



Vegetation Classification and Mapping of Land Additions at Richmond National Battlefield Park, Virginia

Addendum to Technical Report
NPS/NER/NRTR–2008/128

Natural Resource Report NPS/RICH/NRR—2022/2450



ON THE COVER

Upper left: Coastal Plain Mixed Oak / Heath Forest. Upper right: Coastal Plain / Piedmont Acidic Seepage Swamp. Lower left: Cultural Meadow with cannon. Photographs by: Gary P. Fleming. Lower right: Open Earthworks. Photograph by: Karen D. Patterson.

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Abstract

In 2008 and 2015, the Virginia Department of Conservation and Recreation, Division of Natural Heritage produced vegetation maps for Richmond National Battlefield Park, following the protocols of the United States Geological Survey (USGS) – National Park Service (NPS) Vegetation Mapping Program. The original 2008 report was part of a regional project to map and classify the vegetation in seven national parks in Virginia. The 2015 report was an addendum to the original report and mapped the vegetation in newly acquired parcels. Since 2015, the park has acquired an additional 820 acres of land within 12 individual parcels, including the 650 acre North Anna unit. This report is an addendum to the 2008 and 2015 reports and documents the mapping of vegetation and other land-use classes for the 12 new land parcels at Richmond National Battlefield Park, with an updated vegetation map for the entire park. The updated map and associated data provide information on the sensitivity and ecological integrity of habitats and can help prioritize areas for protection.

The vegetation map of the new land parcels includes eighteen map classes, representing 14 associations from the United States National Vegetation Classification, one nonstandard, park-specific class, and three Anderson Level II land-use categories. The vegetation classification and map classes are consistent with the original 2008 report. Vegetation-map classes for the new land parcels were identified through field reconnaissance, data collection, and aerial photo interpretation. Aerial photography from 2017 served as the base map for mapping the 12 new parcels, and field sampling was conducted in the summer of 2020.

Three new map classes for the park were encountered and described during the study, all within the North Anna park unit. These map classes are Coastal Plain / Outer Piedmont Basic Mesic Forest, Northern Coastal Plain / Piedmont Oak – Beech / Heath Forest, and Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest. The examples of Coastal Plain / Outer Piedmont Basic Mesic Forest and Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest at North Anna meet the criteria of size, condition, and landscape context to be considered a Natural Heritage exemplary natural community occurrence and should be targeted for protection and management as needed. New local and global descriptions for the three map classes are included as part of this report. Refinements were made to the vegetation field key to include the new map classes. The updated field key is part of this report. An updated table listing the number of polygons and total hectares for each of the 28 vegetation- map classes over the entire park is also included in the report.

A GIS coverage containing a vegetation map for the entire park with updated Federal Geographic Data Committee (FGDC) compliant metadata was completed for this project. The attribute table field names are the same as the 2008 and 2015 products, with the exception of an additional field indicating the year each polygon was last edited.

The original 2008 and 2015 reports for Richmond National Battlefield Park can be accessed at the NPS Integrated Resource Management Applications (IRMA) portal.

- [Vegetation Classification and Mapping at Richmond National Battlefield Park, Virginia \(2008\)](#)

- [Vegetation classification and mapping of land additions at Richmond National Battlefield Park, Virginia: Addendum to technical report NPS/NER/NRTR—2008/128 \(2015\)](#)

Introduction

Project Background

In 2008, the Virginia Department of Conservation and Recreation, Division of Natural Heritage (VADNH) produced vegetation maps for Richmond National Battlefield Park (RICH), following the protocols of the USGS-NPS Vegetation Mapping Program (Patterson, 2008). The 2008 report was part of a regional project to map and classify the vegetation in seven national parks in Virginia, including RICH. Vegetation data collected from the seven NPS units were combined with over 2,000 existing plot samples from throughout the Mid-Atlantic Piedmont and Coastal Plain. These data were used to refine the vegetation classification for the Mid-Atlantic region based on the United States National Vegetation Classification (USNVC) (FGDC, 2008) and to produce accurate vegetation maps for each national park.

Between 2008 and 2015, RICH acquired an additional 659 hectares (1,627 acres) of land within 20 individual parcels. These lands were inventoried and mapped by VADNH using the same methodology as Patterson 2008 and the study was produced as an addendum to the original report (Taverna, 2015). In 2016, RICH acquired an additional 265 hectares (654 acres) along the North Anna River in Hanover County, Virginia (hereafter North Anna unit). Additional land acquisitions cover 67 hectares (166 acres) in 11 smaller parcels across Richmond National Battlefield Park. In 2019, the National Park Service contracted with VADNH to map the vegetation on the new RICH parcels that were not included in the 2015 vegetation mapping project. This study is intended to be a second addendum to the original report and all new maps use the vegetation classification developed for the 2008 report. The goal of the continued mapping effort at RICH is to produce an updated digital geospatial vegetation database for the park that includes the newly mapped parcels as well as the portions originally mapped in 2008. This updated dataset and associated information can be used to support a wide variety of natural resources assessment, management, and conservation activities.

The contract between NPS and VADNH also specifies that any new map classes present in the new parcels should be added to the vegetation field key and map class descriptions. Three new map classes were encountered and described during the study in the North Anna unit; Coastal Plain / Outer Piedmont Basic Mesic Forest, Northern Coastal Plain / Piedmont Oak – Beech / Heath Forest, and Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest. In addition, new information was collected for Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash - Red Maple Type). New and updated local and global descriptions for the four map classes are included in Appendix B of this report. Refinements were made to the existing vegetation field key to describe the new types and the updated field key is included in Appendix A. See Patterson 2008 and Taverna 2015 for the most up-to-date descriptions for all other map classes at RICH.

New Parcel Information

Prior to the new land additions in 2016, Richmond National Battlefield Park consisted of 1224 ha (3,024 ac) in ten units spread out over Henrico, Hanover, and Chesterfield counties, Virginia, and the city of Richmond. The new parcels are located in three of the park's ten principal units and include a new unit north of Richmond along the North Anna River, the North Anna unit. All the units span the

Northern Coastal Plain of Virginia. Figure 1 illustrates the location of new land parcels in relationship to the previously mapped park land.

The 12 parcels acquired for the park since 2016 add an additional 332 ha (820 ac) of land. The parcels range in size from 1.2 ha (3 ac) to the large North Anna parcel of 265 ha (654 ac). Table 1 lists summary information for the new parcels, including number of parcels in each park unit, total acreage, and tract information.

Table 1. Summary of land parcel information for new land additions at Richmond National Battlefield Park, Virginia.

Location	Tract Name	Parcel count	Area (Ha)	Area (Acres)
North Anna	North Anna	1	264.8	654.3
Cold Harbor	Nolte, Owens, Foss, Wright	4	32.2	79.6
Gaines' Mill	Boyette, Ryan, Adams, Randolph	4	10.8	26.6
Malvern Hill	Glendale, Donley, Woods	3	24.2	59.8
TOTAL	n/a	12	332.0	820.3

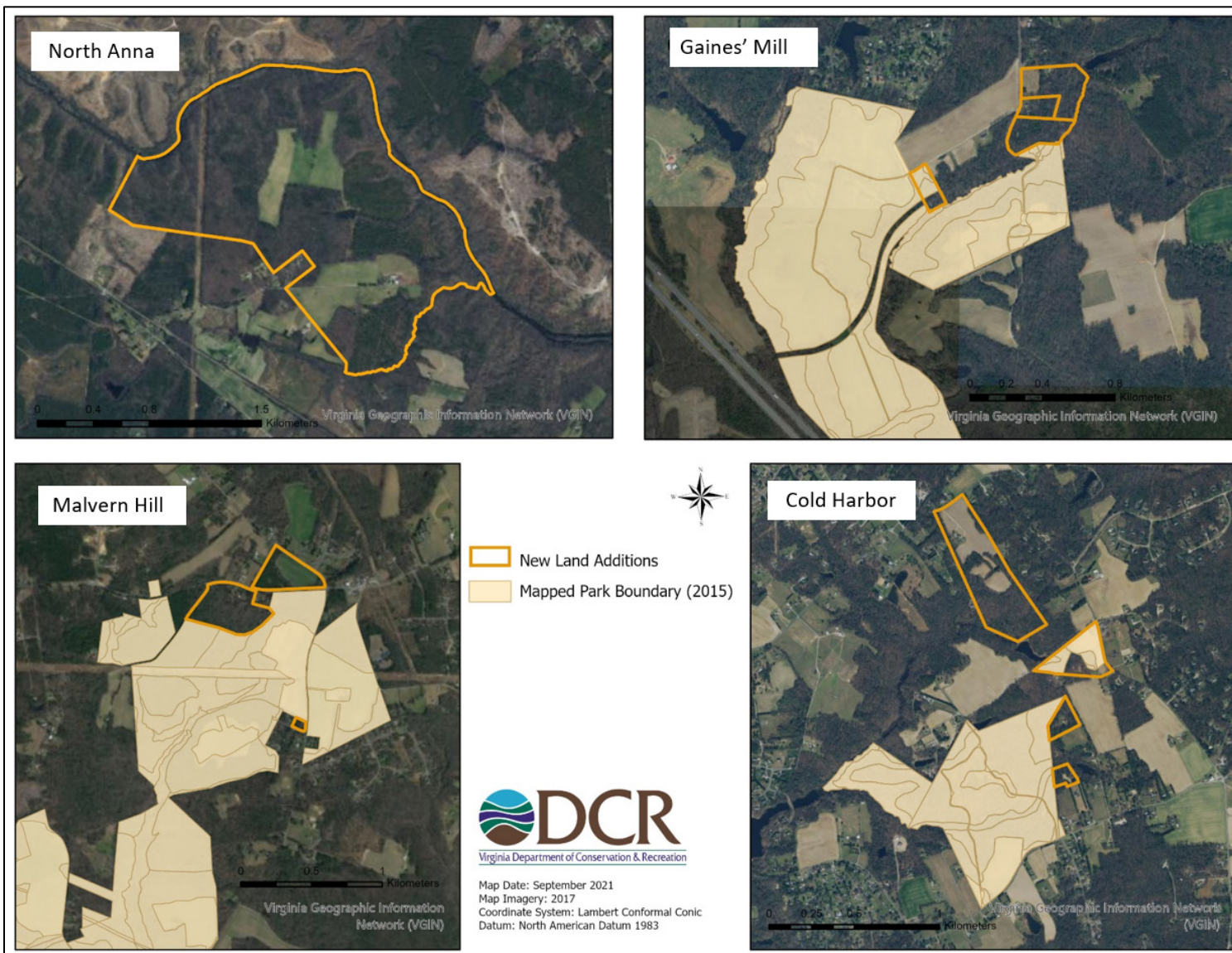


Figure 1. Map of new land parcels at Richmond National Battlefield Park, Virginia.

Methods

Preliminary Data Collection and Review of Existing Information

The existing spatial data products from the 2015 vegetation mapping project were combined with the new parcel layers to create a new geodatabase for the park using Esri ArcGIS Pro 2.8.0 software. The 2017 leaf-off, color-infrared orthophotography from the Virginia Base Mapping Program (VBMP) was used as the base for mapping. The 2017 imagery has a nominal scale of 1:200 with 1-ft pixel resolution.

The parcel shapefile obtained from NPS was examined over the aerial photography to identify clear areas of homogeneous vegetation or land use and to prioritize sites for field data collection. Two parcels, identified as open meadows, agricultural areas, residential, or other built-up land were classified to map class using photo interpretation alone. Because of the distinct photo-signature these areas were not considered priorities for on-the-ground evaluation. The remaining 10 parcels contained forested areas and were targeted for field surveys during the 2020 field season. The North Anna unit required multiple visits over the field season to fully inventory the property. NPS staff at RICH reviewed the parcels and identified areas with private land restrictions and assisted VADNH Ecologists in gaining access.

Field Data Collection

VADNH Ecologists conducted field data collection on the new land additions in Richmond National Battlefield Park from May to August of 2020. The objectives of the fieldwork were to identify the dominant vegetation in each parcel using the field key developed for RICH in 2008 (Patterson, 2008), and to collect any additional information needed (such as variation in vegetation or environment) to help attribute and edit the polygon line work in the new parcel layer.

VADNH ecologists collected 76 qualitative observation points throughout 12 parcels in the park. Fifty-one of the total observation points were collected at the North Anna unit. Preselected points were located in the field using a handheld Garmin Oregon 650. At each point, the ecologists assigned the stand to a map class using the existing field key or took notes to describe any new types and/or vegetation transitions. When possible, the entire stand was traversed and additional points were collected to mark significant vegetation change within the stand. Dominant or diagnostic species were usually noted, as well as any other site characteristics that may be helpful in classifying and mapping the vegetation. This process allowed for additional field testing of the 2015 key and helped to identify any shortcomings. The key was edited and refined as needed as field work progressed.

Vegetation Map Preparation

The updated vegetation map for RICH integrates spatial data from the 2008 and 2015 mapping projects with the vegetation polygons created from mapping the new parcels. Initial map preparation included dissolving all internal parcel boundary lines to create a project boundary. The new parcel shapefile was then merged with the 2015 vegetation map to create one seamless feature class. The boundary of the 2015 map was considered the correct map boundary and any overlapping parcel boundaries were corrected to conform to this vegetation map boundary (as per NPS staff communication).

To ensure geometric integrity, the merged vegetation feature class was validated using defined map topology rules. The cluster tolerance was set to 0.5 m (approximately one tenth of the desired positional accuracy). Topology rules were established such that polygons would neither overlap nor have gaps between them. Topology was repeatedly validated as editing proceeded.

VADNH ecologists delineated visible areas of homogeneous vegetation or land use, as well as other map classes, in the new parcel polygons using ArcGIS Pro 2.8.0 onscreen digitizing tools (Esri 2021). Geoprocessing to split polygons and modify polygon boundaries was executed at a scale of 1:6000 or finer (typically at 1:2000). Differences in color, texture, density, and pattern (i.e. photo signature) were useful for distinguishing some map classes, but many were indistinguishable by photo signature alone. We also relied on elevation contours and field data for separating vegetation communities and assigning map classes.

Each new polygon was assigned to one of the map classes developed for RICH in the 2008 and 2015 vegetation mapping projects (Patterson 2008, Taverna 2015) or to one of the three new map classes identified during the project. The attribute table of the final vegetation map is consistent with the 2008 vegetation map, except for the addition of a 'YR_EDITED' field indicating the year each polygon was last edited (2008, 2013, or 2020).

After completion of a draft map, final quality control measures were implemented. A topology check was run to ensure no polygon gaps or overlaps, and a geometry check was run to ensure there were no self-intersections, empty features, or other spatial errors. Any polygons under 0.01 ha in size were individually inspected as possible spurious sliver polygons and merged with adjacent polygons as needed.

Prior to the project it was determined that an accuracy assessment of the new vegetation polygons, as described in the NPS accuracy assessment protocols (Lea and Curtis, 2010), was not necessary given the relatively small size and number of additional lands. A full accuracy assessment was carried out for the original 2008 vegetation map and the overall map accuracy for the final vegetation map was 85.9% (Patterson, 2008). In some cases the new polygons are extensions of the original 2008 polygons and therefore initial field work covered much of the general area. In addition, the majority of the new parcels have less than 20 polygons per map class and cover a relatively small area (<10 ha).

Metadata Preparation

The final vegetation map is accompanied by detailed FGDC compliant metadata (FGDC, 1998). Metadata are critical elements of each spatial dataset, allowing future users of the data to understand how the dataset was developed, appropriate uses, and to locate specific information within the spatial dataset. An updated metadata record for the new vegetation map was created using Esri ArcGIS Pro 2.8.0. This process ensures that all elements required by the FGDC standard are included in the metadata files.

Results

The 2021 vegetation map for Richmond National Battlefield Park expands the mapped park acreage by 27%, for a total mapped area of 1550 ha (3830 ac). Table 2 shows the map classes identified and mapped on the RICH lands acquired since 2016 and provides a summary of the map class frequency and abundance. Ninety-four new vegetation polygons were delineated on 12 land parcels. The 2021 updated full vegetation map for RICH has a total of 445 polygons and includes 28 vegetation map classes (Table 3).

Table 2. Number of polygons and total mapped hectares for the post-2015 land additions at Richmond National Battlefield Park, Virginia.

Map Class	Number of polygons	Total mapped hectares
Acidic Oak - Hickory Forest	15	28.1
Mesic Mixed Hardwood Forest	12	70.8
Coastal Plain / Outer Piedmont Basic Mesic Forest	4	10.7
Coastal Plain Mixed Oak / Heath Forest	10	26.4
Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest	3	1.4
Coastal Plain / Piedmont Acidic Seepage Swamp	1	0.2
Coastal Plain / Piedmont Small Stream Floodplain Forest	2	2.0
Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest	3	8.2
Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type)	3	0.8
Beaver Wetland Complex	1	0.5
Cultural Meadow	7	64.1
Successional Mixed Scrub	1	0.5
Successional Tuliptree Forest	6	12.2
Loblolly Pine – Hardwood Forest	15	42.8
Loblolly Pine Plantation	4	45.7
Transportation, Communications, and Utilities	1	5.2
Residential	4	6.5
Water	2	7.4
TOTAL	94	333.4*

*Total mapped acreage slightly higher than parcel acreage since total includes some acreage outside parcel boundaries that were merged with older polygons.

Table 3. Number of polygons and total mapped hectares for the 28 vegetation map classes in the 2021 updated map for Richmond National Battlefield Park, Virginia.

Map Class	Number of polygons	Total mapped hectares
Acidic Oak - Hickory Forest	30	74.4
Mesic Mixed Hardwood Forest	44	196.1
Coastal Plain Mesic Mixed Hardwood Forest	3	10.8
Coastal Plain / Outer Piedmont Basic Mesic Forest	4	10.7
Coastal Plain Mixed Oak / Heath Forest	24	129.5
Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest	3	1.4
Coastal Plain / Piedmont Acidic Seepage Swamp	10	9.9
Coastal Plain / Piedmont Small Stream Floodplain Forest	25	40.6
Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest	3	8.2
Coastal Plain / Piedmont Floodplain Swamp Forest (Mixed Oak – Red Maple Type)	9	21.9
Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type)	21	42.2
Non-Riverine Saturated Forest	6	26.8
Non-Riverine Saturated Forest - pine subtype	4	5.8
Beaver Wetland Complex	24	118.0
Successional Shrub Swamp	1	0.5
Forested Earthworks	11	25.0
Open Earthworks	4	4.7
Cultural Meadow	47	341.8
Successional Mixed Scrub	14	30.1
Successional Black Walnut Forest	1	0.6
Successional Red-cedar Forest	2	1.0
Successional Tuliptree Forest	33	143.8
Loblolly Pine – Hardwood Forest	39	113.2
Loblolly Pine Plantation	10	112.3
Other Urban or Built-up Land	10	11.2
Transportation, Communications, and Utilities	37	47.8
Residential	24	13.9
Water	20	7.4
TOTAL	445	1549.6

Table 4 shows the 18 map classes identified and mapped on the new land parcels, the relationship of the map classes to standard classifications, and the relationship to the local and global descriptions presented in Appendix I of the 2008 report and Appendix B of this report. Fourteen of the 18 map classes were crosswalked to the finest level of the USNVC (association) and represent 5 upland forests, 4 wetland forests or shrublands, 4 successional forests/fields, and 1 planted plantation type.

One of the 18 map classes, Successional Mixed Scrub, is a nonstandard, park-specific vegetation class, and three were crosswalked to the Anderson (Anderson et al., 1976) Level II classification. Polygons that were attributed with Anderson Level II class 14 (Transportation, Communication, and Utilities) are further attributed in the Comment field in the map attribute table to identify the finer feature they represent (road, utility line, etc.). Particularly disturbed examples of natural vegetation types that may not have the typical species composition and diversity are labeled as “disturbed” in the Comment field of the map attribute table.

Table 4. Vegetation-map classes and corresponding United States National Vegetation Classification (USNVC) associations (Natureserve, 2021) or other classification mapped in the post-2015 land additions at Richmond National Battlefield Park, Virginia. All map class names are consistent with the 2008 and 2015 park vegetation maps (Patterson, 2008; and Taverna, 2015).

Map Class	USNVC Association (association code)	Regional Vegetation Name or Land-use Class* (name source)
Acidic Oak - Hickory Forest	<i>Quercus alba</i> - <i>Quercus rubra</i> - <i>Carya tomentosa</i> / <i>Vaccinium stamineum</i> / <i>Desmodium nudiflorum</i> Piedmont Forest (CEGL008475)	Piedmont Acidic Oak - Hickory Forest (Fleming et al. 2021)
Mesic Mixed Hardwood Forest	<i>Fagus grandifolia</i> - <i>Quercus (alba, rubra)</i> - <i>Liriodendron tulipifera</i> / <i>Ilex opaca</i> Forest (CEGL006075)	Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest (Fleming et al. 2021)
Coastal Plain / Outer Piedmont Basic Mesic Forest	<i>Fagus grandifolia</i> - <i>Liriodendron tulipifera</i> - <i>Carya cordiformis</i> / <i>Lindera benzoin</i> / <i>Podophyllum peltatum</i> Forest (CEGL006055)	Coastal Plain / Outer Piedmont Basic Mesic Forest (Fleming et al. 2021)
Coastal Plain Mixed Oak / Heath Forest	<i>Quercus alba</i> - <i>Quercus falcata</i> - (<i>Carya pallida</i>) / <i>Gaylussacia frondosa</i> Forest (CEGL006269)	Coastal Plain Mixed Oak / Heath Forest (Fleming et al. 2021)
Coastal Plain / Piedmont Acidic Seepage Swamp	<i>Acer rubrum</i> - <i>Nyssa sylvatica</i> - <i>Magnolia virginiana</i> / <i>Viburnum nudum</i> var. <i>nudum</i> / <i>Osmunda cinnamomea</i> Swamp Forest (CEGL006238)	Coastal Plain / Outer Piedmont Acidic Seepage Swamp (Fleming et al. 2021)
Northern Coastal Plain / Piedmont Oak –Beech / Heath Forest	<i>Fagus grandifolia</i> - <i>Quercus (alba, velutina, montana)</i> / <i>Kalmia latifolia</i> Forest (CEGL006919)	Northern Coastal Plain / Piedmont Oak –Beech / Heath Forest (Fleming et al. 2021)
Coastal Plain / Piedmont Small Stream Floodplain Forest	<i>Liquidambar styraciflua</i> - <i>Liriodendron tulipifera</i> / <i>Lindera benzoin</i> / <i>Arisaema triphyllum</i> Floodplain Forest (CEGL004418)	Coastal Plain / Piedmont Small-Stream Floodplain Forest (Fleming et al. 2021)
Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest	<i>Liquidambar styraciflua</i> - <i>Quercus (phellos, nigra, alba)</i> / <i>Carpinus caroliniana</i> Floodplain Forest (CEGL007006)	Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest (Fleming et al. 2021)
Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type)	<i>Acer rubrum</i> - <i>Fraxinus pennsylvanica</i> / <i>Saururus cernuus</i> Swamp Forest (CEGL006606)	Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash - Red Maple Type) (Fleming et al. 2021)

*Equivalent to the common name (Park-specific) as used in detailed descriptions of Appendix I of Patterson 2008

Table 4 (continued). Vegetation-map classes and corresponding United States National Vegetation Classification (USNVC) associations (Natureserve, 2021) or other classification mapped in the post-2015 land additions at Richmond National Battlefield Park, Virginia. All map class names are consistent with the 2008 and 2015 park vegetation maps (Patterson, 2008; and Taverna, 2015).

Map Class	USNVC Association (association code)	Regional Vegetation Name or Land-use Class* (name source)
Beaver Wetland Complex	<i>Alnus serrulata</i> / <i>Calamagrostis canadensis</i> Shrub Swamp (CEGL005082)	Beaver Wetland Complex (park-specific name)
Cultural Meadow	<i>Dactylis glomerata</i> - <i>Phleum pratense</i> - <i>Festuca</i> spp. - <i>Solidago</i> spp. Ruderal Meadow (CEGL006107)	Cultural Meadow (park-specific name)
Successional Mixed Scrub	Not defined - nonstandard, park-specific vegetation class	Successional Mixed Scrub (park-specific name)
Successional Tuliptree Forest	<i>Liriodendron tulipifera</i> - <i>Quercus</i> spp. Ruderal Forest (CEGL007221)	Successional Tuliptree Forest (park-specific name)
Loblolly Pine - Hardwood Forest	<i>Pinus taeda</i> - <i>Liquidambar styraciflua</i> Ruderal Forest (CEGL008462)	Loblolly Pine - Hardwood Forest (park-specific name)
Loblolly Pine Plantation	<i>Pinus taeda</i> Planted Forest (CEGL007179)	Loblolly Pine Plantation (NatureServe 2007)
Transportation, Communications, and Utilities	Not defined - Anderson land-use class	Transportation, Communications, and Utilities (14) (Anderson et al. 1976)
Residential	Not defined - Anderson land-use class	Residential (11) (Anderson et al. 1976)
Water	Not defined - Anderson land-use class	Water (50) (Anderson et al. 1976)

*Equivalent to the common name (Park-specific) as used in detailed descriptions of Appendix I of Patterson 2008

The final vegetation map for the units with new parcels is provided in Figures 2-5. The updated association-level vegetation map for the entire park with FGDC compliant metadata is provided as a geodatabase with this report. This study identified and documented three new map classes in the park: Coastal Plain / Outer Piedmont Basic Mesic Forest, Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest, and Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest. Additionally, new stands of Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type) were documented and mapped.

The revised field key for all vegetation map classes at Richmond National Battlefield Park is provided in Appendix A of this report. The local and global descriptions for the three newly mapped associations and one revised association are provided in Appendix B of this report. All three new types are uncommon in the park and are only documented in the North Anna unit (Figure 2). The existing local descriptions for the remaining 14 map classes encountered in the new parcels were reviewed and no changes were needed.

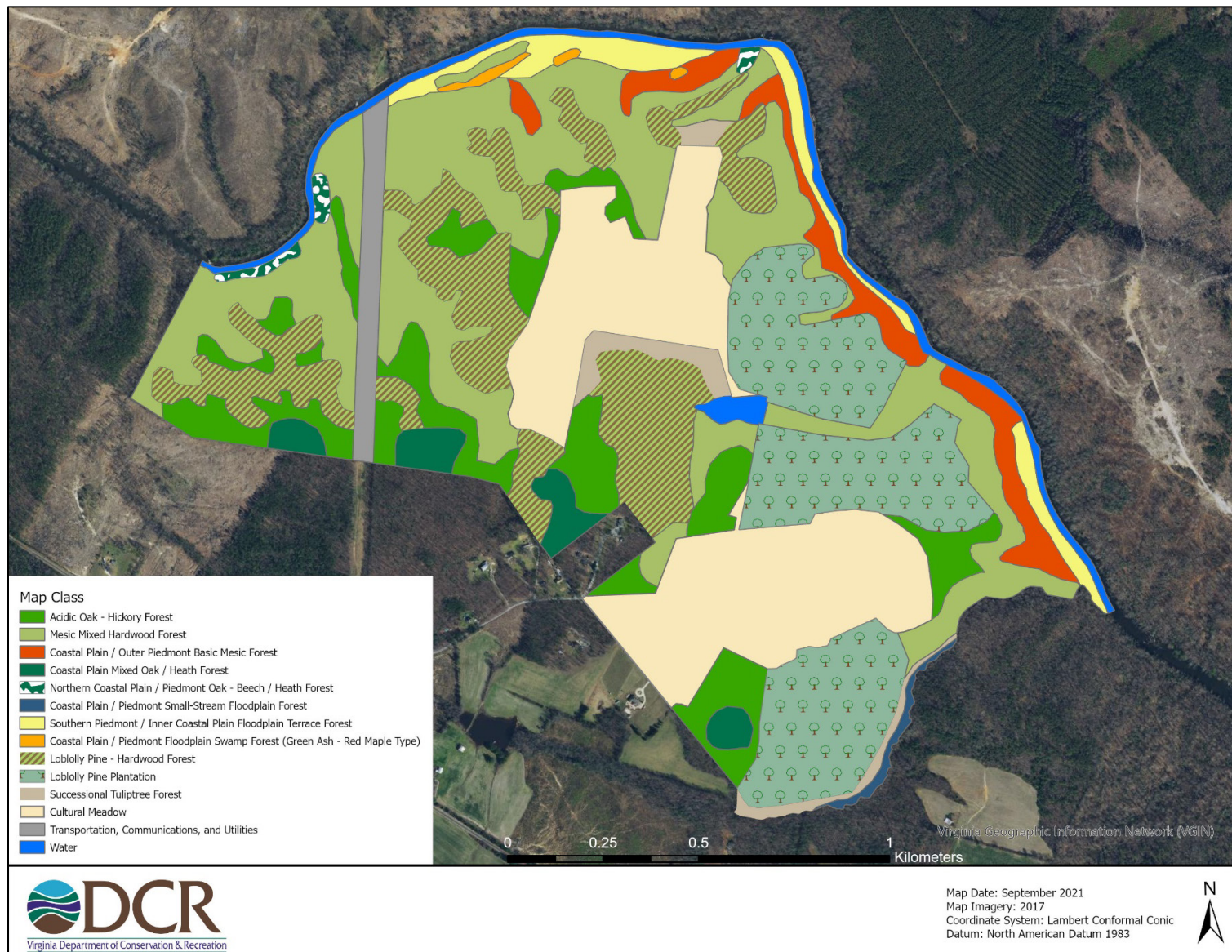


Figure 2. Vegetation and Anderson Level II map classes for North Anna in Richmond National Battlefield Park, Virginia.

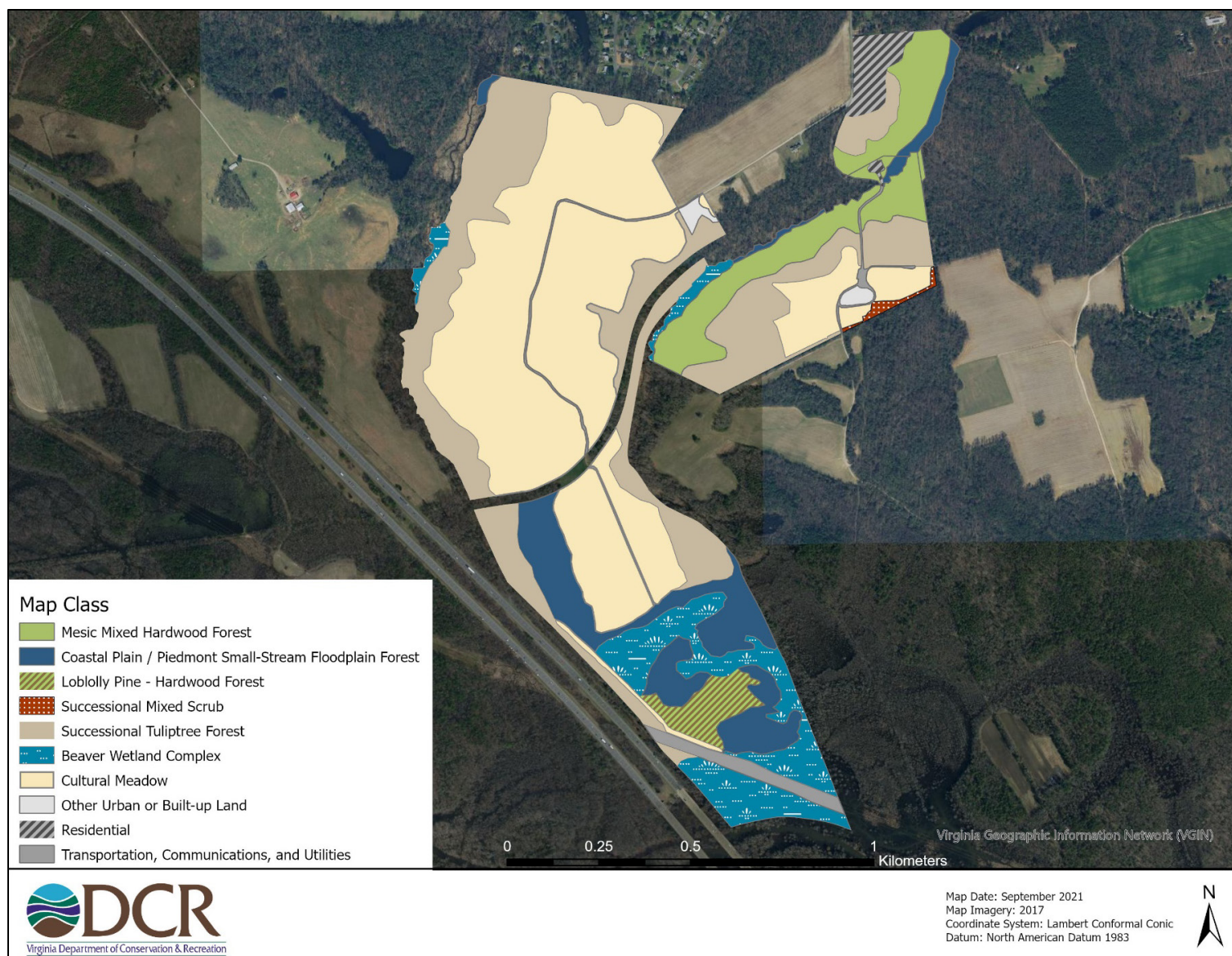


Figure 3. Vegetation and Anderson Level II map classes for Gaines' Mill in Richmond National Battlefield Park, Virginia.

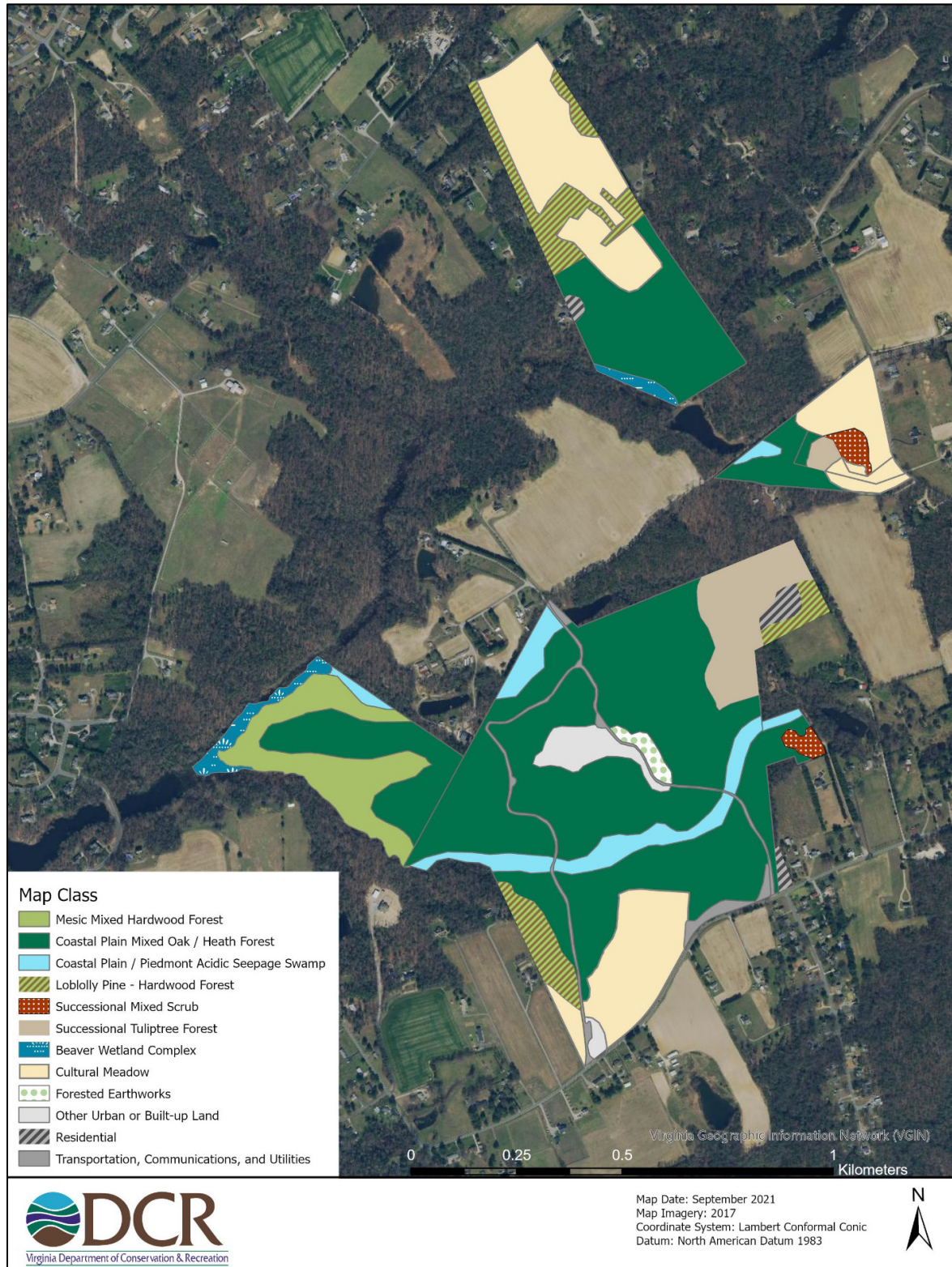


Figure 4. Vegetation and Anderson Level II map classes for Cold Harbor in Richmond National Battlefield Park, Virginia.

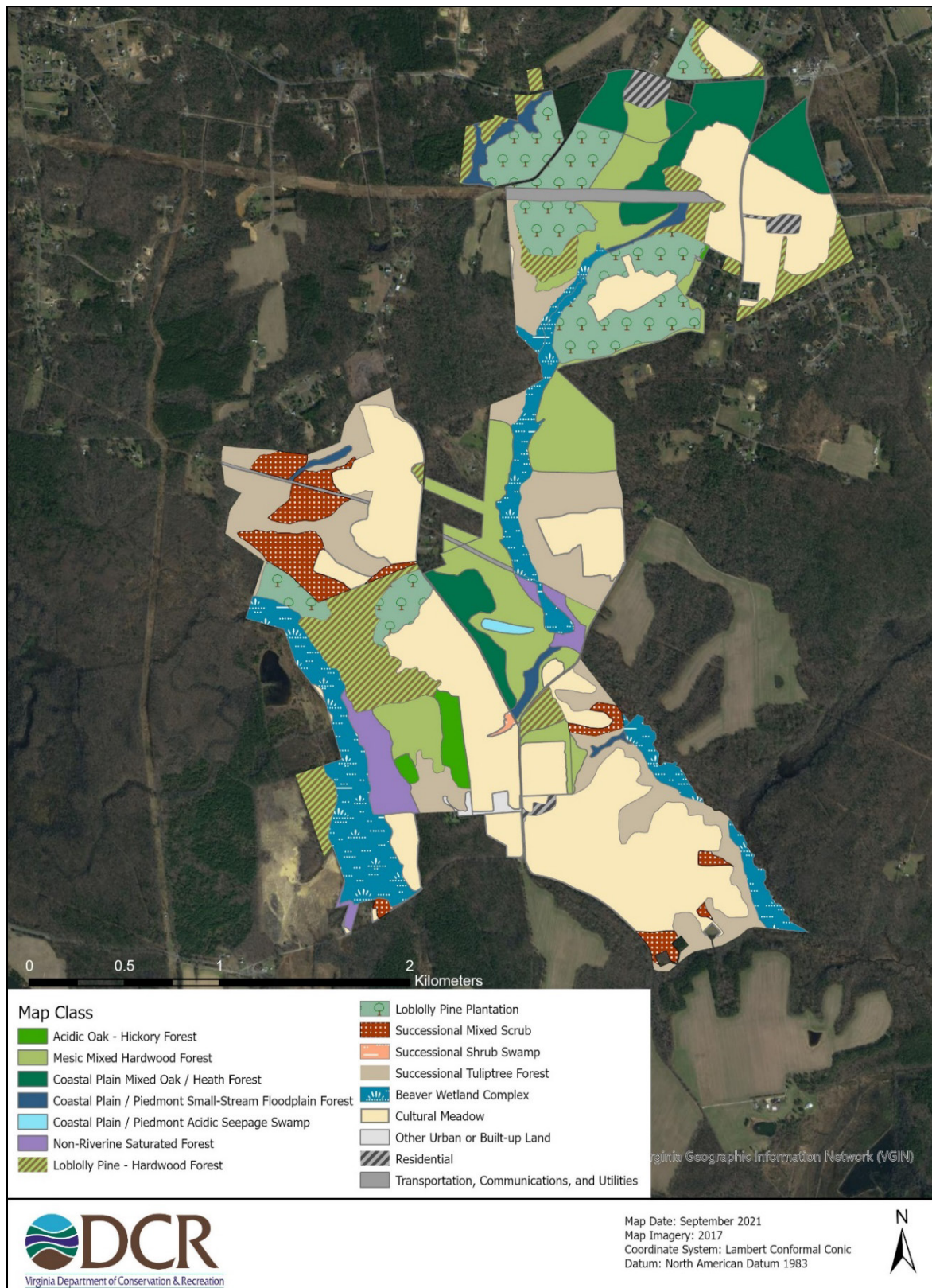


Figure 5. Vegetation and Anderson Level II map classes for Malvern Hill in Richmond National Battlefield Park, Virginia.

Discussion

This study at Richmond National Battlefield Park identified the vegetation in 12 new land parcels spread throughout three of the parks existing principal units and one new park unit, North Anna. Vegetation in the parcels were mapped using the classification developed in Patterson (2008) and Taverna (2015), except for the three new vegetation types encountered during the study which were mapped using USNVC associations. Included below is a discussion of the vegetation map classes delineated in the new land parcels. Full descriptions of all 28 vegetation-map classes found at RICH, including environmental characteristics and species composition, are included in Appendix B of this report, Appendix I of Patterson (2008), and Appendix B of Taverna (2015).

In the context of this study, late successional forests are mature forests found in the least disturbed areas in the park. These native vegetation associations or “natural communities” have the most stable species composition, with a greater diversity of native flora than other map classes representing disturbed or cultural vegetation. In the new land parcels, nine map classes represent late-successional vegetation, and together they cover ~45% of the land in the new parcels (149 ha [368 ac]). The addition of these lands increases the total cover of late-successional vegetation in the park to 543 ha (1342 ac), or 35% of total land cover (Table 3).

These map classes can be broadly characterized based on different environmental settings as upland forests (five map classes) and forested wetlands (four map classes). The upland forest map classes are Acidic Oak - Hickory Forest, Mesic Mixed Hardwood Forest, Coastal Plain Mixed Oak / Heath Forest, Coastal Plain / Outer Piedmont Basic Mesic Forest, and Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest. Three of these upland forest types were previously mapped at RICH (Patterson 2008 and Taverna 2015), are common throughout their range, and are associated with well-drained, low fertility, acidic soils found throughout the park.

Coastal Plain / Outer Piedmont Basic Mesic Forest is a new upland forest type for the park, mapped as four stands covering a total of 11 hectares. In RICH, it is only known to occur on fertile colluvial and alluvial soils on steep lower slopes along the North Anna River (Figure 2). The stands are mature, medium-aged mixed hardwood forests with lush herb layers dominated by may apple (*Podophyllum peltatum*) and Christmas fern (*Polystichum acrostichoides*). The vegetation grades to a forested wetland in the lower floodplain zone of the river and, further upslope, the vegetation shifts to a less species- rich upland forest, Mesic Mixed Hardwood Forest. The overall extent of Coastal Plain / Outer Piedmont Basic Mesic Forest is declining throughout its range and threats include development and logging. The stands at North Anna meet the criteria of size, condition, and landscape context to be considered a Natural Heritage exemplary natural community occurrence and should be targeted for protection and management as needed. The main threat is the spread of already present non-native invasive plant species, including multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), and Japanese stiltgrass (*Microstegium vimineum*).

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest is another new upland forest type for the park, mapped as three stands covering a total of 1.4 hectares. In RICH, it is only known to occur on a few very steep, north to northwest facing slopes above the North Anna River. Northern Coastal

Plain / Piedmont Oak - Beech / Heath Forests are associated with nutrient-poor uplands eroded by down cutting streams into a dissected, ravine-and-ridge landscape. At RICH, the stands are mixed deciduous forests on very infertile soils with a canopy dominated by oaks (*Quercus* spp.) and scattered American beech (*Fagus grandifolia*). A dense cover of mountain laurel (*Kalmia latifolia*) dominates the shrub layer. The stands extend down to the North Anna River on the steep slopes subtending the river and largely shift to Mesic Mixed Hardwood Forest on the more gradual uplands.

Forested wetlands are mapped over 155 ha (383 ac) of RICH (10 percent of the park). The new mapped parcels include 11 ha (27 ac) of forested wetlands, mapped as four map classes: Coastal Plain / Piedmont Small Stream Floodplain Forest, Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type), Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest, and Coastal Plain / Piedmont Acidic Seepage Swamp. All but one of these classes were previously mapped (Patterson 2008 and Taverna 2015). The new stands of Coastal Plain / Piedmont Small Stream Floodplain Forest and Coastal Plain / Piedmont Acidic Seepage Swamp are small (2.0 ha and 0.2 ha, respectively).

The new stands of Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type) are small-forested back-swamps and pond-like depressions located at the base of slopes and back part of the floodplain along the North Anna River. The stands are narrow and often have standing water with muck and poor drainage. The sloughs have probably always been seasonally flooded to some extent, but it is unclear to what degree the natural hydrologic regime and vegetation have been altered by land-use impacts. There is some evidence of ditching and channel development present near river. Three new stands at North Anna cover a total of 0.8 hectares, and meet the criteria of size, condition, landscape context to be considered a Natural Heritage exemplary natural community occurrence and should be targeted for protection and management.

Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest is a new forested wetland for the park, mapped as three stands covering a total of 8 ha (20 ac) and occurring on the high, well-drained floodplain terrace of the North Anna River where it forms a matrix with small inclusions of Coastal Plain / Piedmont Floodplain Swamp Forest. The stands of Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest are fairly mature, and are dominated by tuliptree (*Liriodendron tulipifera*), with lesser amounts of sycamore (*Platanus occidentalis*), swamp chestnut oak (*Quercus michauxii*), willow oak (*Quercus phellos*), river birch (*Betula nigra*), and bitternut hickory (*Carya cordiformis*). Stands typically have a prominent understory / shrub layer of pawpaw (*Asimina triloba*). The herb layer is variable, but can be quite diverse, with a variety of sedges.

The remaining nine map classes in the new parcels in RICH represent early successional/transitional vegetation or cultural map classes (Table 2). With the addition of the new parcels, these stands now cover 928 ha (2293 ac), or 60% of the entire park. Much of this increase is due to the extent of Cultural Meadows throughout the new parcels. Cultural Meadow includes all mowed or maintained fields in the park, such as fields under agricultural use. A significant portion of North Anna is still under active cultivation. Nearly 20% of the land in the new parcels is mapped as Cultural Meadow (158 ha [64 ac]; Table 2). The eight remaining successional and cultural map classes cover 120 ha (297 ac) of land in the new parcels.

Conclusion

The updated vegetation map for Richmond National Battlefield Park is a useful model of the distribution of vegetation communities across the park landscape. The new map, along with the revised vegetation field key and local descriptions, can be used by the park to help guide the management of forest resources, to provide vegetation information for monitoring programs, and to assist in training park staff about existing vegetation communities. It is possible that additional map classes may be discovered if further field work is done in the park or additional land parcels are acquired. In such cases, new data can be used to update the map, the list of map class descriptions, and the vegetation field key.

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Appendix A: Revised field key to the vegetation map classes at Richmond National Battlefield Park, Virginia.

- 1a Land covered by vegetation not maintained by mowing or active cultivation, without buildings, paved areas, or human-created earthworks..... 2
- 1b Land use includes buildings, paved areas, human-created earthworks, or vegetation maintained by mowing or active cultivation. 27
- 2a Vegetation of uplands: vegetation not influenced by flooding or groundwater. 3
- 2b Vegetation of wetlands: vegetation of swamps, floodplains, or groundwater seepage. 17
- 3a Forested vegetation: vegetation dominated by trees (tall, single-stemmed woody plants) with canopy coverage of at least 25%. 4
- 3b Non-forested vegetation: dominated by shrubs (shrublands or scrubby vegetation, short trees or multi- trunked woody plants) or herbaceous plants. 16
- 4a Mostly deciduous forest: evergreen trees make up less than 30% of overall polygon (canopy). 5
- 4b Evergreen or mixed evergreen-deciduous forest: Evergreen trees make up greater than 30% of the overall polygon (canopy). 13

Upland Deciduous Forests

- 5a Vegetation dominated by early successional or ruderal species such as tuliptree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), black walnut (*Juglans nigra*); exotic species can be common to dominant such as tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), Nepalese browntop (*Microstegium vimineum*); stands may be very young or mature, but trees are usually even-aged (i.e. of the same age class). 6
- 5b Vegetation dominated by deciduous trees such as oaks (*Quercus* spp.), hickories (*Carya* spp.), American beech (*Fagus grandifolia*), and/or tuliptree (*Liriodendron tulipifera*); stands are middle to late successional in age, diverse in woody species composition, often with mixed age classes. 8
- 6a Short (less than 20m), scrubby forests dominated by a mix of successional and exotic species; occurring along edges of roadways and Cultural Meadows. **Successional Mixed Scrub**
- 6b Well developed (tall) forests; dominated by deciduous trees. 7
- 7a Forest dominated by black walnut (*Juglans nigra*), sweetgum (*Liquidambar styraciflua*), and common hackberry (*Celtis occidentalis*); herbs include Nepalese browntop (*Microstegium*

- vimineum*) and eastern bottlebrush grass (*Elymus hystrix*).
..... **Successional Black Walnut Forest**
- 7b Forest dominated by tuliptree (*Liriodendron tulipifera*), and/or sweetgum (*Liquidambar styraciflua*), sometimes with co-dominance by red maple (*Acer rubrum*); Vines can cover large areas, draping over trees and shrubs and dominating canopy openings; herb layer often characterized by vines or a carpet of stilt grass (*Microstegium vimineum*).
..... **Successional Tuliptree Forest**
- 8a Forests of submesic to xeric sites with canopies dominated with variable combinations of white oak (*Quercus alba*), black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and southern red oak (*Quercus falcata*); heath-family shrubs dominant in understory 9
- 8b Forests of submesic to mesic sites with canopies dominated by oaks (*Quercus* spp.), American beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), and / or sweetgum (*Liquidambar styraciflua*) and with hickories (*Carya* spp.) often prominent. Heath shrubs are not dominant in understory 10
- 9a Dry, oak and oak / pine dominated forests on upland flats and gentle slopes. Short ericaceous shrubs, including huckleberries (*Gaylussacia* spp.) and blueberries (*Vaccinium* spp.) are common. Few to no herbaceous species present with leaf litter or vines dominating the ground layer..... **Coastal Plain Mixed Oak / Heath Forest**
- 9b Submesic oak dominated forests on steep slopes above the North Anna River. American beech (*Fagus grandifolia*) is common in the canopy and subcanopy. Shrub layer dominated by mountain laurel (*Kalmia latifolia*). Herbs sparse
..... **Northern Coastal Plain / Piedmont Oak – Beech / Heath Forest**
- 10a Submesic forests of rolling uplands and lower slopes dominated by mixtures of oaks (*Quercus* spp.) and hickories (*Carya* spp.); low shrub / herb layer patchy or sparse in cover, but diverse in species with mixtures of woody seedlings, vines, ericaceous shrubs, sedges, grasses, and forbs..... **Acidic Oak - Hickory Forest**
- 10b Forests of mesic slopes and ravines OR elevated upland ‘islands’ within larger swamp complexes. Stands are dominated by various mixtures of American beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), and oaks (*Quercus* spp.); little to no ericaceous shrub cover and herb layer variable..... 11
- 11a Species rich forests dominated by tuliptree (*Liriodendron tulipifera*), with northern red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), and bitternut hickory (*Carya cordiformis*). Fairly dense shrub layer, with dominance by paw paw (*Asimina triloba*) and/or spice bush (*Lindera benzoin*). Lush herb layer with may apple (*Podophyllum peltatum*) and Christmas fern (*Polystichum acrostichoides*) the leading patch-dominants. Only documented on the lower mesic slopes above the North Anna River
..... **Coastal Plain / Outer Piedmont Basic Mesic Forest**

- 11b Forests of mesic slopes and ravines throughout the park OR elevated upland ‘islands’ within larger swamp complexes. Stands have little to no ericaceous shrub layer and a sparse herb layer 12
- 12a Forests dominated by various mixtures of American beech (*Fagus grandifolia*), tuliptree (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), white oak (*Quercus alba*), and/or northern red oak (*Quercus rubra*); characteristic associates are mockernut hickory (*Carya alba*), and American holly (*Ilex opaca* var. *opaca*) .. **Mesic Mixed Hardwood Forest**
- 12b Forests located on elevated upland ‘islands’ within larger swamp complexes along the Chickahominy River. Forests dominated by American beech (*Fagus grandifolia*), swamp chestnut oak (*Quercus michauxii*), and tuliptree (*Liriodendron tulipifera*) with a prominent understory / shrub layer of American holly (*Ilex opaca* var. *opaca*), sweet pepperbush (*Clethra alnifolia*), and occasional sweetleaf (*Symplocos tinctoria*). **Coastal Plain Mesic Mixed Hardwood Forest**

Upland Evergreen or Mixed Evergreen-Deciduous Forests

- 13a Forests of loblolly pine (*Pinus taeda*) with or without other tree species 14
- 13b Forests of eastern redcedar (*Juniperus virginiana* var. *virginiana*) with or without other species; bordering fields and residences. **Successional Red-cedar Forest**
- 14a Early successional or planted evergreen forests of loblolly pine (*Pinus taeda*) without deciduous trees in the canopy (uppermost stratum); young successional hardwoods may occur in the shrub layer, polygon signature is fine textured (i.e. evergreen with small tree crowns), trees often in rows. **Loiblolly Pine Plantation**
- 14b Forests ranging from mostly evergreen to mixed evergreen-deciduous; canopies mixtures of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), tuliptree (*Liriodendron tulipifera*), and/or oaks (*Quercus* spp.). 15
- 15a Forest tree canopy with variable mixtures of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), and/or tuliptree (*Liriodendron tulipifera*); sometimes with southern red oak (*Quercus falcata*); lacking dense ericaceous shrubs; associated species are often weedy or exotic. **Loiblolly Pine - Hardwood Forest**
- 15b Forests of xeric sites with canopies dominated by loblolly pine (*Pinus taeda*) with variable combinations of white oak (*Quercus alba*), black oak (*Quercus velutina*), and southern red oak (*Quercus falcata*), and with huckleberries (*Gaylussacia* spp.) and blueberries (*Vaccinium* spp.), leaf litter, or vines dominating the ground layer; few to no herbaceous species present. **Coastal Plain Mixed Oak / Heath Forest**

Non-forested Vegetation

- 16a Vegetation dominated by herbs; trees and shrubs, if present, occur at less than 25% cover; open fields dominated by a dense mix of native and European grasses and forbs or planted with an agricultural crop. **Cultural Meadow**
- 16b Dense thicket of tall shrubs or vines, or combination of both; bordering roads and meadows; typical species can include both nonnative species: tree of heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), Japanese honeysuckle (*Lonicera japonica*), and native species: eastern redcedar (*Juniperus virginiana* var. *virginiana*), winged elm (*Ulmus alata*), eastern poison ivy (*Toxicodendron radicans*), frost grape (*Vitis vulpina*), and blackberries (*Rubus* spp.). **Successional Mixed Scrub**

Wetland Vegetation

- 17a Wetland vegetation dominated by shrubs and small trees. 18
- 17b Wetland vegetation dominated by trees with a forest canopy. 19
- 18a Wetland vegetation of broad flooded areas, dominated by shrubs and small trees, with herbaceous openings and often with standing dead trees; typical species include red maple (*Acer rubrum*), hazel alder (*Alnus serrulata*), common buttonbush (*Cephalanthus occidentalis*), black willow (*Salix nigra*), occurring with wetland herbs. **Beaver Wetland Complex**
- 18b Wetland vegetation of small disturbed drainages; dominated by dense, scrubby vegetation, approximately 10 meters tall with American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and hazel alder (*Alnus serrulata*). **Successional Shrub Swamp**
- 19a Wetland forest with a mainly evergreen canopy of loblolly pine (*Pinus taeda*); associated species can include red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), pin oak (*Quercus palustris*), and willow oak (*Quercus phellos*). **Non-Riverine Saturated Forest - pine subtype**
- 19b Wetland forest with canopy dominated by deciduous trees. 20
- 20a Forests that are typically narrow features associated with relatively well drained, temporarily flooded stream banks, sandy stream terraces, or saturated ravine bottoms / draws 21
- 20b Forests on broad flats, poorly drained floodplains areas, backswamps or associated with beaver flooded wetlands; soils permanently saturated to seasonally flooded 24
- 21a Vegetation associated primarily with banks or floodplains of small streams, including mature stands and early successional, even-aged stands. Also includes floodplain vegetation along the larger North Anna River..... 22

- 21b Forests of narrow ravine bottoms or stream headwaters saturated with groundwater seepage; substrate sandy to mucky, with hummock and hollow microtopography and patches of peat mosses (*Sphagnum* spp.); canopy characterized by red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and black gum (*Nyssa sylvatica*); hydric oaks may be present but are not common; shrub layer often includes possumhaw (*Viburnum nudum*), sweetbay (*Magnolia virginiana*), coastal sweetpepperbush (*Clethra alnifolia*), or swamp doghobble (*Leucothoe racemosa*); herb layer is a dense mixture of graminoids, ferns, and forbs.
..... **Coastal Plain / Piedmont Acidic Seepage Swamp**
- 22a Forests on the floodplains and well-drained terraces of the North Anna River. Stands with a mixed overstory of tuliptree (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), sweetgum (*Liquidambar styraciflua*), American elm (*Ulmus americana*), river birch (*Betula nigra*), bitternut hickory (*Carya cordiformis*), and swamp chestnut oak (*Quercus michauxii*). Shrub layer dominated by pawpaw (*Asimina triloba*), and a diverse assortment of nutrient-demanding herbs..... **Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest**
- 22b Vegetation associated primarily with banks or floodplains of small streams, not located along the North Anna River 23
- 23a Forests of banks or floodplains of small streams, receiving at least occasional stream flooding; canopy is dominated by combinations of red maple (*Acer rubrum*), tuliptree (*Liriodendron tulipifera*), and sweetgum (*Liquidambar styraciflua*), occurring with river birch (*Betula nigra*), American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*); typical herbs are common ladyfern (*Athyrium filix-femina*), New York fern (*Thelypteris noveboracensis*), and netted chainfern (*Woodwardia areolata*), and smallspike false nettle (*Boehmeria cylindrica*). **Coastal Plain / Piedmont Small-Stream Floodplain Forest**
- 23b Successional forest that develops following clearcutting or other disturbance along well-drained alluvial floodplains of small streams and other temporarily flooded areas; canopy typically even-aged and dominated by the early-successional species *Liriodendron tulipifera* (tuliptree) and/or *Liquidambar styraciflua* (sweetgum). *Acer rubrum* (red maple) often codominates in canopy and subcanopy. Herbs often a dense layer of *Microstegium vimineum* (Nepalese browntop) or a tangle of *Smilax rotundifolia* (roundleaf greenbrier), *Lonicera japonica* (Japanese honeysuckle), and/or *Rubus* spp. (blackberry).....
..... **Coastal Plain / Piedmont Small-Stream Floodplain Forest (Disturbed Stand)**
- 24a Forests on broad flats with saturated or very shallowly seasonally flooded hydrology; not associated with the main stream channel and never inundated by overland flooding, although water table is at or near the surface during most of the growing season; canopy characterized by mixtures of red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and loblolly pine (*Pinus taeda*) with hydric oaks such as cherrybark oak (*Quercus pagoda*), willow oak (*Quercus phellos*), pin oak (*Quercus palustris*), and swamp chestnut oak (*Quercus michauxii*) are usually present either in the canopy, subcanopy, or shrub layers; the ground may be

- mostly bare, covered with matted leaf litter and mud, with scattered patches of wetland grasses and sedges. **Non-Riverine Saturated Forest**
- 24b Forests on broad terraces usually seasonally flooded by overland flow; canopy varying from closed to open with standing dead trees 25
- 25a Open to very open forests with standing dead trees prominent; red maple (*Acer rubrum*) and black willow (*Salix nigra*) are typical dominants; other trees and shrubs can include river birch (*Betula nigra*), sweetgum (*Liquidambar styraciflua*), American sycamore (*Platanus occidentalis*), common alder (*Alnus serrulata*) and buttonbush (*Cephalanthus occidentalis*). .
..... **Beaver Wetland Complex**
- 25b More or less closed canopy forests dominated by mixed hardwoods, including red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), swamp tupelo (*Nyssa biflora*), green ash (*Fraxinus pennsylvanica*), and wet-site oaks 26
- 26a Habitat flooded relatively deeply and/or for prolonged parts of the growing season; overstory dominated by red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and/or swamp tupelo (*Nyssa biflora*); herb layer dominated by hydrophytic forbs, especially lizard's-tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), and/or arrow arum (*Peltandra virginica*).....
..... **Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type)**
- 26b Habitat only shallowly seasonally flooded over short periods; hydrophytic oaks such as swamp white oak (*Quercus michauxii*), willow oak (*Quercus phellos*), and cherrybark oak (*Q. pagoda*) dominant or co-dominant in canopy; herb layer usually dominated by hydrophytic sedges and grasses.....
..... **Coastal Plain / Piedmont Floodplain Swamp (Mixed Oak – Red Maple Type)**

Land-Use Classes and Cultural Vegetation

- 27a Land use includes buildings or paved areas with or without maintained lawns and plantings. 28
- 27b Land use with no buildings or paved areas; vegetation maintained by mowing or active cultivation. 30
- 28a Land use is primarily single-family dwellings; including houses, outbuildings, and maintained lawns and plantings. **Residential**
- 28b Land use is for park maintenance, recreation, or transportation corridors. 29
- 29a Land use is primarily a transportation corridor with paved roadways, parking areas, and mowed roadsides. **Transportation, Communications, and Utilities**

29b	Land use includes park structures for maintenance or recreation with associated maintained lawns and plantings	Other Urban or Built-up Land
30a	Area forested with trees.	31
30b	Area with less than 10% cover by trees.	32
31a	Park land with historic human-created earthworks with cover by trees.	Forested Earthworks
31b	Park land with forest cover and with maintained grassland below, associated with park interpretation.	Other Urban or Built-up Land
32a	Open, non-forested park land with historic human-created earthworks.	Open Earthworks
32b	Open, non-forested park land without historic human-created earthworks.	33
33a	Non-forested areas maintained by mowing for use as a utility corridor.	Transportation, Communications, and Utilities
33b	Non-forested areas maintained by mowing or planted in crops.	Cultural meadow

Appendix B: New and revised local descriptions for Richmond National Battlefield Park, Virginia.

COMMON NAME (PARK-SPECIFIC)

COASTAL PLAIN / OUTER PIEDMONT BASIC MESIC FOREST

USNVC English Name

American Beech – Tuliptree – Bitternut Hickory / Northern Spicebush / Mayapple Forest

USNVC Scientific Name

Fagus grandifolia - *Liriodendron tulipifera* - *Carya cordiformis* / *Lindera benzoin* / *Podophyllum peltatum* Forest

USNVC Identifier

[CEGL006055](#)*

* For the most current Global information please refer to NatureServe Explorer 2.0

Local Information

Environmental Description

Coastal Plain / Outer Piedmont Basic Mesic Forests occurs on fertile, mesic, low-elevation habitats of the Coastal Plain and Piedmont. Typical sites are deep ravines, sheltered north or east facing slopes leading to large streams and rivers and occasionally well-drained floodplain terraces. At North Anna, the habitat consists of moderately steep, north- to northeast-facing bluffs and lower slopes, extending in places onto a high, well-drained floodplain terrace. Soils consist of fertile colluvium and alluvium, the former weathered from underlying granitic and biotite gneiss.

Vegetation Description

A medium-aged mixed hardwood forest with a lush herb layer dominated by nutrient-demanding species. The larger trees in this forest generally range up to ~ 70 cm DBH. *Liriodendron tulipifera* (tulip-tree) is the most abundant canopy tree in mixed stands with *Quercus rubra* (red oak), *Fagus grandifolia* (American beech), *Juglans nigra* (black walnut), *Quercus alba* (white oak), *Carya cordiformis* (bitternut hickory), and *Liquidambar styraciflua* (sweetgum). The shrub layer is fairly dense in most places, with dominance by *Asimina triloba* (pawpaw) and/or *Lindera benzoin* (spicebush). Other small trees and shrubs include *Carpinus caroliniana* (American hornbeam), *Cornus florida* (Flowering dogwood), *Cercis canadensis* (redbud), *Staphylea trifolia* (bladdernut), and *Hydrangea arborescens* (wild hydrangea). *Podophyllum peltatum* (mayapple) and *Polystichum acrostichoides* (Christmas fern) are the leading patch-dominants of the herb layer. The following additional herbs were also recorded: *Adiantum pedatum* (maidenhair fern), *Arisaema triphyllum* (Jack-in-the-pulpit), *Cardamine concatenata* (cut-leaf toothwort), *Carex amphibola* (eastern narrow-leaved sedge), *Carex jamesii* (James's sedge; locally abundant), *Carex platyphylla* (broad-leaved sedge), *Chaerophyllum procumbens* var. *procumbens* (spreading chervil), *Circaea canadensis* (enchanter's night-shade), *Claytonia virginica* (spring beauty), *Cryptotaenia canadensis* (honestwort), *Erythronium americanum* ssp. *americanum* (yellow trout lily), *Galearis spectabilis* (showy orchis),

Galium aparine (cleavers), *Geum canadense* (white avens), *Maianthemum racemosum* ssp. *racemosum* (eastern Solomon's plume), *Sanguinaria canadensis* (bloodroot), *Sanicula canadensis* (black snakeroot), *Scutellaria nervosa* (veined skullcap), and *Uvularia perfoliata* (perfoliate bellwort). *Rosa multiflora* (multiflora rose), *Lonicera japonica* (Japanese honeysuckle), and *Microstegium vimineum* (Japanese stiltgrass) are all locally problematic invasives in the stand, but are not rampant or abundant.

Characteristic Species

Liriodendron tulipifera (tulip-tree), *Asimina triloba* (pawpaw), *Lindera benzoin* (spice bush), *Podophyllum peltatum* (mayapple), and *Polystichum acrostichoides* (Christmas fern).

Subnational Distribution with Crosswalk Data

- State: VA
- SRank: S3
- SName: Coastal Plain / Outer Basic Mesic Forest
- Reference: Fleming et al. 2021

Local Range

Coastal Plain / Outer Piedmont Basic Mesic Forests only occurs along the steep lower slopes above the North Anna River. It extends in places onto the high, well-drained floodplain terrace. It covers a total of 11 hectares and is mapped as four polygons.

Classification Comments

Coastal Plain / Outer Piedmont Basic Mesic Forest can be distinguished from the surrounding upland Mesic Mixed Hardwood Forest by the presence of a lush herb layer dominated by nutrient-demanding species. Closer to the North Anna River, it transitions to the less well-drained Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest.

Other Comments

Fraxinus americana (white ash) was formerly an important tree but the population has suffered extensive mortality from Emerald Ash Borer outbreaks. There are inclusions of less rich, Mesic Mixed Hardwood Forest on some of the slopes convexities. Small inclusions of poorly drained bottomland forest and pools occur near the river. High-quality examples of this community are uncommon throughout the range of the association. The stand at North Anna meets the criteria of size, condition, and landscape context to be considered a Natural Heritage exemplary natural community occurrence and should be targeted for protection and management as needed. The main threat is the spread of already present nonnative invasive plant species, including *Rosa multiflora*, *Lonicera japonica*, and *Microstegium vimineum*.

Local Description Authors

K. Taverna.

Plots

None.

Global Information

Global Description

Environmental Description

This type occurs on soils derived from amphibolite, other mafic rocks, and metasedimentary rocks with basic intrusions in the Piedmont, and in Coastal Plain ravines that have downcut into Tertiary shell deposits or limesands. Although very high compared to those of most Piedmont and Coastal Plain soils, soil pH and base cation levels at 39 plot sampling sites indicate only moderate fertility (VDNH unpubl. data). Typical soil chemistry values for this type are pH about 5.0, Ca about 1200 to 1500 ppm, Mg about 100 to 200 ppm, and total base saturation about 60%. In Maryland, this type occurs on steep calcareous bluffs along the Potomac River below Washington, DC. Other Maryland examples of this community are called "rich woods pockets" on the eastern shore. They are seemingly limited to ravine slopes (<1 acre) and in some cases sublevel uplands (largest stand about 15 acres) between ravines of the Choptank Formation (interbedded brown to yellow very fine-grained to fine-grained sand and gray to dark bluish-green argillaceous silt; locally indurated to calcareous sandstone; prominent shell beds; thickness 0-15 m [0-50 feet]). They are most prevalent in Talbot, Queen Annes, Kent, and Dorchester (2 locations) counties on the Outer Coastal Plain.

Vegetation Description

In the 40 Virginia and Maryland stands analyzed for the National Capital Parks project, *Fagus grandifolia* and *Liriodendron tulipifera* are the most important canopy dominants, with *Carya cordiformis* and *Quercus rubra* as constant associates. Additional trees that may be locally important are *Juglans nigra*, *Ulmus rubra*, *Quercus alba*, *Quercus muehlenbergii* (especially important in Coastal Plain shell-marl ravines), *Fraxinus americana*, and *Tilia americana* var. *americana*. Stands typically have a dense understory dominated by *Asimina triloba* and *Lindera benzoin*. The herb layer is lush but tends to be characterized by patch-dominance of clonal forbs and ferns. *Podophyllum peltatum*, *Arisaema triphyllum*, *Circaea lutetiana* ssp. *canadensis*, *Maianthemum racemosum* ssp. *racemosum*, and *Polystichum acrostichoides* are widespread and abundant herbs. More locally abundant herbs include *Cystopteris protrusa*, *Deparia acrostichoides*, *Diplazium pycnocarpon*, *Actaea racemosa* (= *Cimicifuga racemosa*), *Phegopteris hexagonoptera*, *Nemophila aphylla*, and *Actaea pachypoda*. Many additional low-cover herbaceous species are present in plot-sampled stands. Mean species richness is 54 taxa per 400 m². In eastern Maryland, *Liriodendron tulipifera* is dominant with *Fagus grandifolia*, *Quercus alba*, and *Quercus rubra* usually present. Hickories are variable, with *Carya cordiformis*, *Carya glabra*, and sometimes *Carya tomentosa* usually present at low cover. Diagnostic shrubs include *Viburnum prunifolium* and *Lindera benzoin*. The herb layers in this community are quite lush compared to most surrounding drier mixed oak-heath forests. Dominant and most frequent herbs include *Podophyllum peltatum*, *Botrychium oneidense*, *Polystichum acrostichoides*, *Sanguinaria canadensis*, *Arisaema triphyllum*, *Circaea lutetiana* ssp. *canadensis*, *Actaea racemosa*, *Galium circaeans*, *Cardamine concatenata*, and *Uvularia perfoliata*. Herbs mentioned in the description that have not been reported on the eastern shore of Maryland include *Diplazium pycnocarpon*, *Nemophila aphylla*, and *Cystopteris protrusa*. However, there is documentation that these species occur in such habitats on the Inner Coastal Plain and Piedmont.

USFWS Wetland System

Upland.

Distribution

Range

This association occurs in the eastern Piedmont and Inner Coastal Plain from Virginia to New Jersey.

States/Provinces

DC, DC, MD, NJ, VA.

Conservation Status

Rank

G4? (9-May-2002).



Figure B1. Coastal Plain / Outer Piedmont Basic Mesic Forest in North Anna unit at Richmond National Battlefield Park, Virginia. Photo by Gary Fleming. April 2018.

COMMON NAME (PARK-SPECIFIC)

NORTHERN COASTAL PLAIN / PIEDMONT OAK – BEECH / HEATH FOREST

USNVC English Name

American Beech - (White Oak, Black Oak, Chestnut Oak) / Mountain Laurel Forest

USNVC Scientific Name

Fagus grandifolia - *Quercus* (*alba*, *velutina*, *montana*) / *Kalmia latifolia* Forest

USNVC Identifier

[CEGL006919](#)*

* For the most current Global information please refer to NatureServe Explorer 2.0

Local Information***Environmental Description***

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forests are associated with nutrient-poor uplands eroded by down cutting streams into a dissected, ravine-and-ridge landscape. This vegetation type typically occupies steep, mostly NW to NE-facing slopes. Soils are extremely acidic, nutrient-poor sandy loams and sandy clay loams with very low base saturation. At Richmond National Battlefield Park, Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest is only known to occur at North Anna on a few very steep, N to NW facing slopes above the North Anna River.

Vegetation Description

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest is an upland mixed deciduous forest with a dense evergreen shrub layer and very infertile soils. The overstory is largely dominated by oaks (*Q. montana*, *Q. alba*, *Q. rubra*), with scattered associates of *Fagus grandifolia* (American beech), *Quercus velutina* (black oak), and *Liriodendron tulipifera* (tulip-tree). American beech is typically common in the understory tree layers and may represent ongoing successional changes in the stand. The shrub layer is dominated by the evergreen *Kalmia latifolia* (mountain laurel) with often greater than 75% cover. Minor shrubs and small trees include *Acer rubrum* (red maple), *Nyssa sylvatica* (black gum), and *Hamamelis virginiana* var. *virginiana* (witch hazel). The herb layer consists largely of woody seedlings and deciduous ericads. True herbs are extremely sparse, but can include *Chimaphila maculata* (spotted wintergreen), *Polystichum acrostichoides* (Christmas fern), and *Mitchella repens* (partridge berry).

Characteristic Species

White oak (*Quercus alba*), chestnut oak (*Quercus montana*), American beech (*Fagus grandifolia*), and mountain laurel (*Kalmia latifolia*).

Subnational Distribution with Crosswalk Data

- State: VA
- SRank: S3
- SName: Northern Coastal Plain / Oak – Beech / Heath Forest

- Reference: Fleming et al. 2021

Local Range

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest occurs at North Anna on steep N to NW facing slopes above the North Anna River. The stands go directly down to the river edge with no established floodplain. It is of very limited extent in Richmond National Battlefield Park and only covers a total of 1.4 hectares across three small patches.

Classification Comments

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest is distinguished from Mesic Mixed Hardwood Forest by the prevalence of *Kalmia latifolia* (mountain laurel) in the shrub layer.

Other Comments

Stands of Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest occur adjacent to and transition into Mesic Mixed Hardwood Forest and Coastal Plain / Outer Piedmont Basic Mesic Forest, but occupy drier, much steeper sites that support fewer mesophytic plants and a greater abundance of heaths. Some areas mapped as Mesic Mixed Hardwood Forest may contain small, unmapped inclusions of Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest. Because of the poor soils, Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest is not very susceptible to invasive exotics. Stands can have local areas of disturbance due to wind or downed trees.

Local Description Authors

K. Taverna.

Plots

None.

Global Information

Global Description

Environmental Description

This association is characteristic of steep ravine slopes and bluffs in dissected terrain of the Inner Coastal Plain and eastern Piedmont. It also occurs occasionally on short, steep bluffs of the Outer Coastal Plain, as well as on elevated swamp islands with sandy, oligotrophic soils. Sites are mesic to submesic, with extremely acidic, infertile soils. The type occurs on slopes of various aspects but tends to favor northerly ones. Soil samples collected from 24 Virginia and Maryland sites had a mean pH of 4.2 and very low cation and base saturation levels. In the southern part of the range, this association is fairly common in dissected landscapes of the Inner Coastal Plain and fall-line zone of the Piedmont, but occurs in progressively smaller and more isolated patches westward in the Piedmont, typically on steep cut-slopes on the outside of meander bends in large creeks and small rivers.

Vegetation Description

The overstory is composed of *Fagus grandifolia* with variable codominance by several oaks, particularly *Quercus montana* (= *Quercus prinus*), *Quercus alba*, and *Quercus velutina*. Minor associates include *Quercus coccinea*, *Acer rubrum*, *Carya* spp., and *Liriodendron tulipifera*. Typical

subcanopy trees include *Sassafras albidum*, *Acer rubrum*, *Nyssa sylvatica*, *Cornus florida*, *Amelanchier arborea*, and *Ilex opaca*, the latter frequently dominating in Coastal Plain stands. An evergreen shrub layer with strong dominance by *Kalmia latifolia* is characteristic, with low-cover associates of *Rhododendron periclymenoides*, *Vaccinium* spp., and *Gaylussacia baccata*. Deciduous ericads alone are dominant in rare patches that lack *Kalmia latifolia*. On northern exposures, *Fagus grandifolia* tends to strongly dominate, and *Kalmia latifolia* may achieve >75% cover.

USFWS Wetland System

Upland.

Distribution

Range

This mixed forest of beech and oaks occurs on the Inner Coastal Plain and eastern Piedmont along the fall zone, from New Jersey to southern Virginia.

States/Provinces

DC, DE, MD, NJ, VA.

Conservation Status

Rank

G4 (22-Sept-2008).



Figure B2. Northern Coastal Plain / Piedmont Oak – Beech / Heath Forest in North Anna unit at Richmond National Battlefield Park, Virginia. Photo by Kristin Taverna. June 2020.

COMMON NAME (PARK-SPECIFIC)

SOUTHERN PIEDMONT / INNER COASTAL PLAIN FLOODPLAIN TERRACE FOREST

USNVC English Name

Sweetgum - (Willow Oak, Water Oak, White Oak) / American Hornbeam Floodplain Forest

USNVC Scientific Name

Liquidambar styraciflua - Quercus (phellos, nigra, alba) / Carpinus caroliniana Floodplain Forest

USNVC Identifier

[CEGL007006](#)*

* For the most current Global information please refer to NatureServe Explorer 2.0

Local Information***Environmental Description***

Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest occurs in the North Anna unit on the high, well-drained floodplain terrace along the North Anna River. Flooding here is probably infrequent and only occasionally severe. Soils consist of deep alluvial deposits varying from sandy to silty in texture.

Vegetation Description

Floodplain forests dominated by *Liriodendron tulipifera* (tuliptree), with lesser amounts of *Platanus occidentalis* (sycamore), *Quercus michauxii* (swamp chestnut oak), *Quercus phellos* (willow oak), *Betula nigra* (river birch), and *Carya cordiformis* (bitternut hickory). The largest trees are 40-70 cm DBH. Subcanopy associates include *Liquidambar styraciflua* (sweetgum), *Acer rubrum* (red maple), and *Carya cordiformis* (bitternut hickory). Stands typically have a prominent understory / shrub layer of *Asimina triloba* (pawpaw). Additional shrub species include *Carpinus caroliniana* (American hornbeam), *Lindera benzoin* (spicebush), and low-shrub cover of *Toxicodendron radicans* (poison ivy) and *Smilax rotundifolia* (roundleaf greenbrier). The herb layer is variable, but can be quite diverse, with a variety of sedges. Dominant sedges typically include *Carex tribuloides* (blunt broom sedge) and *Carex amphibola* (Eastern narrow-leaved sedge). Additional common sedges include *Carex radiata*, *C. blanda*, *C. typhina*, *C. intumescens*, and *C. stipata* var. *maxima*. Other forbs and graminoids include *Chasmanthium latifolium* (river oats), *Saururus cernuus* (lizard's tail), *Cinna arundinacea* (common wood reedgrass), *Impatiens capensis* (Orange jewelweed), *Poa sylvestris* (woodland bluegrass), and *Parathelypteris noveboracensis* (New York fern).

Characteristic Species

Liriodendron tulipifera (tuliptree), *Quercus michauxii* (swamp chestnut oak), *Asimina triloba* (pawpaw), *Carex tribuloides* (blunt broom sedge) and *Carex amphibola* (Eastern narrow-leaved sedge).

Subnational Distribution with Crosswalk Data

- State: VA
- SRank: S3

- SName: Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest
- Reference: Fleming et al. 2021

Local Range

Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest occurs at the North Anna unit, on the high, well-drained floodplains along the North Anna River. It is mapped as 3 polygons covering a total of 8 hectares.

Classification Comments

Southern Piedmont / Inner Coastal Plain Floodplain Terrace Forest transitions to Coastal Plain / Outer Piedmont Basic Mesic Forest or Mesic Mixed Hardwood Forest in higher elevation zones further from the North Anna River. Small inclusions of poorly drained bottomland forest and pools occur within the floodplain and are mapped as Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash-Red Maple Type). The floodplain swamp forest has standing water or small ponds early in the growing season and typically has high cover of *Saururus cernuus* (Lizard's tail) in the herb layer.

Other Comments

This community is susceptible to flooding in high-water events. Invasive nonnative species are common and a continual threat. Species found in North Anna stands include *Microstegium vimineum* (Japanese stiltgrass) and *Lonicera japonica* (Japanese honeysuckle).

Local Description Authors

K. Taverna.

Plots

None.

Global Information

Global Description

Environmental Description

These forests occur along medium to large Piedmont rivers, on floodplains or terraces that are elevated several meters above the river. They occur on sites that are higher above the river, less frequently flooded, and better drained than *Quercus pagoda* - *Quercus phellos* - *Quercus lyrata* - *Quercus michauxii* / *Chasmanthium latifolium* Swamp Forest (CEGL007356). Matthews (2011) found them primarily on medium-sized rivers. Comparable large river sites exist, but few have natural vegetation; this association may occur on them as well. In Virginia, this type is almost exclusively found along medium-sized rivers, since most suitable large-river sites are cleared or in recovery from clearing.

Vegetation Description

Composition differs somewhat in the Virginia examples of the association. *Quercus nigra* is absent and southern species such as *Acer floridanum* that reach their northern limits in Virginia are not as frequent. *Liquidambar styraciflua* and *Carya cordiformis* are the most constant canopy trees. One or

more oaks are also usually important, especially in older and less-disturbed stands. The most frequent oaks are *Quercus phellos*, *Quercus michauxii*, and *Quercus shumardii*, while *Quercus pagoda* and *Quercus alba* are only occasional. *Liriodendron tulipifera* and trees more typical of levees, such as *Celtis occidentalis*, *Platanus occidentalis*, *Ulmus americana*, and *Fraxinus pennsylvanica*, are frequently scattered but rarely important. However, these species tend to increase following disturbance and removal of oaks by cutting. *Ulmus alata*, *Carpinus caroliniana*, and *Asimina triloba* are constant understory trees, while *Acer floridanum* may also be common within its southern Virginia range. *Ilex decidua*, *Lindera benzoin*, and *Viburnum prunifolium* are the most constant shrubs. The herb flora is similar to that described for North Carolina. Occasionally, there may be a prominent component of nutrient-demanding forbs such as *Asarum canadense* on the richer sites. A distinct variant of this association occurs at a small number of sites along the Dan, Roanoke, Meherrin, and Nottoway rivers in Virginia. The soils at these sites have exceptionally high calcium and pH values, and the forests are more dominated by *Acer floridanum*, *Carya cordiformis*, *Aesculus sylvatica*, and a suite of rich-site herbs that includes *Trillium sessile*, *Enemion biternatum*, *Phacelia covillei*, *Nemophila aphylla*, and others. However, other than the relatively greater abundance of nutrient-demanding species, the floristic composition of these stands is very similar to that of more typical stands of the association. Several of the rich stands are quite old, and it is also possible that tolerant trees such as *Acer floridanum* have simply become more prevalent with maturity.

USFWS Wetland System

Upland.

Distribution

Range

This association is found in the Piedmont of North Carolina and the central and southern Piedmont of Virginia. It extends into the extreme Inner Coastal Plain of southeastern Virginia, at a few sites along the Meherrin and Nottoway rivers with exceptionally rich soils. It is likely to occur in South Carolina and Georgia.

States/Provinces

NC, VA.

Conservation Status

Rank

G3G4 (22-March-2011).



Figure B3. Southern Piedmont / Inner Coastal Floodplain Terrace Forest along the North Anna River at Richmond National Battlefield Park, Virginia. Photo by Gary Fleming. June 2020.

COMMON NAME (PARK-SPECIFIC)

COASTAL PLAIN / PIEDMONT FLOODPLAIN SWAMP FOREST (GREEN ASH - RED MAPLE TYPE)

USNVC English Name

Red Maple - Green Ash / Lizard's-tail Swamp Forest

USNVC Scientific Name

Acer rubrum - *Fraxinus pennsylvanica* / *Saururus cernuus* Forest

USNVC Identifier

[CEGL006606](#)*

* For the most current Global information please refer to NatureServe Explorer 2.0

Local Information***Environmental Description***

Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) occurs on poorly drained areas along small streams and in backswamps along the outer edges of large floodplains. These bottomlands have pronounced seasonal flooding and hummock-and-hollow microtopography. During the growing season, when these areas are not flooded, deep, mucky soils are exposed and the water table is just below the ground surface. Leaf litter typically covers the hummocks, while depressions are water or muck filled.

Vegetation Description

These broad-leaved deciduous forests are typically co-dominated by medium-diameter *Fraxinus pennsylvanica* (green ash), *Acer rubrum* (red maple), and *Nyssa biflora* (swamp tupelo). Areas with a longer hydroperiod have larger trees with the largest being 40-60 cm DBH. Common associates include *Liquidambar styraciflua* (sweetgum) and *Quercus palustris* (pin oak). Shrubs have patchy cover, with *Ilex opaca* var. *opaca* (American holly) most common on tree-base hummocks and *Viburnum nudum* (possumhaw) common in hollows. Other shrubs include *Clethra alnifolia* (sweet pepperbush), *Ilex verticillata* (common winterberry), and *Smilax rotundifolia* (roundleaf greenbrier). Herbaceous composition varies with microhabitats. Hummocks usually support *Boehmeria cylindrica* (smallspike false nettle), *Chasmanthium laxum* (slender woodoats), *Cinna arundinacea* (sweet woodreed), *Pilea pumila* (Canadian clearweed), *Glyceria striata* (fowl mannagrass), *Impatiens capensis* (jewelweed), and many hydrophytic sedges *Carex* spp. (sedges) like *Carex crinita* (fringed sedge), *Carex gracillima* (graceful sedge), *Carex granularis* (limestone meadow sedge), *Carex intumescens* (greater bladder sedge), *Carex laevivaginata* (smoothsheath sedge), *Carex lupulina* (hop sedge), *Carex lurida* (shallow sedge), *Carex oxylepis* (sharp scale sedge), *Carex stipata* (owlfruit sedge), *Carex styloflexa* (bent sedge), and *Carex tribuloides* (blunt broom sedge). Hollows are usually dominated by *Saururus cernuus* (lizard's tail), with associates such as *Peltandra virginica* (green arrow arum), *Rumex verticillatus* (swamp dock), *Triadenum walteri* (greater marsh St. Johnswort), and in more disturbed areas, *Juncus effusus* (common rush) and *Mikania scandens* (climbing hempvine). Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) occurs on poorly drained areas, but some areas mapped may be cut off from former natural flooding

regimes due to the presence of roads, ditching, or beaver activities. Stands impacted by beaver flooding typically have many dead trees and vast areas of the exotic, invasive plant, *Murdannia keisak* (marsh dewflower). Another major cause of dead trees in this type is outbreaks of Emerald Ash Borer. Green ash has suffered extensive mortality from Emerald Ash Borer throughout the region and typical canopy composition is shifting to one dominated by red maple.

Characteristic Species

Acer rubrum (red maple), *Carex tribuloides* (blunt broom sedge), *Fraxinus pennsylvanica* (green ash), *Leersia oryzoides* (rice cutgrass), *Saururus cernuus* (lizard's tail).

Subnational Distribution with Crosswalk Data

- State: VA
- SRank: S3S4
- SName: Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash-Red Maple Type)
- Reference: Fleming et al. 2021

Local Range

Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) occurs in backswamps along the Chickahominy River and the North Anna River. The backswamps are typically separated from the main river channel (up to ca.700m). Beaver flooding has impacted much of the forest toward the Chickahominy River and there are vast areas of dead trees and the nonnative invasive herb *Murdannia keisak* (marsh dewflower). The stands are small and intact along the North Anna River. Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) occurs along the Chickahominy River at Beaver Dam Creek and the SE end of Watt House, known as Turkey Hill. It is mapped over 18 polygons and covers 41 hectares. It occurs along the North Anna River over 0.8 hectares and is mapped in 3 polygons.

Classification Comments

Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) is distinguished from other wetland forests by being seasonally flooded with deep muck and standing water prevalent and with canopies dominated by *Fraxinus pennsylvanica* (green ash) and/or *Acer rubrum* (red maple). As noted above, the canopy of the type is shifting to more red maple dominance with ash decline due to Emerald Ash Borer. The herbaceous layer is also distinct in that it is often dominated by *Saururus cernuus* (Lizard's tail). Unlike Coastal Plain / Piedmont Small-Stream Floodplain Forest, this forest is not associated with active floodplains and is located well away from the main stream channel. Areas heavily impacted by beavers may be transitional in composition and structure to Beaver Wetland Complex.

Other Comments

Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) is fairly widespread in the backswamps of Virginia's Northern Coastal Plain. Beaver impoundments are the principal threat to this vegetation and many stands have been destroyed or altered. The examples of Coastal Plain / Piedmont Floodplain Swamp (Green Ash – Red Maple Type) at Turkey Hill and North Anna meet

the criteria of size, condition, and landscape context to be considered a Natural Heritage exemplary natural community occurrences. Beaver threaten the occurrence at Turkey Hill and have impacted large areas of the floodplain closer to the river.

Local Description Authors

K. D. Patterson and K. Taverna.

Plots

None.

Global Information

Global Description

Environmental Description

This swamp forest occurs in backswamps, watercourses, flats and depressions that are flooded for significant portions of the growing season. These areas receive some nutrient inputs from adjacent uplands or overland flooding and have soils that are moderately calcareous. The substrate is deep muck with a pronounced hummock-and-hollow microtopography.

Vegetation Description

This forest type is characterized by a well-developed tree canopy codominated by *Acer rubrum* and *Fraxinus pennsylvanica* in variable proportions. Other canopy associates may include *Nyssa sylvatica*, *Quercus phellos*, *Quercus lyrata*, *Ulmus americana*, and *Populus heterophylla*. At the southern end of the range, *Nyssa biflora* and *Taxodium distichum* may be minor associates. The shrub layer is of variable cover but usually not dense. The most common species are *Lindera benzoin*, *Eubotrys racemosa* (= *Leucothoe racemosa*), *Vaccinium corymbosum*, *Ilex verticillata*, *Carpinus caroliniana*, *Rosa palustris*, and *Viburnum dentatum*. Other shrub associates may include *Rhododendron viscosum*, *Cephalanthus occidentalis*, *Alnus serrulata*, and *Cornus amomum*. The herb layer is diverse and generally characterized by abundant *Saururus cernuus*, typically in hollows. Other associates are many and varied but generally include *Peltandra virginica*, *Impatiens capensis*, *Pontederia cordata*, *Boehmeria cylindrica*, *Glyceria* spp., *Cinna arundinacea*, *Bidens connata*, *Thelypteris palustris*, *Onoclea sensibilis*, *Osmunda regalis*, *Carex stricta*, *Carex lurida*, *Carex crinita*, *Triadenum walteri*, *Lobelia cardinalis*, *Lycopus virginicus*, *Pilea pumila*, *Carex tribuloides*, *Polygonum punctatum*, *Polygonum arifolium*, *Cicuta maculata*, *Leersia oryzoides*, *Galium obtusum*, *Commelina virginica*, and others. Vines may include *Toxicodendron radicans*, *Smilax rotundifolia*, *Campsis radicans*, and *Parthenocissus quinquefolia*. Mosses are generally sparse to absent, except on logs and tree bases above the high-water line.

USFWS Wetland System

Palustrine.

Distribution

Range

This red maple - green ash swamp community occurs in the Coastal Plain of the Chesapeake Bay region and rarely in the adjacent Piedmont from New Jersey to North Carolina.

States/Provinces

DC, DE, MD, NJ, VA.

Conservation Status

Rank

G3G4 (14-Feb-2012).



Figure B4. Coastal Plain / Piedmont Floodplain Swamp Forest (Green Ash – Red Maple Type) at Richmond National Battlefield Park, Virginia. Photo by Gary Fleming. June 2010.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 367/127640A, September 2022

National Park Service
U.S. Department of the Interior



[Natural Resource Stewardship and Science](#)

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