Forest Communities and Geology of Washington and Vicinity

Friends of Dyke Marsh, Friends of Huntley Meadows Park, Northern Virginia Conservation Trust, Friends of Little Hunting Creek, Four Mile Run Conservatory Foundation, and Friends of Mason Neck State Park

May 10, 2017

Rod Simmons

The Southern Megalopolis

The Washington-Baltimore region is probably the most geologically and floristically diverse area in the eastern United States.

Urban and suburban areas in and around these large old cities also typically contain the largest number and variety of old-age trees and remnant stands.

Also, in close proximity to the Megalopolis are a surprising number of extensive, high quality natural communities, i.e., Patuxent Research Refuge, Beltsville Agricultural Research Center, Greenbelt Park, Chapman State Park, Mattawoman Wildlands, Potomac Gorge, etc.

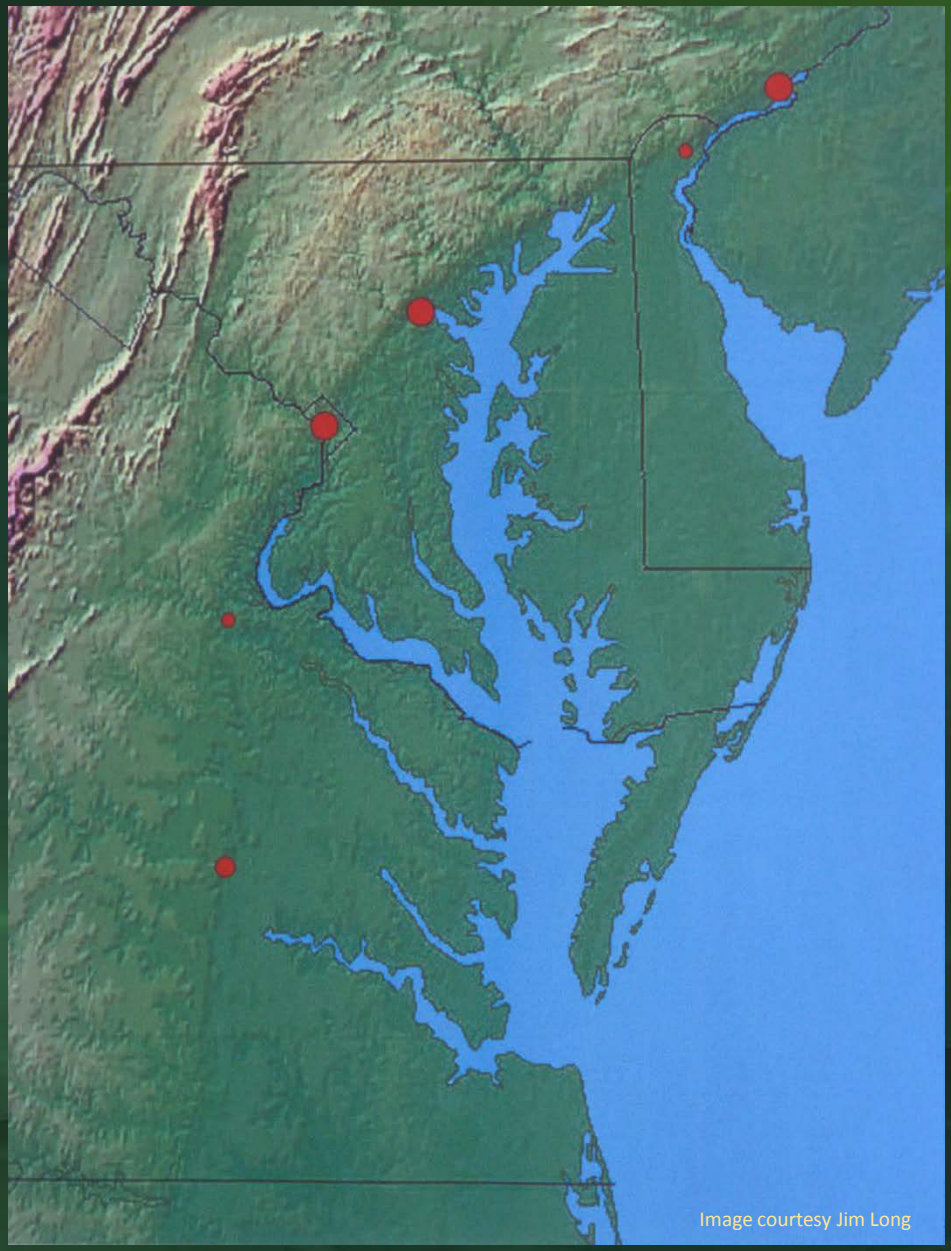


Image courtesy Jim Long

Fall Line Physiographic Province

The Fall Line, or “Fall Zone”, is a first order physiographic boundary between the Piedmont Plateau on the west and the Atlantic Coastal Plain to the east. This zone of transition, where the hard, crystalline bedrock of the Piedmont descends under the soft sediments of the Coastal Plain, is defined by deeply-entrenched stream valleys that commonly form gorges, waterfalls, and rapids. It was also the farthest navigable limits upstream for oceangoing vessels, thus most of the old, large cities along the Atlantic seaboard are situated along it.

Unconsolidated (mixed size), large and small gravels (cobbles) at the surface of old-age **Central Appalachian / Inner Piedmont Low-Elevation Chestnut Oak Forest**: *Quercus montana* - (*Quercus coccinea, Quercus rubra*) / *Kalmia latifolia / Vaccinium pallidum* Forest (USNVC: CEGL006299) on a gravel terrace above Pulpit Rock at Rock Creek Park, Washington, D.C.

Pristine example of old-age **Piedmont / Central Appalachian Mixed Oak / Heath Forest:** *Quercus alba - Quercus* (*coccinea, velutina, montana*) */ Gaylussacia baccata* Forest (USNVC: CEGL008521) atop high gravel terrace of the Fall Line (zone) in the City of Alexandria, Virginia. Lowbush Blueberry (*Vaccinium pallidum*) and Black Huckleberry (*Gaylussacia baccata*) are co-dominant at this site.

Northern Coastal Plain / Piedmont Oak - Beech / Heath Forest: *Fagus grandifolia - Quercus* (*alba*, *velutina*, *montana*) / *Kalmia latifolia* Forest (USNVC: CEGL006919) on rugged, steep, north-facing bluffs below Oak-Heath Forest at Chapman State Park, Charles County, Maryland. This northern coastal type contrasts nicely with the steep slope variant of Central Appalachian / Inner Piedmont Low-Elevation Chestnut Oak Forest (USNVC: CEGL006299) with co-dominant Witch-hazel (*Hamamelis virginiana*) of the Fall Line and Piedmont.

Pristine **Piedmont Acidic Oak - Hickory Forest**: *Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Hylodesmum nudiflorum* Forest (USNVC: CEGL008475) along the west side of Shirley Highway (395) opposite Bren Mar Park in Fairfax County, Virginia. These diverse communities are common in the Piedmont, but along the Fall Line are essentially restricted to ancient colluvial slope benches of weathered Potomac Formation clay , and are largely absent from the Coastal Plain. This type generally occurs as a gradient between Oak-Heath Forest and Mesic Mixed Hardwood Forest, usually on dry to mesic, acidic, southwest facing slopes with high solar exposure.

Exceptional diabase “flatwoods” with extensive Bashful Bulrush (*Trichophorum planifolium*) glades at the eastern edge of the Triassic Basin at Confederate Fortifications Historic Site, Fairfax County, Virginia.

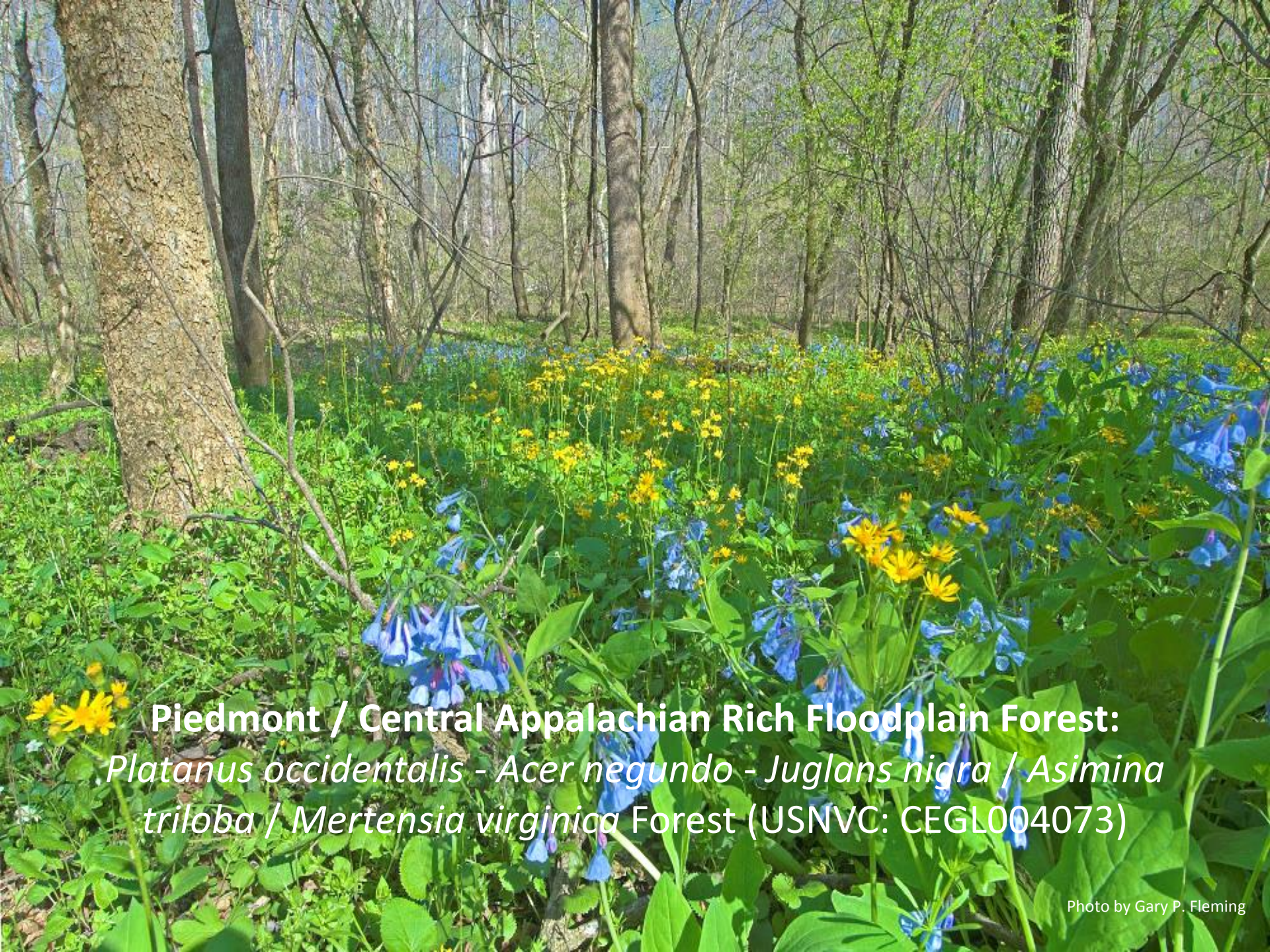
Outstanding example of **Basic Oak-Hickory Forest (Northern Hardpan Type)**: *Quercus alba – Carya glabra – Fraxinus americana / Cercis canadensis / Muhlenbergia sobolifera – Elymus hystrix* Forest (USNVC: CEGL006216) - a Triassic Basin diabase glade at Cub Run Stream Valley Park, Fairfax County, Virginia. Global/State Ranks: G3/S3.

Old-age example of **Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest**: *Fagus grandifolia* - *Quercus* (*alba, rubra*) - *Liriodendron tulipifera* / (*Ilex opaca* var. *opaca*) / *Polystichum acrostichoides* Forest (USNVC: CEGL006075) on a steep slope of massive, underlying quartz monzonite in the Holmes Run Gorge in Fairfax County, Virginia. American Beech (*Fagus grandifolia*), Northern Red Oak (*Quercus rubra*), Christmas Fern (*Polystichum acrostichoides*), and others occurring together, especially along stream banks, are diagnostic of this common stream bank and mesic forest community.

Old-age example of the coastal variant of **Northern Coastal Plain / Piedmont Mesic Mixed Hardwood Forest** (USNVC: CEGL006075) at Chapman State Park, Charles County, Maryland. In addition to White Oak (*Quercus alba*), American Beech (*Fagus grandifolia*), and Tulip Tree (*Liriodendron tulipifera*), dominant species include Southern Red Oak (*Quercus falcata*) and Pagoda Oak (*Quercus pagoda*) instead of Red Oak (*Quercus rubra*), and Sweetgum (*Liquidambar styraciflua*). American Holly (*Ilex opaca*) is especially prevalent. The coastal variant of this community is absent from Arlington and Alexandria westward, but is common in southeastern Fairfax County (minus *Q. pagoda*) southeastward along the Potomac River.

Lush colonies of spring ephemerals and other wildflowers in **Coastal Plain / Outer Piedmont Basic Mesic Forest:** *Fagus grandifolia - Liriodendron tulipifera - Carya cordiformis / Lindera benzoin / Podophyllum peltatum* Forest (USNVC: CEGL006055) of rolling uplands and ravines at Turkey Run Park, Fairfax County, Virginia.

Extensive Ostrich Fern (*Matteuccia struthiopteris* var. *pensylvanica*) colony in **Coastal Plain / Outer Piedmont Basic Mesic Forest:** *Fagus grandifolia - Liriodendron tulipifera - Carya cordiformis / Lindera benzoin / Podophyllum peltatum* Forest (USNVC: CEGL006055) occupying an ancient alluvial bench at Plummers Island, Montgomery County, Maryland.



Piedmont / Central Appalachian Rich Floodplain Forest: *Platanus occidentalis - Acer negundo - Juglans nigra / Asimina triloba / Mertensia virginica* Forest (USNVC: CEGL004073)

Photo by Gary P. Fleming

Coastal Plain / Piedmont Small Stream Forest: *Liquidambar styraciflua - Liriodendron tulipifera / Lindera benzoin / Arisaema triphyllum* Forest (USNVC: CEGL004418) with extensive New York Fern (*Parathelypteris noveboracensis*) glades along Still Creek North Branch at Greenbelt Park, Prince George's County, Maryland. Unlike the rich floodplains of large streams and rivers, these perennially damp forest communities are flooded very rarely by stream overflows and are mainly fed by a mosaic of seeps and springs that emanate from the porous sandy-gravelly soils of slopes along the stream valleys.

Northern Coastal Plain / Inner Piedmont Mixed Oak Floodplain Swamp: *Quercus* (*phellos, palustris, michauxii*) - *Liquidambar styraciflua / Cinna arundinacea* Forest (USNVC: CEGL006605) along the Patuxent River on the west side of the Baltimore-Washington Parkway in Prince George's County, Maryland. These forested "backswamps" occupy extensive, seasonally saturated depressions over impermeable clay within alluvial floodplains of large streams and rivers along the Fall Zone and inner Coastal Plain of the Washington, D.C. area. Swamp White Oak (*Quercus bicolor*) is often co-dominant at many such sites in this region as well.

The Potomac Gorge


Photo by R.H. Simmons


Image courtesy USGS

"The Potomac Gorge encompasses a 15 mile stretch of the Potomac River valley from just above Great Falls to the vicinity of Georgetown in Washington, D.C. The valley in this stretch is deeply entrenched as the river drops 46 meters in elevation through rocks of the Fall Line at the eastern edge of the Piedmont Plateau. The south side of the river is in Virginia while the river itself and the north side are in Maryland and the District of Columbia. The Potomac Gorge has long been considered one of the most important natural areas in the mid-Atlantic region, and is especially significant because of its location within an urban and suburban setting. This exceptional site provides habitat for over 60 rare plants, animals, and natural communities."[1]

[1] Vegetation Ecology of the Potomac Gorge, Fleming 2006

Exceptional **Potomac River Bedrock Terrace Hardpan Forest:** *Carya glabra - Quercus* (*rubra,montana*) - *Fraxinus americana / Viburnum rafinesqueanum/ Piptochaetium avenaceum* Forest (USNVC: CEGL006209) along the C&O Canal National Historical Park at Bear Island, Montgomery County, Maryland. Global/State Ranks: G1G2/S1.

Old-age **Riverside Bedrock Terrace Woodland:** *Pinus virginiana - Juniperus virginiana - Quercus stellata / Amelanchier spicata / Danthonia spicata / Leucobryum glaucum* (USNVC: CEGL008449) along the C&O Canal National Historical Park at Bear Island, Montgomery County, Maryland. Global/State Ranks: G1/S1.

Old-age Piedmont / Coastal Plain Hemlock - Hardwood Forest: *Tsuga canadensis - Fagus grandifolia - Quercus* (*montana, alba*) Forest at Hemlock Overlook Park along Bull Run in Fairfax County, Virginia (USNVC: CEGL006474). Global/State Ranks: G2G3,S2. Similar old-age Piedmont stands of Hemlock forest occur at Mink Hollow along the Patuxent River in Montgomery County.

Globally rare, old-age “flatwoods” glade of **Piedmont Ultramafic Woodland** dominated by *Quercus stellata* and graminoids at **Travilah Serpentine Barrens**, Montgomery County, Maryland.

Extensive **Pine Barrens Pine-Oak Woodland** of the Western Shore: *Pinus rigida* – *Quercus coccinea* – *Quercus falcata* / (*Quercus marilandica*) / *Gaylussacia frondosa* Woodland (USNVC: CEGL006329) at the "Central Farm" of the Beltsville Agricultural Research Center (BARC) in northern Prince George's County. Global/State Ranks: G2G3/S3.

Pitch Pine (*Pinus rigida*) is the dominant and characteristic tree of the New Jersey Pine Barrens, where it occurs on sandy soils in dry to moist conditions.

Pitch Pine as a dominant community component is highly rare in the greater Washington, D.C. area, reaching its southern coastal extension in the eastern U.S. on the vast, deep Cretaceous sand deposits that extend from northeastern Prince George's County through Anne Arundel County.

All of the Pitch Pine communities in the region are allied with similar types in the New Jersey Pine Barrens and are globally rare[1].

[1]Simmons, R.H., J.M. Parrish, M.D. Tice, and M.T. Strong. 2008. Conservation Priorities and Selected Natural Communities of the Upper Anacostia Watershed. Marilandica 12: pp. 1–22.

Photo by R.H. Simmons

The National Champion **Dwarf Chinquapin Oak (*Quercus prinoides*)**, above left, and the nearby State Champion **Sand Hickory (*Carya pallida*)**, above right, in sandy *Pinus rigida – Quercus coccinea – Quercus falcata* / (*Quercus marilandica*) / *Gaylussacia frondosa* Woodland (USNVC: CEGL006329) at the "East Farm" of the Beltsville Agricultural Research Center (BARC) in northern Prince George's County.

Pristine, sandy Oak-Pine-Heath Forest on knoll at Sawmill Creek Park above Sawmill Creek near the eastern end of Dorsey Road in Glen Burnie, Anne Arundel County. Dangleberry (*Gaylussacia frondosa*) is co-dominant here with a diversity of ericads, including Highbush Blueberry (*Vaccinium corymbosum*), Sheep Laurel (*Kalmia angustifolia*), Eastern Teaberry (*Gaultheria procumbens*), Trailing Arbutus (*Epigaea repens*), and others.

Bear Oak (*Quercus ilicifolia*)

Inkberry (*Ilex glabra*)

Sheep Laurel (*Kalmia angustifolia*)

Wild Raisin (*Viburnum cassinoides*)

Stands of mature **Pitch Pine (*Pinus rigida*)** along the south shore of the upper Magothy River in northeastern Anne Arundel County. The Box Huckleberry station was located on a wooded slope a short distance from the back of the house in the photo.

Maryland's last known station for **Box Huckleberry (*Gaylussacia brachycera*)** (Michx.) Gray was a small, dwindling population on a north-facing, sandy hillside in Oak-Pine-Heath Forest along the headwaters of the Magothy River near Lake Waterford Park in Anne Arundel County (G3,SH?).

Box huckleberry is a dwarf, evergreen shrub that forms extensive, self-sterile colonies. Its natural range is essentially the mid-Atlantic region, occurring in Pennsylvania, Delaware, Maryland, West Virginia, Virginia (S1), Kentucky, North Carolina, and Tennessee. It occurs in all physiographic provinces throughout its range, though is known only from the coastal plain of Delaware and Maryland (see [1]Pooler et al. 2006).

[1]Pooler, M.R., R.L. Dix, and R.J. Griesbach. 2006. Genetic diversity among accessions of the endangered box huckleberry (*Gaylussacia brachycera*) based on AFLP markers. Journal of the Torrey Botanical Society 133(3), pp. 439-448.

Photo by R.H. Simmons

Old-age Pitch Pine (*Pinus rigida*) and tangle of graminoids (grass-like plants) and shrubs at the exceptionally pristine **Aitcheson Bog** on the west side of I-95 in northern Prince George's County, Maryland - one of the finest and last remaining examples of the globally rare **Fall Line Magnolia Bog community**: *Nyssa sylvatica - Magnolia virginiana -* (*Pinus rigida*) */ Rhododendron viscosum - Toxicodendron vernix / Smilax pseudochina* Woodland (USNVC: CEGL006219). Global/State Ranks: G1/S1.

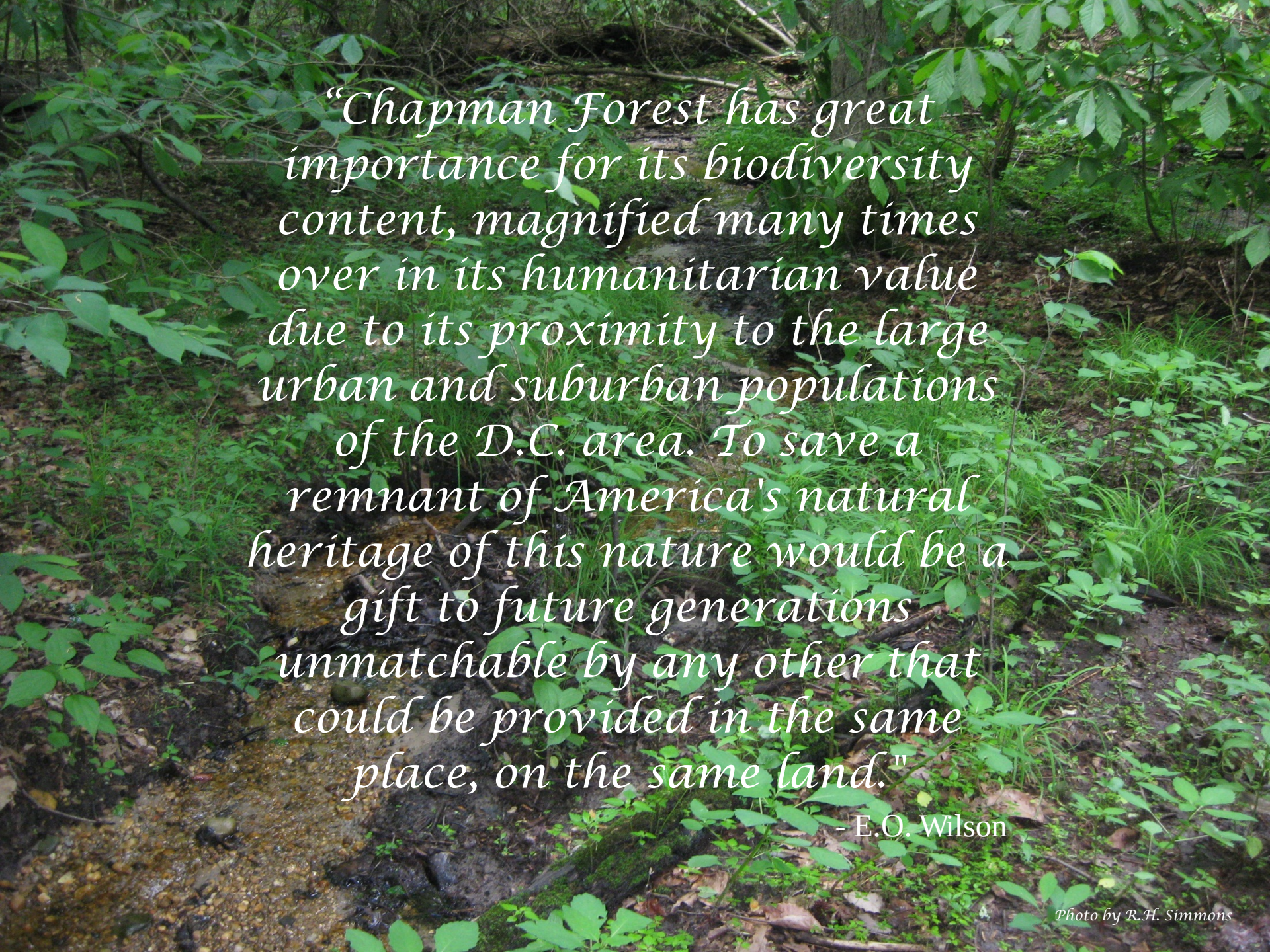
Coastal Plain / Outer Piedmont Acidic Seepage Swamp: *Acer rubrum – Nyssa sylvatica – Magnolia virginiana / Viburnum nudum / Osmundastrum cinnamomeum – Woodwardia areolata* Forest (USNVC: CEGL006238) typically arise at the outflow of bogs and form relatively large, braided, acidic swamps, which in turn form small seepage streams. Global/State Ranks: G3?/S3.

Chapman Forest – Jewel in Southern Maryland

- North Tract – Chapman State Park: Potomac Drainage
- South Tract – Parris N. Glendening NEA: Mattawoman Drainage

Keystone Linking Multiple Greenways

- Rare species often need corridors of connected habitat and deep interior spaces
- Chapman Forest connects natural areas in the VA and MD Potomac region to the Mattawoman Natural Area
- The Chapman Forest Important Bird Area (IBA) is contiguous with the Mattawoman IBA


"Chapman Forest has great importance for its biodiversity content, magnified many times over in its humanitarian value due to its proximity to the large urban and suburban populations of the D.C. area. To save a remnant of America's natural heritage of this nature would be a gift to future generations unmatchable by any other that could be provided in the same place, on the same land."
- E.O. Wilson
Photo by R.H. Simmons

Globally-rare **Coastal Plain River-Bluff Xeric Oak Forest**: *Quercus montana* / *Avenella flexuosa* – *Solidago bicolor* Forest (USNVC: CEGL006490) with large Hairgrass (*Avenella flexuosa*) glade atop bluffs above the Potomac River at Chapman State Park, Charles County, Maryland. Similar glades occur in acidic soil atop high river bluffs along the Potomac River at Leesylvania State Park, Prince William County, Virginia.

Globally-rare **Coastal Plain Dry Calcareous Forest:** *Quercus muhlenbergii / Cercis canadensis / Dichanthelium boscii - Bromus pubescens - Erigeron pulchellus* var. *pulchellus - Aquilegia canadensis* Forest (USNVC: CEGL007748) on steep, southwest-facing slope at Chapman State Park, Charles County, Maryland.

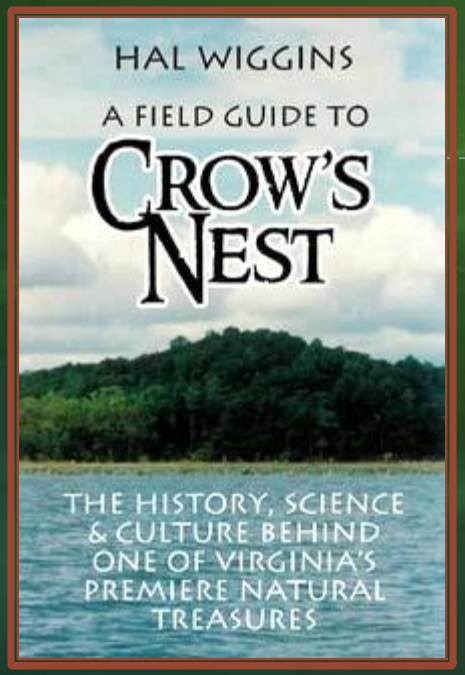
Steep, rugged bluffs and ravines along the Potomac River at Chapman State Park in Charles County, Maryland opposite Mason Neck National Wildlife Refuge. This coastal plain landscape was formed where river bluffs and deep ravines over millennia exposed underlying calcareous and glauconitic marine sands and marl beds deposited during the Paleocene, Eocene, and Miocene epochs when the area was a shallow sea at the western edge of the Atlantic Ocean.

The Maryland State Champion Chinquapin Oak (*Quercus muehlenbergii*) in old-age **Shell-Marl Ravine Forest** at Chapman State Park. At present, Shell-Marl Ravine Forest is perhaps best classified in the United States National Vegetation Classification (USNVC) as a coastal variant of **Coastal Plain / Outer Piedmont Basic Mesic Forest:** *Fagus grandifolia - Liriodendron tulipifera - Carya cordiformis / Lindera benzoin / Podophyllum peltatum* Forest (USNVC: CEGL006055).

Mixed, old-age stand of White Ash (*Fraxinus americana*), Bitternut Hickory (*Carya cordiformis*), Sweetgum (*Liquidambar styraciflua*), Chinquapin Oak (*Quercus muehlenbergii*), and Slippery Elm (*Ulmus rubra*) at Chapman State Park (Chapman Forest). The location and unique assemblage of these and other montane and coastal plain species strongly defines this type as a coastal variant of **Coastal Plain / Outer Piedmont Basic Mesic Forest** (USNVC: CEGL006055).

Disjunct Calciphiles of Shell-Marl Ravine Forest

Similar History & Ecology



"Crow's Nest is considered one of the finest, if not the finest example of mature forests remaining in the Coastal Plain of Virginia."

Virginia Department of Conservation and Recreation, Division of Natural Heritage, 1999

- Same geology – Aquia Formation
- Similar Ecological Communities:
  - Calcareous Ravine Forest
    (G2, globally imperiled)
  - Basic Mesic Forest
    (G2, globally imperilled)
  - Basic Oak-Hickory Forest
    (G2, globally imperiled)

Oak-Heath Forest in **black slate canyon (Quantico Formation)** formed over millennia by the pristine headwaters of Neabsco Creek, just east of I-95 in Prince William County, Virginia. The Cretaceous-aged clay, silt, sands, and gravels of the Potomac Formation and Tertiary terrace gravels at the summits overlie the black slate.

Extensive, seasonally flooded **Non-Riverine Coastal Plain Flatwoods** with vast colonies of Brown Bog Sedge (*Carex buxbaumii*), Velvet Sedge (*Carex vestita*), and Button Sedge (*Carex bullata*) at Huntley Meadows Park in Fairfax County, Virginia. This is one of the finest examples of this community type in the state.

Seasonally flooded **Coastal Plain Oak Floodplain Swamp**: *Quercus* (*phellos, palustris, michauxii*) – *Liquidambar styraciflua / Cinna arundinacea* Forest (USNVC: CEGL006605) along Mattawoman Creek, with Overcup Oak (*Quercus lyrata*), Pin Oak (*Quercus palustris*), Willow Oak (*Quercus phellos*), Sweetgum (*Liquidambar styraciflua*), Red Maple (*Acer rubrum*), American Elm (*Ulmus americana*), numerous carices (*Carex* spp.), and others.

May 2009 joint MNPS, VNPS, Botanical Society of Washington, and Mattawoma Watershed Society “bioblitz” along the seasonally flooded bottomland forests of Mattawoman Creek.

Freshwater tidal channel of Farm Creek meandering through Freshwater Tidal Marsh at Featherstone National Wildlife Refuge, Prince William County, Virginia. Regularly flooded **Tidal Hardwood Swamp Forest**, characterized by hummock-and-hollow microtopography and diverse hydrophytic herbs and shrubs, borders the open Tidal Freshwater Marsh and Tidal Shrub Swamp communities.

Extensive colonies of state rare River Bulrush (*Bolboschoenus fluviatilis*) in high quality Tidal Freshwater Marsh (Mixed High Marsh Type): *Impatiens capensis - Persicaria arifolia - Peltandra virginica* - (*Typha angustifolia*) Tidal Herbaceous Vegetation (USNVC: CEGL006325) at Dyke Marsh, Fairfax County, Virginia.


American Lotus (Nelumbo lutea)
Photo By Jim Long

Questions?

Virginia Spiderwort (*Tradescantia virginiana*) at “Cactus Rock”, Plummers Island, Montgomery County, Maryland. Photo by R.H. Simmons.

Resources:

City of Alexandria Flora and Natural Communities webpage at http://alexandriava.gov/22560

Geologic Atlas of the City of Alexandria and Vicinity at https://www.alexandriava.gov/89974

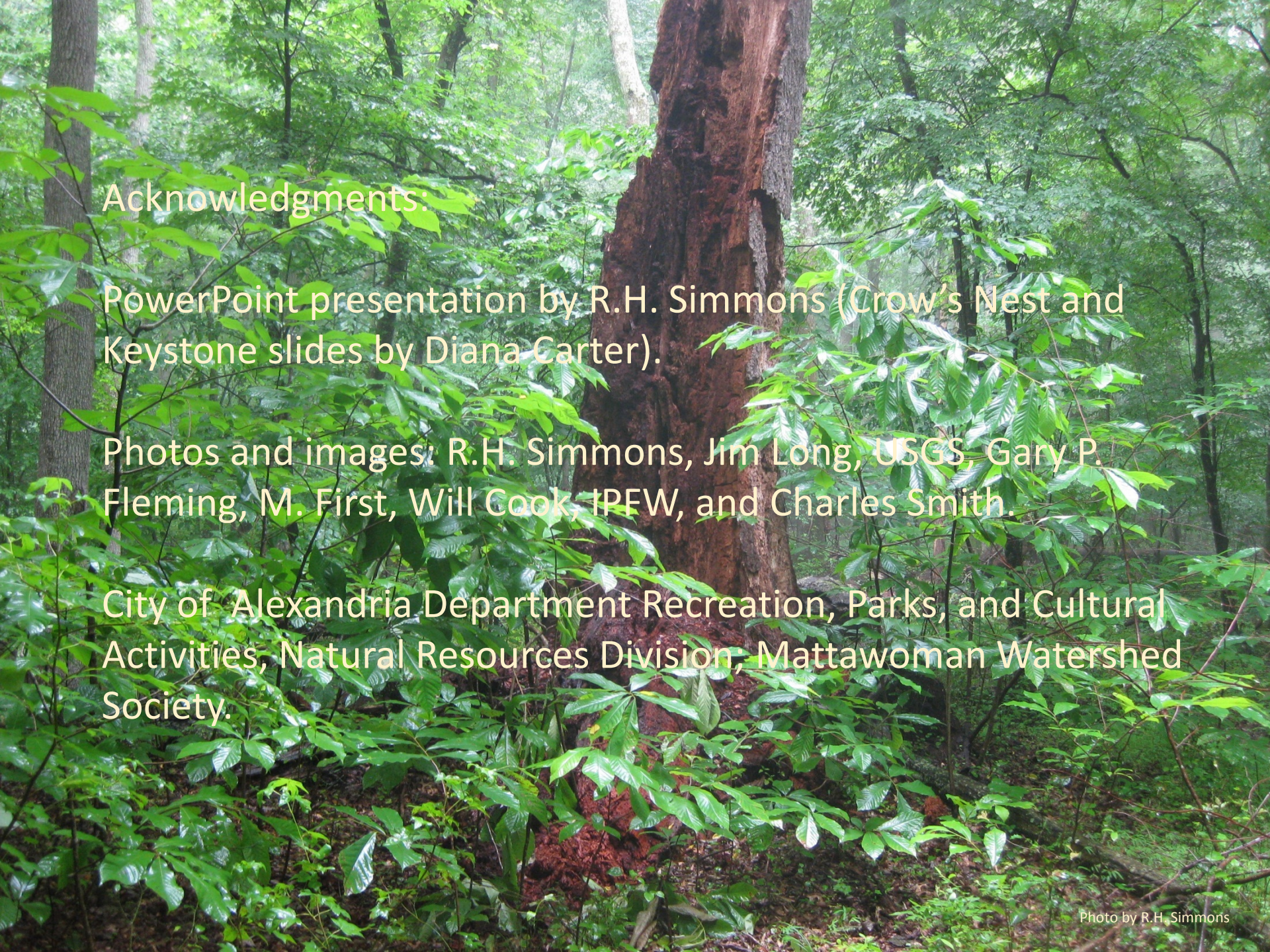
The Natural Communities of Virginia, 2nd Approximation - last updated 2/2016

Rare Plants of Virginia (PDF) - last updated 11/2016

Digital Atlas of the Virginia Flora at http://www.vaplantatlas.org

"*The Natural Communities of Maryland: 2016 Natural Community Classification Framework*".

Expanded Rare, Threatened, and Endangered Plants of Maryland



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City of Alexandria Department Recreation, Parks, and Cultural Activities, Natural Resources Division; Mattawoman Watershed Society.

Photo by R.H. Simmons