andrew_landsman@nps.gov for CHOH and Brent Steury, brent_steury@nps.gov, for GWMP as well as myself on any communication.

Let me know if anything gets stuck. We'll do our best to be expeditious with these requests.

Thanks,
Laurel

CHOH Feedback

Although the survey protocol includes the 15 species that we have documented within the LOD, it does not account for other species that had been documented nearby that may now exist within the LOD. CHOH has documented occurrences of 87 state-listed plant species within a 1,000 m buffer of the current road centerline. Considering a 500 m buffer, we have the below 67 plant species. Targeted surveys for 67 species seem logistically difficult so it would probably be easier to do a full flora of the area just within the LOD.

Ammannia coccinea

Arabis patens

Arabis shortii

Arisaema dracontium

Astragalus canadensis

Baptisia australis

Bromus latiglumis

Bromus nottowanus

Carex careyana

Carex conjuncta

Carex hitchcockiana

Carex leavenworthii
Carex shortiana
Celtis laevigata
Ceratophyllum echinatum
Chrysogonum virginianum
Clematis viorna
Corallorhiza wisteriana
Coreopsis tripteris
Cuscuta polygonorum
Cyperus retrofactus
Diplazium pycnocarpon
Dirca palustris
Ellisia nyctelea
Erigenia bulbosa
Erythronium albidum
Galactia volubilis
Gentiana villosa
Geum aleppicum
Hasteola suaveolens
Helianthus occidentalis
Hibiscus laevis
Hybanthus concolor
Iresine rhizomatosa
Lathyrus venosus
Lipocarpha micrantha
Lythrum alatum

Maianthemum stellatum
Matelea obliqua
Matteuccia struthiopteris
Mecardonia acuminata
Melica mutica
Monarda clinopodia
Paspalum fluitans
Passiflora lutea
Phacelia covillei
Phacelia purshii
Phaseolus polystachios
Polygala polygama
Potamogeton foliosus
Potentilla arguta
Ptelea trifoliata
Pycnanthemum verticillatum
Pycnanthemum virginianum
Ruellia strepens
Rumex altissimus
Sagittaria rigida
Salix exigua
Scutellaria galericulata
Sida hermaphrodita
Silene nivea
Solidago rupestris
Solidago simplex var. *racemosa*

Triphora trianthophora

Valeriana pauciflora

Vitis rupestris

Zizia aurea

GWMP Feedback

Below is a list of Virginia state rare plants that have been recorded from Turkey Run Park and the Potomac Heritage Trail (most of these species are not on the list in the protocol or are not recorded for Virginia). For certain that *Matteuccia struthiopteris* (not listed in the protocol) occurs very close to the project area in Turkey Run Park as does *Phacelia covillei*. We also have state listed animal species recorded from Turkey Run Park - will there be surveys for those species? It would be nice to have a complete list of all the plant species in these areas because some of the state rare moth species that have been found in this area have larvae that feed on non-state listed plants.

PLANTS

Arabis patens (spreading rockcress), S2 G3, Turkey Run Park

Arabis shortii (*Boechera dentata*) (short's rockcress), S2 G5, Turkey Run & Great Falls Parks

Aster shortii (*Symphotrichum shortii*) (short's aster), S1 G4G5, Windy Run area

Carex careyana (carey's sedge), S3 G4G5, Turkey Run & Great Falls Parks

Cerastium arvense var. *velutinum* (field chickweed), S2? G5T4?, Turkey Run & Great Falls Parks

Erigenia bulbosa (harbinger-of-spring), S3 G5, Great Falls and Turkey Run Parks

Erythronium albidum (white trout-lily), S2 G5, Turkey Run, Great Falls, & Theodore Roosevelt Island

Floerkea proserpinacoides (false mermaid-weed), S3 G5, Turkey Run & Great Falls Parks

Hasteola suaveolens (*Senecio suaveolens*) (sweet-scented indian-plantain), S2 G4, Turkey Run & Great Falls Park

Juglans cinerea (butternut), S3? G4, Turkey Run & Great Falls Parks

Maianthemum stellatum (starry false solomon's seal), S2 G5, Turkey Run & Great Falls Parks

Matteuccia struthiopteris (ostrich fern), S1 G5T5, Turkey Run Park; S2S3 G5 Theodore Roosevelt Island VOU (s.n. US)

Panax quinquefolius (american ginseng), S3S4 G3G4 LT, Turkey Run LT

Phacelia covillei (coville's phacelia), S1 G3, Clara Barton and Turkey Run Parks

Sida (*Ripariosida*) *hermaphrodita* (virginia sida), S1 G3, Potomac River shore near Spout Run

Solidago racemosa (sticky goldenrod), S1 G3?, Great Falls Park, Turkey Run Park and Gulf Branch

Spartina pectinata (freshwater cordgrass), S2 G5, Turkey Run & Great Falls Parks

Valeriana pauciflora (pink valerian), S2 G4, Turkey Run & Great Falls Parks

ANIMALS

Stygobromus pizzinii (groundwater amphipod), S1S2 G2, Turkey Run, Pimmit Run, Windy Run, and a seep at Great Falls.

Fontigens bottimeri (appalachian springsnail), S1S2 G2, Great Falls & Turkey Run Parks

Striatura milium (fine-ribbed striate), SU G5, Turkey Run and Great Falls Parks

Acronicta radcliffei (Radcliffe's dagger moth), S2S4 G5, TurkeyRun Park and Great Falls

Oligia (*Neoligia*) *crytora* (mantled brocade), S2S4, Great Falls and Turkey Run Parks

Orthosia revicta (subdued quaker moth), S2S4 G?, TurkeyRun Park

Sphinx franckii (franck's sphinx), S2S3 G4, Turkey Run, 2014 image (host Elm & White Ash)

Cordulegaster erronea (tiger spiketail), S3 G4, Turkey Run & Great Falls Park

Neophylax virginica (A Caddisfly, Trichoptera), Turkey Run, Turkey Run Park (1921) rediscovered in 2004, described as **new to science** in 2011.

Hydropsyche hoffmani (A Caddisfly, Trichoptera), G3G4, S3, Turkey Run & Great Falls Parks

Ithytrichia clavata (A Caddisfly, Trichoptera), G5, S2S4, Turkey Run Park

Mayatrichia ayama (A Caddisfly, Trichoptera), G5, S2S4, Turkey Run & Great Falls Parks

Ochrotrichia tarsalis (A Caddisfly, Trichoptera), G5, S2S4, Turkey Run & Great Falls Parks

Rhyacophila invaria (A Caddisfly, Trichoptera), G5, S2S4, Turkey Run Park

Hydropsyche brunneipennis (A Caddisfly, Trichoptera), G3G4, S1S3, Turkey Run & Great Falls Parks

Perimyotis (*Pipistrellus*) *subflavus* (tricolored bat or eastern pipistrelle), S1S3 G3 PE, Petitioned for federal listing (2016), Great Falls, Turkey Run, Dyke Marsh, Ft. Hunt, Riverside Park

Laurel Hammig, AICP | National Park Service

Regional Planner

Region 1 - National Capital Area

1100 Ohio Drive SW

Washington, DC 20242

O: 202-619-6347

C: 202-875-3609

From: Caryn Brookman (Consultant) <CBrookman.consultant@mdot.maryland.gov>
Sent: Tuesday, March 24, 2020 8:20 AM
To: Hammig, Laurel D <Laurel_Hammig@nps.gov>
Subject: [EXTERNAL] RE: REVISED Survey Protocol

Good morning Laurel,

I hope you are well. I wanted to follow up on the permit as we will need to gear up to start soon. I know the existing permit needs updating so please let me know what you need from our end. So far we've shared the protocol, list of species based on VDCR and NPS consultation and survey area mapping.

Anything more you can do on your end to get this going would be much appreciated.

Thanks,
Caryn

From: Hammig, Laurel D <Laurel_Hammig@nps.gov>
Sent: Monday, March 9, 2020 9:16 AM
To: Caryn Brookman (Consultant) <CBrookman.consultant@mdot.maryland.gov>
Subject: Re: REVISED Survey Protocol

Hi Caryn,
The permits will need to be updated to include this work. The team also has concerns that the species included is not comprehensive. Would you like a list of species or would a call with the teams be better? Let me know.

Thanks!
Laurel

Laurel Hammig, AICP | National Park Service
Regional Planner
Region 1 - National Capital Area
1100 Ohio Drive SW
Washington, DC 20242

O: 202-619-6347
C: 202-875-3609

From: Caryn Brookman (Consultant) <CBrookman.consultant@mdot.maryland.gov>
Sent: Wednesday, March 4, 2020 12:53 PM
To: Hammig, Laurel D <Laurel_Hammig@nps.gov>
Subject: [EXTERNAL] REVISED Survey Protocol

Hi Laurel,

Virginia Department of Conservation and Recreation (VDCR) has asked that we survey other species of concern in Virginia. We will include surveying of these species in the current effort. There are three additional species now listed in the survey protocol (attached).

The team would like to survey March 30th-April 4th. However, we need to know whether we can use the existing SUPs to cover this work. Please let me know as soon as you know.

Thank you for helping with this effort.

Caryn

 STATE HIGHWAY ADMINISTRATION I-495 & I-270 P3 Office 601 North Calvert Street Baltimore, MD 21202 <u>Mailing Address</u> 707 North Calvert Street P-601 Baltimore, MD 21202	Caryn J. G. Brookman Environmental Program Manager I-495 & I-270 P3 Office Email: cbrookman@sha.state.md.us Office: 410.637.3335 www.roads.maryland.gov www.495-270-P3.com 
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 <p>SCIENTIFIC RESEARCH AND COLLECTING PERMIT</p> <p>Grants permission in accordance with the attached general and special conditions</p> <p>United States Department of the Interior National Park Service Chesapeake and Ohio Canal</p>	<p>Study#: CHOH-00251</p> <p>Permit#: CHOH-2020-SCI-0010</p> <p>Start Date: Apr 02, 2020</p> <p>Expiration Date: Dec 31, 2020</p> <p>Coop Agreement#:</p> <p>Optional Park Code:</p>
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Name of principal investigator: Name: Mr David Smith Phone: 4438372154 Email: davids@cri.biz		
Name of institution represented: Coastal Resources Inc.		
Additional investigators or key field assistants:		
Name: Stacey Young	Phone: 4104629176	Email: syoung@rkk.com
Name: Kevin Stohlgren	Phone: 4438372286	Email: kevins@cri.biz
Name: Sean Sipple	Phone: 4438372285	Email: seans@cri.biz
Name: Amanda Cruz	Phone: 4438372151	Email: amandac@cri.biz
Study Title: I-495 & I-270 Managed Lanes Study		
Purpose of study: To document threatened and endangered species and other state listed rare plants within the I-495 & I-270 MLS project study area that overlaps with the C&O Canal Park and George Washington Memorial Parkway units. These surveys will help the project team better assess potential effects of the project on sensitive plant species and allow the project to implement avoidance, minimization, and mitigation alternatives where state threatened or endangered plants occur within the study area.		
Subject/Discipline: Vascular Plants		
Locations authorized: Within the I-495 & I-270 Managed Lanes Study corridor where it crosses the CHOH. This includes a width from the existing roadway of between 200 and 1,000 feet along the Potomac River floodplain adjacent to the tow path.		
Transportation method to research site(s): On foot		
Collection of the following specimens or materials, quantities, and any limitations on collecting: No permanent specimen collection is approved Location of plants and/or plant populations must be noted with a GPS and any and all data, including GPS coordinates, must be provided to NPS		
Name of repository for specimens or sample materials if applicable: Repository type: Will be destroyed through analysis or discarded after analysis Objects collected: The intention of this survey is not to collect specimens. However, for some RTE plant species initial collection may be necessary for positive identification in the laboratory or by outside experts.		
NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit: Please notify the park research coordinator at least 48 hours prior to working in the park. Provide a description of the vehicle, tag number, and researcher names in case of emergency. Work site(s) shall be kept free of trash. All debris, equipment, and supplies are to be removed from the park upon completion of work. Researcher must carry identification and a copy of the permit with them at all times.		

Researcher will provide a copy of the final project report(s), data, dissertations, publications, and photographs to the park, in addition to the Investigator's Annual Report. Final reports will be included in the park library and archives.

If any GPS data are collected it will be provided to the park accompanied by appropriate metadata.

No permanent specimen collection is permitted without confirmation from research coordinator

Recommended by park staff(name and title):

ANDREW
LANDSMAN

Digitally signed by
ANDREW LANDSMAN
Date: 2020.03.30
08:24:31 -04'00'

Approved by park official:

TINA
CAPPETTA

Digitally signed by TINA
CAPPETTA
Date: 2020.03.30
09:35:24 -04'00'

Reviewed by Collections Manager:

Yes ☒

No ☐

Date Approved:

Title:

Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

David R. Smith

(Principal investigator's signature)

3/27/2020

(Date)

**THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE
CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)**



GENERAL CONDITIONS For SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

1. **Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.
2. **Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.
3. **False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.
4. **Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.
5. **Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.
6. **Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.
- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol / formalin, tanned and mounted, dried and boxed, etc.), and current location.
- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park - specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.
- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.
- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for

scientific or educational purposes only, and may not be used for commercial or other revenue - generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement (CRADA) or other approved benefit - sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent (20 %) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. Reports - - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and / or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service

8. Confidentiality - - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. Methods of travel - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. Other permits - The permittee must obtain all other required permit(s) to conduct the specified project.

11. Insurance - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. Mechanized equipment - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. NPS participation - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. Permanent markers and field equipment - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. Access to park and restricted areas - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. Notification - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit. Ideally this contact should occur at least one week prior to the initial visit to the park.

17. Expiration date - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. Other stipulations - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

SCIENTIFIC RESEARCH AND COLLECTING PERMIT



Grants permission in accordance with the attached
general and special conditions

United States Department of the Interior
National Park Service

George Washington Memorial Parkway

Study#: GWMP-00181

Permit#: GWMP-2020-SCI-0013

Start Date: Apr 02, 2020

Expiration Date: Oct 31, 2020

Coop Agreement#:

Optional Park Code:

Name of principal investigator:

Name: Mr David Smith

Phone: 4438372154

Email: davids@cri.biz

Name of institution represented:

Coastal Resources Inc.

Additional investigators or key field assistants:

Name: Stacey Young

Phone: 4104629176

Email: syoung@rkk.com

Name: Kevin Stohlgren

Phone: 4438372286

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Name: Sean Sipple

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Name: Amanda Cruz

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Name: Lindsey Nolen

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Name: Megan Niehaus

Phone: 443-837-2142

Email: megann@cri.biz

Name: Shannon Pursell

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Study Title:

I-495 & I-270 Managed Lanes Study

Purpose of study:

To document threatened and endangered species and other state listed rare plants within the I-495 & I-270 MLS project study area that overlaps with the C&O Canal Park and George Washington Memorial Parkway units. These surveys will help the project team better assess potential effects of the project on sensitive plant species and allow the project to implement avoidance, minimization, and mitigation alternatives where state threatened or endangered plants occur within the study area.

Subject/Discipline:

Plant Communities (Vegetation)
Threatened / Endangered / Rare Species

Locations authorized:

Within the I-495 & I-270 Managed Lanes Study corridor where it crosses the GWMP. This includes a width from the existing roadway of about 200 feet within the Potomac River floodplain and up to 2,200 feet along the George Washington Memorial Parkway.

Transportation method to research site(s):

On foot

Collection of the following specimens or materials, quantities, and any limitations on collecting:

Name of repository for specimens or sample materials if applicable:

Repository type: Will be destroyed through analysis or discarded after analysis
Objects collected:

The intention of this survey is not to collect specimens. However, for some RTE plant species initial collection may be necessary for positive identification in the laboratory or by outside experts.

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

Photographic vouchers of any RTEs will be taken.

Findings, raw data, images, etc. will be shared with the park upon request.

Recommended by park staff(name and title):

Mireya Storzaker Natural Resources Specialist

Approved by park official:

Brent Steury

Title:

Brent Steury, Natural Resources Program Manager

Reviewed by Collections Manager:

Yes ☐ No ☐

Date Approved:

8 April 2020

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

[Signature]
(Principal investigator's signature)

3/31/20
(Date)

**THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE
CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)**



GENERAL CONDITIONS For SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior
National Park Service

1. **Authority** - The permittee is granted privileges covered under this permit subject to the supervision of the superintendent or a designee, and shall comply with all applicable laws and regulations of the National Park System area and other federal and state laws. A National Park Service (NPS) representative may accompany the permittee in the field to ensure compliance with regulations.
2. **Responsibility** - The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.
3. **False information** - The permittee is prohibited from giving false information that is used to issue this permit. To do so will be considered a breach of conditions and be grounds for revocation of this permit and other applicable penalties.
4. **Assignment** - This permit may not be transferred or assigned. Additional investigators and field assistants are to be coordinated by the person(s) named in the permit and should carry a copy of the permit while they are working in the park. The principal investigator shall notify the park's Research and Collecting Permit Office when there are desired changes in the approved study protocols or methods, changes in the affiliation or status of the principal investigator, or modification of the name of any project member.
5. **Revocation** - This permit may be terminated for breach of any condition. The permittee may consult with the appropriate NPS Regional Science Advisor to clarify issues resulting in a revoked permit and the potential for reinstatement by the park superintendent or a designee.
6. **Collection of specimens (including materials)** - No specimens (including materials) may be collected unless authorized on the Scientific Research and Collecting permit.

The general conditions for specimen collections are:

- Collection of archeological materials without a valid Federal Archeology Permit is prohibited.
- Collection of federally listed threatened or endangered species without a valid U.S. Fish and Wildlife Service endangered species permit is prohibited.
- Collection methods shall not attract undue attention or cause unapproved damage, depletion, or disturbance to the environment and other park resources, such as historic sites.
- New specimens must be reported to the NPS annually or more frequently if required by the park issuing the permit. Minimum information for annual reporting includes specimen classification, number of specimens collected, location collected, specimen status (e.g., herbarium sheet, preserved in alcohol / formalin, tanned and mounted, dried and boxed, etc.), and current location.
- Collected specimens that are not consumed in analysis or discarded after scientific analysis remain federal property. The NPS reserves the right to designate the repositories of all specimens removed from the park and to approve or restrict reassignment of specimens from one repository to another. Because specimens are Federal property, they shall not be destroyed or discarded without prior NPS authorization.
- Each specimen (or groups of specimens labeled as a group) that is retained permanently must bear NPS labels and must be accessioned and cataloged in the NPS National Catalog. Unless exempted by additional park - specific stipulations, the permittee will complete the labels and catalog records and will provide accession information. It is the permittee's responsibility to contact the park for cataloging instructions and specimen labels as well as instructions on repository designation for the specimens.
- Collected specimens may be used for scientific or educational purposes only, and shall be dedicated to public benefit and be accessible to the public in accordance with NPS policies and procedures.
- Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for

scientific or educational purposes only, and may not be used for commercial or other revenue - generating purposes unless the permittee has entered into a Cooperative Research And Development Agreement (CRADA) or other approved benefit - sharing agreement with the NPS. The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without a CRADA or other approved benefit-sharing agreement with NPS, permittee will pay the NPS a royalty rate of twenty percent (20 %) of gross revenue from such sales or other revenues. In addition to such royalty, the NPS may seek other damages to which the NPS may be entitled including but not limited to injunctive relief against the permittee.

7. Reports - - The permittee is required to submit an Investigator's Annual Report and copies of final reports, publications, and other materials resulting from the study. Instructions for how and when to submit an annual report will be provided by NPS staff. Park research coordinators will analyze study proposals to determine whether copies of field notes, databases, maps, photos, and / or other materials may also be requested. The permittee is responsible for the content of reports and data provided to the National Park Service

8. Confidentiality - - The permittee agrees to keep the specific location of sensitive park resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

9. Methods of travel - Travel within the park is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.

10. Other permits - The permittee must obtain all other required permit(s) to conduct the specified project.

11. Insurance - If liability insurance is required by the NPS for this project, then documentation must be provided that it has been obtained and is current in all respects before this permit is considered valid.

12. Mechanized equipment - No use of mechanized equipment in designated, proposed, or potential wilderness areas is allowed unless authorized by the superintendent or a designee in additional specific conditions associated with this permit.

13. NPS participation - The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.

14. Permanent markers and field equipment - The permittee is required to remove all markers or equipment from the field after the completion of the study or prior to the expiration date of this permit. The superintendent or a designee may modify this requirement through additional park specific conditions that may be attached to this permit. Additional conditions regarding the positioning and identification of markers and field equipment may be issued by staff at individual parks.

15. Access to park and restricted areas - Approval for any activity is contingent on the park being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional park specific stipulations attached to this permit.

16. Notification - The permittee is required to contact the park's Research and Collecting Permit Office (or other offices if indicated in the stipulations associated with this permit) prior to initiating any fieldwork authorized by this permit. Ideally this contact should occur at least one week prior to the initial visit to the park.

17. Expiration date - Permits expire on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).

18. Other stipulations - This permit includes by reference all stipulations listed in the application materials or in additional attachments to this permit provided by the superintendent or a designee. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits.

Appendix B

RTE Plant Species Descriptions

Appendix B

RTE Plant Species Descriptions

***Arabis patens* Sullivant** – Spreading rockcress is another biennial to sometimes perennial member of the mustard family. Stems are 3-6 dm tall, simple or branched, with spreading hairs or glabrous above. Basal leaves are ovate to oblanceolate, 1.5-7 cm long and dentate. Stem leaves are ovate, 2-5 cm long, with an auricled, clasping base and serrate-dentate margins or the uppermost entire. Lower leaves are hirsute on both sides. Pedicels are ascending, 10-16 mm long in fruit. Flowers are white. Siliques 25-45 X 0.5-1.5 mm in size, linear, subterete, and ascending. Valves are 1-nerved to or above the middle. Seeds narrowly winged, 1.25-1.7 mm, and in one row. Habitat includes thin soils on and around shaded outcrops of limestone, dolomite, marble, and calcareous shale; also, in nutrient-rich, river floodplain forests. Flowers occur from April through May and seeds are present through July.

***Astragalus canadensis* Linnaeus** – Canadian milk-vetch is a perennial and rhizomatous member of the legume family. Stems are coarse, branched, 3-16 dm tall, and smooth or slightly hairy. Leaflets number 13-31 and are 1.5-4 cm long by 5-15 mm wide. They are elliptic or obtuse in shape and slightly notched at the tip and are smooth above with stiff, appressed hairs beneath. Racemes 5-12 cm long and densely flowered. Flowers are spreading to reflexed and creamy to greenish-white. Pods cylindrical, erect, 1-2 cm long by 4-7 mm thick, and crowded. Habitats include dry to occasionally mesic, open forests, rocky woodlands, river bluffs in the Piedmont, usually on calcareous substrates. Flowers in May through July and is in seed in August and September.

***Baptisia australis* (Linnaeus) R. Brown** – Blue wild indigo is a perennial herb with ascending branches that can grow to over 1.5 m tall. Leaflets are small (3 cm by 7 cm), oblong, and have entire margins. Flower racemes are erect, terminal, and loosely flowered, growing to 40 cm tall. Flowers are blue and seed pods are pointed, somewhat inflated, and contain many small seeds. Habitat includes prairie-like scour bars and riverside prairies in rich alluvium. Flowering occurs in May and fruits are present from June to August.

***Boechera dentata* (Rafinesque) Al-Shehbaz & Zarucchi** – Short's rockcress is a small, hairy biennial to sometimes perennial member of the mustard family. Stems are 2-7 dm tall, usually branched at the base, and thinly pubescent. Basal rosette leaves are long petioled, dentate, and stellate below, strigose above. Flower petals are white and 2-3 mm long. Siliques (seed capsules) are 1.5-4 X 0.07-0.13 cm, straight to slightly curved, spreading, and stellate-pubescent. Seeds are up to 1 mm in length along one row, wingless. Habitat includes rich, well-drained floodplains and rocky slopes along the Potomac River. Flowering takes place in late March through early to mid-April and seeds are present in June.

***Bromus latiglumis* (Shear) A.S. Hitchcock** – Early-leaf brome is a perennial grass. Stems range in height from 0.5-2 m tall from tufted bases. Leaf sheaths are strongly ribbed, smooth, longer than the internodes, and closed by a firm, hairy ring at the base of the blade. Blades are dark green and 5-17 mm wide with a conspicuous white midrib. The base of the blade contains flanges that form an auricle. The flowering panicle is loose, ovoid, 1.5-3 dm long, with the spreading or drooping branches usually in pairs. Spikelets are lanceolate to elliptic-oblong, 1.5-3.5 cm long by 5-9 mm wide, and each loosely 3-8-flowered. Glumes hairy or smooth. Lemmas thin, smooth or slightly hairy near the base, 3-4 mm wide, and strongly 5-7-nerved. Awns 2-6 mm. Palea with rounded flat

Appendix B

RTE Plant Species Descriptions

tip. Grains 6-7 mm. Habitats include well-drained floodplain forests, riverbanks, and mesic upland forests near streams. Plants begin to flower in July and seeds remain through November.

***Carex careyana* Torrey ex Dewey** – Carey’s sedge is a perennial sedge that grows in tufts with reddish purple bases. Culms are slender, ascending, and triangular, growing from 2.5-8 dm tall. Each culm has several small leaves. Basal leaves lanceolate, 2-3.7 dm long by 8-17 mm wide. The terminal spike is staminate, peduncled, dark brown, and 1-2 cm long. Pistillate spikes 2-4 widely spaced, peduncled to nearly sessile upwardly. Spikes are 4-8-flowered, cylindrical, and 7-20 mm long. Perigynia ovoid, 3-angled, and 5-6.5 cm long with many nerves. Scales are ovate, acute to awned, white to purplish in color with a green midrib, shorter than the perigynia. Achenes 4.5-6 mm and sharply trigonous. Habitat includes rich, well-drained floodplain forests, mesic and dry-mesic upland forests over limestone, dolomite, and mafic rocks. Flowering occurs in March and April and seeds are present in June and July.

***Carex hitchcockiana* Dewey** – Hitchcock’s sedge is a perennial sedge that grows in tufts with brownish bases. Culms are coarse, sharply angled, and 3-7 dm tall. Leaves are flat, 3-7 mm wide with pubescent sheaths. Bracts are leaf-like with stiff hairs. Staminate spike 1-3 cm long. Pistillate spikes 2-4, loosely few-flowered, erect, 1-2.5 cm long, and well separated with varying length peduncles. Perigynia ovoid to obovoid and triangular, 4-5 mm long, and finely nerved. Scales ovate, exceeding the perigynia, and awned. Achenes 3.2-3.9 mm long, obovoid, and tightly enclosed by the perigynium. Habitat includes rich, well-drained floodplain forests, rich cove forests, dry-mesic to dry calcareous forests over limestone, dolomite, and rarely, mafic rocks. Flowering occurs in May and June and seeds are present in July and August.

***Clematis viorna* Linnaeus** – Vasevine is a high climbing somewhat woody perennial in the crowfoot family. Stems are 6-angled and sparsely hairy. Leaves usually bipinnately compound with 2-4 pairs of bright green leaflets. Leaflets are ovate to lanceolate, acute, entire or 2-3-lobed, and sparsely hairy beneath. Flowering stems are usually minutely hairy. Flowers are dull purple and hairy on the back and margins. Fruiting heads are 5-7 cm in diameter. Achenes are 3.5-5 X 3-4.5 mm in size with yellow-brown hairs. Habitats include dry to mesic rocky forests, woodlands, barrens, rock outcrops, rocky river shores, and rich floodplains, usually on base-rich substrates. Flowers in April through early summer with seeds present through October.

***Corallorhiza wisteriana* Conrad** – Spring coralroot is a perennial member of the orchid family. Flowering stems are purplish, somewhat swollen at the base, and 1-4.5 dm tall. The raceme is 5-20 cm long with 6-16 flowers. Flowers are reddish to purplish and horizontal to reflexed on the stem. The flower lip is white with purplish dots, rounded, and bent downward. Capsule 8-12 mm long, drooping. Habitat includes rich mesic forests, dry rocky forests and woodlands, calcareous ravines in the Coastal Plain; usually in base-rich soils. Flowers appear in March and April and seed capsules are present June into July.

***Coreopsis tripteris* Linnaeus** – Tall tickseed is a perennial herb in the composite family with long or short rhizomes. Stems are stout and up to 3 m tall. Leaves are numerous, grow mostly along the stem, and are divided into three to five leaflets. Flowers are yellowish and become tinted purple or deep red. Habitat includes bedrock scour bars and riverside prairies in rich alluvium. Flowering occurs in September and fruits are present from September through October.

Appendix B

RTE Plant Species Descriptions

***Cuscuta polygonorum* Engelm** – Smartweed dodder is an annual parasitic twining or trailing herb in the morning glory family. Stems are slender and orange in color. Flowers are 2-2.5 mm long and sessile, in compact clusters 0.5-1 cm in diameter. Flower parts mostly in fours. Stamens attached in the notches of the corolla. Mature capsule exceeds the calyx. Seeds about 1.3 mm long. Habitat includes depression swamps and ponds, impoundments, and wet clearings. It can be found on *Persicaria* spp. and other herbaceous hosts. Flowers June and July and seeds persist into November.

***Diplazium pycnocarpon* (Sprengel) Broun** – Glade fern is a rhizomatous terrestrial member of the fern family. Rhizomes are about 5 mm in diameter. Fronds are 6-12 dm tall and 1-2 dm wide and once pinnate. Pinnae in 20-30 pairs, linear; 8-12 cm long, with entire margins. The lower pinnae with short stems and the upper ones sessile. Sori linear, nearly straight, and borne on one side of the veinlets. Habitats include rich soils of cove forests, mesic slope forests, and Coastal Plain calcareous ravines.

***Erigenia bulbosa* (Michaux) Nuttall** – Harbinger-of-spring is a perennial spring ephemeral member of the carrot family with deep tubers. Stems are 1-2.3 dm, simple, and glabrous. One or two broadly ovate leaves reach 10-20 cm at maturity and are two to three-ternately divided into linear to spatulate segments. Umbels are terminal and compound, usually into three rays. Petals are 3-4 mm long and anthers are black. Fruits are about 2 mm long and 3-5 mm wide, subtended by persistent bracts. Plants are found on rich soils of well-drained floodplain forests and mesic slope forests at low elevations. Flowers from late February through March and seeds are present in April.

***Erythronium albidum* Nuttall** – Small white fawn-lily is a perennial member of the lily family. It has a very deep bulb or corm and is extensively colonial. Sterile corms numerous, producing a single leaf. Fertile corms with two, mostly mottled leaves 8-22 X 1.3-2 cm in size. Leaves are elliptic-lanceolate to elliptic, acute or short-acuminate. Scapes (flowering stems) stout, 1-2 dm in length. White to pinkish to bluish white flowers 2.5-5 cm in size. Stigmas 3-cleft and spreading or recurved. Capsules rounded to slightly depressed at the summit, erect, and usually held off the ground. Habitat includes rich, well-rained floodplain forests and, occasionally on adjacent mesic, lower slopes. Flowers appear from February to mid-April and fruits are present in May.

***Galactia volubilis* (Linnaeus) Britton** – Downy milk-pea is trailing or twining herbaceous perennial in the legume family. Stems up to 1.5 m in length with spreading or retrorse, fine hairs. Leaflets are ovate to oval-oblong and 1.5-4 cm long by 1-2.5 cm wide. Peduncles and rachis hairy, 3-15 cm long, with flowers growing nearly to the base 1-3 cm apart from one another. Calyx 4-5.5 mm long. Flower about 12 mm long and pink or purplish in color, the keel petals 6-7 mm long. Legumes linear, 2.5-5 cm long by 4 mm wide, and densely soft-hairy. Habitats include dry woodlands, barrens, and clearings. Flowers from May to July and seeds present through September.

***Gentiana villosa* Linnaeus** – Striped gentian is a perennial herb in the gentian family. Stems can be singular or multiple arising from tubers or rhizomes and range from 1-6 dm tall. Leaves are 4-8 cm long, blunt tipped, and long tapering to the base. Flowers are greenish-white to greenish-

Appendix B

RTE Plant Species Descriptions

purple and striped within. Capsules 1.7-2.5 cm long, ellipsoid to oblong. Seeds 1.1-1.3 mm long, wingless. Habitats include dry to occasionally mesic upland forests and clearings. Flowers in July and August and seeds present into November.

***Geum aleppicum* Jacquin** – Yellow avens is a perennial herb in the rose family. Stems are stout, 6-15 dm tall, and hairy. Basal leaves are long petioled, pinnately compound, with 5-9 main obovate leaflets that are incised and toothed. Stem leaves with 3-5 acute, incised leaflets. Stipules incised and 1-2 cm long. Flowers deep yellow to orange, 10-20 mm across. Petals rounded to broad-obovate, 5-10 mm long. Fruiting head globose-ovoid, 14-23 mm broad, with the achenes attached to a hairy receptacle. Achenes hairy to glabrous. Habitats include floodplain forests, and mesic or alluvial shaded clearings. Flowers appear in May and June and plants remain in seed through July and August.

***Helianthus occidentalis* Riddell** – Few-leaf sunflower is a rhizomatous perennial herb in the composite family. Stems are hairy and 4-25 dm tall. Leaves are opposite, oval or lanceolate-ovate, and range in size from 5-20 cm long by 2-10 cm wide. Margins are mostly entire and leaf surfaces are scabrous. Lower leaves often deciduous. Petioles hairy, upper leaf petioles 3-15 cm long. Flower heads yellow and few, growing on long peduncles. Habitats include riverside prairies and outcrops. Flowers in July and August and seeds persist into November.

***Hibiscus laevis* Allioni** – Halberd-leaf Rose-mallow is a smooth perennial herb in the mallow family. Stems are 0.9-2 m tall. Lower leaves ovate-cordate, upper leaves 6-14 cm long and usually hastate with a long tapering terminal lobe and widely spreading basal lobes. Flowers are pink with a purple center 12-16 cm wide. Capsule ovoid, smooth, but seeds are hairy. Habitats include sandy, gravelly, muddy, and rocky depositional bars and river shores; floodplain pools and ponds, canals, ditches, and disturbed alluvial wetlands. Flowers May through early to mid-July and plants remain in seed in August and September.

***Hybanthus concolor* (T.F. Forster) Sprengel** – Eastern green violet is a perennial member of the violet family. Stems are single or clustered, erect, pubescent, and 3-9 dm tall. Leaves are oblong, entire or toothed, tapering to both the base and apex, and 7-16 cm long. Pedicels 1-2 cm long. Flowers 4-5 mm long with narrow sepals about as long as the greenish white petals. Capsules oblong or ellipsoid, 1.5-2 cm long. Seeds are nearly globose, about 5 mm in diameter, and cream-colored. Habitats include rich cove forests, mesic slope forests and bluffs on mafic and calcareous rocks, rich montane oak-hickory forests, and dry-mesic calcareous forests. Flowers from March to April and seeds present in May and June.

***Iresine rhizomatosa* Standley** – Juda's-bush is a rhizomatous perennial herb in the amaranth family. Stems 3-15 dm tall. Leaves thin, ovate-lanceolate, with a pointed tip and tapered base. Larger leaves are 14 cm long and 4-7 cm wide. Pistillate panicle is pyramid-shaped and up to 3 dm long, with numerous small white-hairy flowers. Seeds to 0.5 mm long. Habitats include sandy floodplain forests and riverbanks in the Piedmont. Flowers emerge in July and August and seeds persist into November.

***Lipocarpha micrantha* (Vahl) G. Tucker** – Small-flower halfchaff sedge is an annual member of the sedge family. Culms are arching and 2-20 cm tall. Leaves up to 10 cm long and about 0.5 mm

Appendix B

RTE Plant Species Descriptions

wide. Spikelets 1-3, cylindrical or ovoid, and 2-4 mm long. Achene cylindrical to oblong-ovoid, about 0.6 mm long, finely reticulate, and possessing a minute beak. Habitats include seasonally exposed, sandy, gravelly, or silty shores and bars along the larger rivers and reservoir impoundments. Flowers emerge in June through July and achenes are present in August and September.

***Maianthemum stellatum* (Linnaeus) Link** – Starry false solomon's seal is another perennial member of the lily family with elongate, pale rhizomes. Stems are erect to arching and somewhat zigzag, 2-6.5 dm tall, and either hairy or glabrous. Stems support 6-12, 2-ranked, sessile, lanceolate to lance-oblong, taper-pointed leaves measuring 4-15 cm long by 2-5 cm wide that are finely pubescent beneath. The flower stalk is 2-5 cm long with few white flowers with perianth parts (sepals and petals) 4-6 mm long. The berry is black or green with black stripes, 6-10 mm in diameter. Habitat includes riverside sand and rock bars, rich floodplain forests, calcareous fens, and seepage swamps. Flowers emerge in April and May and fruits are present into September.

***Matelea obliqua* (Jacquin) Woodson** – Climbing milkweed or angle-pod is a perennial herbaceous vine in the dogbane family. Stems are hairy. Leaves are rounded with a pointed tip and a base that is somewhat heart shaped, growing up to 15 cm in length and 13 cm in width. The inflorescence is branched, often compound, and 10 to 50 flowered. Flowers are somewhat star shaped with purplish petals. Habitat includes bedrock scour and terrace woodlands in rich alluvium, upland forests, barrens, glades, clearings, and roadsides over limestone or shale substrates. The plants typically flower from June to July and are in fruit in September.

***Mecardonia acuminata* (Walter) Small** – Axil-flower is a perennial herb in the plantain family. Stems 2-5 dm tall, erect, and possessing few branches. Leaves 2-4 cm long, oblanceolate, and serrate beyond the middle. Flower stalks slender and 1-3 cm long, ascending from the axils of the leaves. Flowers are white, but sometimes with purple or lavender lines on the lower lip. Capsules 6-8 mm long, ellipsoid. Habitats include floodplain ponds and pools, ditches, wet clearings, wet meadows, bottomland fields, and other open, disturbed wet habitats. Flowers occur in June and July, with plants persisting until October.

***Monarda clinopodia* Linnaeus** – White bergamot is a perennial member of the mint family. Stems are smooth to slightly hairy and reach a meter in height. Leaves are 6-12 cm long, serrate, and ovate to narrowly triangular in shape, tapering to a long point. Bracteal leaves mostly green. The Flowers dull white or yellowish, 1.5-3 cm long, and with the upper lip not long hairy. Nutlets 1.2-1.3 mm long and yellowish brown. Habitats include mesic to dry upland forests, preferring moderately to strongly base-rich soils. Flowers occur in May through early July and seeds are present through October.

***Paspalum fluitans* (Elliott) Kunth** – Horse-tail paspalum is an aquatic annual grass. Stems are soft and spongy and grow to a meter long. Plants submerged in water have elongate stems that are little branched. Plants that are growing more terrestrially often form mats. Leaves are lanceolate, up to 35 cm by 2 cm in size, and taper at both ends. Flowering spikelets occur in open panicles with up to 70 branches. Upper florets are white. Habitat includes floodplain seeps and pools with muck soils or seasonally exposed rocky stream channels. The flowering/fruiting period is late August through September or early October.

Appendix B

RTE Plant Species Descriptions

***Phacelia covillei* S. Watson ex A. Gray** – Buttercup scorpion-weed is a short, hairy annual or biennial. Stems are weak, spreading, and up to 20 cm long. The oblong leaves are pinnate and deeply divided into one to six segments, the terminal segment often with three lobes. The inflorescence is also sparsely hairy and is comprised of five blue petals. Seed capsules are 4-6 mm in diameter, rounded, and contain four seeds. Habitat includes rich floodplain and terrace and ravine forests and mesic upland woods. Flowering typically occurs from late March to April with fruits present in May.

***Phaseolus polystachios* (Linnaeus) Britton, Sterns, & Poggenburg** – Thicket bean is a trailing, twining, or climbing perennial herbaceous vine in the legume family. Stems are finely pubescent and grow 1-4.5 m in length. The three leaflets are ovate to rounded, 4-10 cm long, and the lateral ones with unequal sides. All leaflets have 2 mm stipules at the base of the short stalks. Leaves hairy above and below. Flowers are purple, arising on long-stalked racemes 1-3 dm long. Individual flowers 8-12 mm long. Legumes drooping, flattened, and somewhat curved, 3.5-7 cm long by 5-6 mm wide. Seeds black or dark gray, flattened, and 5-10 mm long. Habitats include mesic to dry forests and rocky woodlands, usually in base-rich soils. Flowers arise June through early August and seeds persist into October.

***Polygala polygama* Walter** – Racemed milkwort is a biennial or perennial member of the milkwort family. Stems are 1-4.5 dm tall, numerous, glabrous, unbranched, and very leafy. Basal leaves are spatulate and stem leaves are oblong or oblanceolate, 1-3 cm long by 2-6 mm wide and entire. Flowers are born in loose, terminal racemes that are 2-15 cm long. Flowers are purple, rose, or white and 5-6 mm long; the central petal with a large, fringed crest. Stamens eight in number. The capsule is plump and 3-4 mm long. Seeds are hairy and bear an aril. Habitats include dry, rocky, or sandy woodlands and clearings. Flowers from April to June with seeds present July through August.

***Potamogeton foliosus* Rafinesque** – Leafy pondweed is a rhizomatous, aquatic perennial pondweed. Stems are flattened and up to 7 dm long, often rooting from the nodes. All leaves are submerged, 2-10 cm long and 0.5-2.5 mm wide. Flower stalks 3-10 mm long bearing cylindrical spikes 4 mm thick in two or three whorls with two flowers each. Fruit is orbicular and flattened, 0.2-2.5 mm long, with a dorsal keel and a beak 0.2-0.4 mm long. Habitats include ponds, lakes, streams, and rivers. Plants are active April to November.

***Pycnanthemum verticillatum* (Michaux) Persoon** – Whorled mountain-mint is a perennial herb of the mint family. Stems grow to 8 dm tall and are slightly hairy on the sides and angles. Leaves are short-petioled, narrowly lanceolate, and the main ones 3-5 cm long by 8-12 mm wide. The tips of the leaves are tapering, the margins have a few low teeth, and hairs occur on the 4-7 lateral veins beneath the leaf. Flowering heads numerous, 8-15 mm in diameter and usually terminal. Outer bracts of the flower grayish white and velvety above. Inner bracts more lanceolate, acuminate, usually longer than the calyces and also hairy. Habitats include wet meadows, fens, stream banks, and open upland forests. Flowers appear in June through early August and seeds persist until October.

Appendix B

RTE Plant Species Descriptions

***Rumex altissimus* A. Wood** – Tall dock is a perennial herbaceous plant with a long tap root that grows up to 2 m tall. Leaves occur primarily along the stem, are ovate or oblong lanceolate, and grow to 15 cm long. Flowers are born on spikelike racemes up to 30 cm long. Habitat includes frequently flooded zones along rivers in sandy to gravelly alluvium. They can also occur within forested wetlands in muck soils. Their flowering period is from May to June or rarely July. The plants typically go to seed in August.

***Sagittaria rigida* Pursh** – Sessile-fruit arrowhead is a highly variable perennial emergent or submerged member of the water-plantain family. Stems can be 1-8 dm in length depending upon the depth of the water. Leaves 5-15 cm long by 2-8 cm wide, linear to oval, and rarely sagittate. Inflorescences with 2-8 whorls, each with 2-8 white flowers. The lower two whorls bear pistillate flowers while the upper whorls bear staminate flowers. Fruiting heads sessile or nearly so. Achenes 2.5-4 mm long, rugose, winged only on the margins, and with an erect or curved beak 1-1.5 mm long. Habitats include natural mountain ponds and wet meadows. Flowers in June and July and plants persist into November.

***Salix exigua* (Nees) Nesom** – Sandbar willow is a somewhat colonial shrub or small tree in the willow family that grows to 10 m in height. Stems are grayish and numerous with abundant lateral shoots. Young branches can be smooth or slightly hairy and are reddish or brown in color. Leaves are linear, 3-15 cm long by 4-6 cm wide, shallowly toothed on the margins, and green on both sides, though paler beneath. Leaf petioles are 1-5 mm long and somewhat hairy. Catkins appear with leaves on short lateral branches from axillary buds of the previous year. Staminate catkins 2-4 cm long and pistillate catkins to 8 cm in fruit. Capsules 5-9 mm long, narrowly lanceolate or ovoid-conic, and thinly silky. Habitats include river and stream banks, rocky flood-scoured shores and bars, sand and gravel bars, and ditches. Flowers from February to June.

***Senecio suaveolens* (Linnaeus) Elliot** – False Indian-plantain is a perennial herb in the composite family. Stems are grooved or ribbed and slightly glaucous, reaching a height of 3 m. Leaves are lanceolate to ovate and hastate, measuring 5-20 cm long and nearly equally wide. Leaf margins are doubly serrate. Leaf petioles are wing-margined. Flower heads 20-40 flowered and white. Habitats include floodplain forests, riverbanks, and sandy or rocky, flood-scoured bars. Flowers emerge in June and July and seeds persist into October.

***Sida hermaphrodita* (Linnaeus) Rusby** – Virginia fanpetals is a smooth perennial herb in the mallow family. Stems grow from 1-4 m tall. Leaves are petioled, palmately veined, and deeply lobed; 1-2 dm long by 7.5-15 cm wide. Lobes are three to seven, sharply pointed, with the middle lobe being the longest. Margins of each lobe are slightly toothed. Flowers are white, 18-24 mm in diameter. They grow in terminal, corymbose panicles. The calyx is round at the base with sharp-pointed lobes. Carpels usually 10, acuminate into one beak. Habitats include sandy or rocky river shores and in adjacent railroad right-of ways. Flowers appear in June and July and plants remain in seed from August through September.

***Silene nivea* (Nuttall) Muhlenberg ex Otth** – Snowy catchfly is a weak perennial member of the pink family. Stems are erect to leaning, 3-8 dm tall, smooth or with minute hairs. Leaves are thin, lanceolate, 8-13 cm long and 1-1.5 cm wide with pointed tips. Flowers are few on slender pedicels in the axils of the upper leaves. Calyx inflated and white petals wedge shaped with a slight notch.

Appendix B

RTE Plant Species Descriptions

Capsules globose and 8-10 mm long. Seeds 0.7-1 mm long. Habitats include rocky or sandy, flood-scoured riversides, stream beds, and rocky banks. Flowers occur in May and June and seeds are present July and August.

***Solidago racemosa* Greene** – Rand's goldenrod is a perennial herb in the composite family. Stems are smooth, slender, and usually tufted from a short, branched base. Plants grow to 6 dm tall. Basal and stem leaves are oblanceolate, acute to sub-acute, entire or slightly toothed, and 3.5-15 cm long by 5-15 mm wide. The inflorescence is a loose, wand-shaped raceme. Involucres narrowly bell-shaped and 3-8 mm high. The phyllaries occur in three series and are sticky-hairy, paper-like, linear, and blunt to sharp-pointed, with green tips. Ray flowers are yellow and number 7-16. Disk flowers 6-31 in number. Achenes 2-3 mm long and somewhat hairy. Habitats include riverside woodlands, prairies, outcrops, and rocky bars. Flowers present July and August and plants in seed through October.

***Triphora trianthophoros* (Swartz) Rydberg** – Threebirds is a perennial herb in the orchid family. Stems are 1-3 dm tall and often tinged with maroon. Leaves are sessile, ovate, and 1-2 cm long. Flowers are 1-1.5 cm long, pale pink to whitish, and marked with green veins. Sepals and petals lanceolate. The flower lip is about equal to the sepals and marked with three green lines. The anthers have reddish-purple ridges and the pollen is purple. Habitats include mesic slope forests, montane alluvial forests, and large-river floodplain forests. Plants flower in July and August and persist until October.

***Valeriana pauciflora* Michaux** – Large-flowered valerian is a perennial herb in the valerian family that spreads by slender, horizontal rhizomes or runners. Stems are numerous and 3-8 dm tall. Basal leaves are long petioled, usually not divided, heart-shaped or broadly ovate, acute with toothed margins. Stem leaves are short-petioled and pinnately divided into 3-7 segments, the end segment broadly ovate and much larger than the lateral ones. Flowers in a dense corymb that elongates into a loosely pyramidal shape. Corolla tubes 1-1.8 cm long and pale pink. Fruits are oblong to lanceolate, 4-5 mm long. Achenes are elliptic to ovate and 4.5-6.2 mm long with the body narrowly winged. Habitats include nutrient-rich soils of floodplain forests and river-fronting slopes. Flowers in April and May and seeds present in June and July.

Appendix C

Photographs

Appendix C Photolog
I-495 & I-270 Managed Lanes Study
Rare, Threatened, and Endangered Plant Survey
CHOH Unit (Maryland)



Photo 1: Looking at mesic forested habitat area on upper terrace with *Phacelia covillei*



Photo 2: Close up of *Phacelia covillei* in flower

Appendix C Photolog I-495 & I-270 Managed Lanes Study Rare, Threatened, and Endangered Plant Survey



Photo 3: Habitat of *Carex careyana*



Photo 4: *Carex careyana* showing purple sheaths

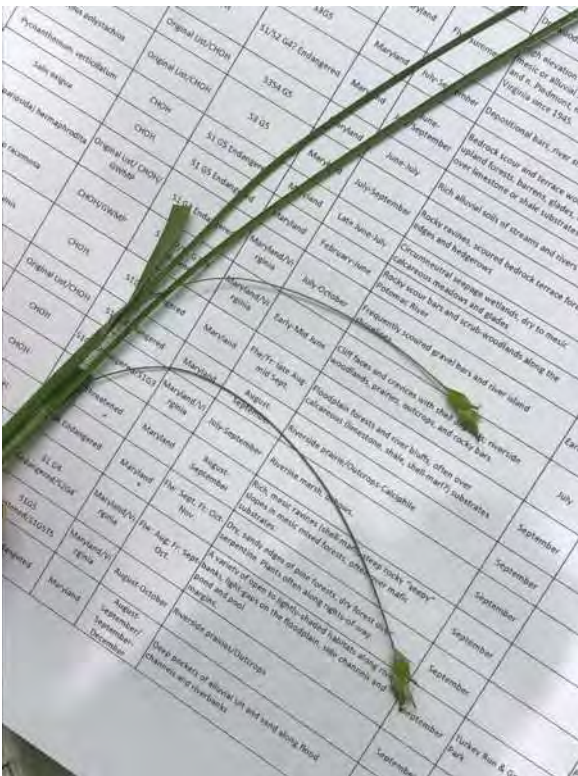


Photo 5: *Carex careyana* lateral spike



Photo 6: *Carex careyana* terminal spike

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Rare, Threatened, and Endangered Plant Survey



Photo 7: Looking upstream at habitat for *Rumex altissimus* along Potomac River shoreline upstream of American Legion Bridge



Photo 8: *Rumex altissimus* growing in floodplain of Potomac River

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Rare, Threatened, and Endangered Plant Survey



Photo 9: Looking downstream at large patch of emerging *Hibiscus laevis* on mudflat



Photo 10: *Hibiscus laevis* growing in C&O Canal within LOD

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Rare, Threatened, and Endangered Plant Survey



Photo 11: *Hibiscus laevis* in bloom

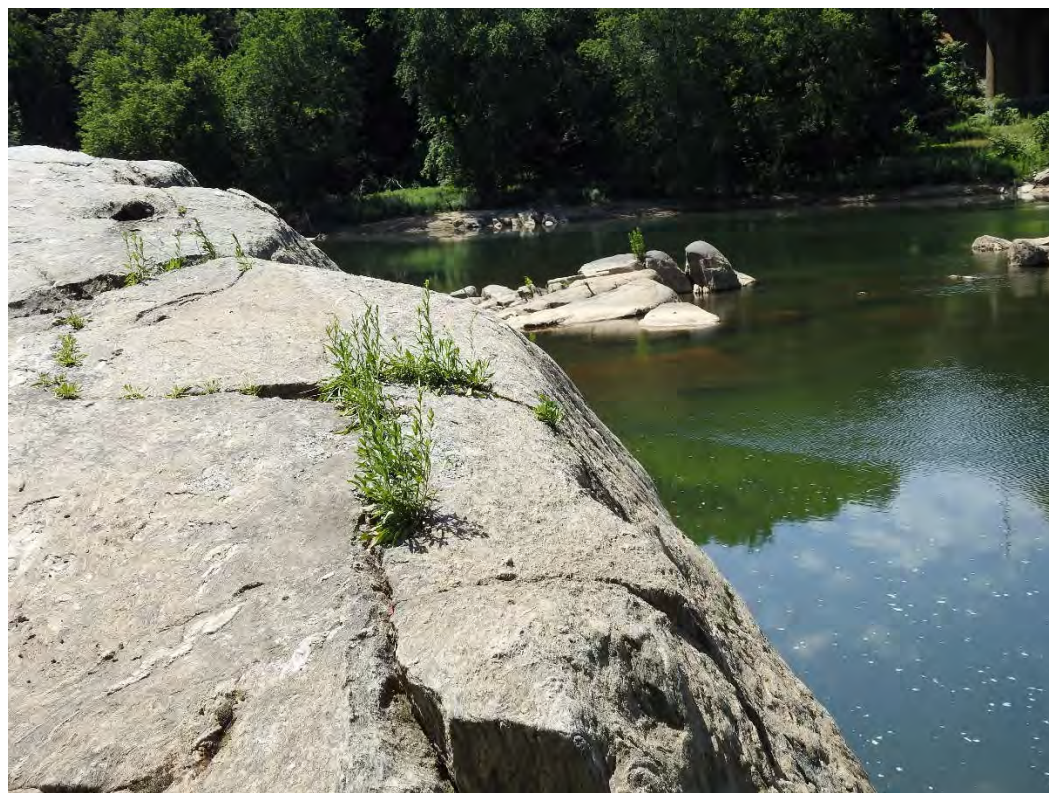


Photo 12: Habitat of *Solidago racemosa* on boulders at Potomac River edge

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Rare, Threatened, and Endangered Plant Survey



Photo 13: *Solidago racemosa* growing on in-river boulder



Photo 14: *Solidago racemosa* flowers

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Photo 15: *Paspalum fluitans* habitat along active floodplain and shoreline looking downstream from upstream of American Legion Bridge



Photo 16: *Paspalum fluitans* spike with seeds

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Photo 17: Patch of likely *Monarda clinopodia* on mesic terrace of Plummers Island



Photo 18: Browsed *Monarda clinopodia* plant

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Rare, Threatened, and Endangered Plant Survey
GWMP Unit (Virginia)



Photo 19: Microhabitat of *Phacelia covillei* within mesic terrace above active floodplain



Photo 20: *Phacelia covillei* in flower

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Photo 21: General habitat area of *Carex careyana* on mesic terrace downstream of the American Legion Bridge



Photo 22: *Carex careyana* microhabitat

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Rare, Threatened, and Endangered Plant Survey



Photo 23: *Carex careyana* purple bases



Photo 24: *Carex careyana* staminate and pistillate spikes