



**Final DRAFT - Public**  
**Environmental Conditions Report**

Louise F. Cosca Regional Park

January 2021

# LOUISE F. COSCA REGIONAL PARK ENVIRONMENTAL CONDITIONS REPORT



*Prepared For:*

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**FINAL DRAFT FOR PUBLIC VIEW**

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*Cover Photo - One of nearly a hundred observed showy orchis along the Butler Branch stream valley, taken in April 2020.*

*A special thank you to James King, Park Manager and Stephanie Jacob, Park Naturalist for facilitating ESA field studies*

## INTRODUCTION

Environmental Systems Analysis, Inc. (ESA) is part of the Lardner/Klein Landscape Architects, P.C. team assisting with natural resources related tasks associated with the preparation of an updated master plan for Louise F. Cosca Regional Park, contract #360324-000. Deliverables include:

- an evaluation of environmental conditions within the park,
- preparation of a plan indicating habitat, cover types and other natural resources,
- recommendations as to what resources should be preserved and what resources may need additional attention, improvement, or specific management.

This report provides documentation and recommendations regarding the environmental conditions of the park. It describes the natural communities, soils, wetlands, unique natural resources including old growth forest and rare species, and natural resource constraints including steep slopes. It also includes an all species plant list, which documents the common and Latin name of every plant species observed by ESA staff during their April/May 2020 field work at Cosca Regional Park.

The 800.39-acre park is located within the northern coastal plain (Major Land Resource Area 149A) in Clinton, Prince George's County, MD. It is bounded by Piscataway Road (Route 223) to the north, Brandywine Road and Branch Avenue (Route 5) to the east, Thrift Road and Piscataway Creek to the south, and Tippet Road to the west. Park access is available from Thrift Road. The park is within the Potomac River watershed and includes Butler Branch, a perennial stream with an active floodplain, and the in-line Cosca Lake, which flows into Piscataway Creek in the southernmost end of the Park. Piscataway Creek ultimately flows to the Potomac River at Fort Washington.

## METHODS

ESA used a base map of Cosca Regional Park prepared in ArcGIS that showed aerial photography, topography, trails, and property boundaries. ESA used this map to delineate the location of the woodlands. Then, ESA used the Planning Department's GIS data to add information to better understand the environmental conditions of the park. ESA reviewed wetland boundary and stream centerline, Natural Resources Conservation Service soil types, and the Green Infrastructure Network. ESA used this GIS data to create maps showing prime agricultural soils, steep slopes of 15% to 25% and 25% and greater, and 300-foot forest interior dwelling bird buffer. ESA downloaded a black & white aerial photo of the Park from 1938, which was obtained through the MD MERLIN website and used this information to create a Potential Old Growth Forest map (see Appendix C).

ESA reviewed these maps to make a preliminary determination of forest stands occurring on the site. These forest stands were ground-authenticated to verify composition, extent, and ecological importance. Sample point locations within each forest stand were randomly selected. Respective forest stands were based on species composition, density, size, condition, and age of the stand. The dominant, co-dominant and associate tree species for each stand were identified and tabulated to indicate their relative frequencies and average tree diameter class.

ESA conducted variable point sampling at each forest stand data station. Variable point sampling refers to a method in which sample trees are selected with a probability proportional to their basal areas, (i.e. larger trees with larger basal areas have higher probabilities of selection than smaller trees). Basal area is defined as a measurement of the cross-sectional area of a tree trunk at breast height. Basal area of a forest stand is

the sum of the basal areas of the individual trees. Furthermore, since basal area is highly correlated with tree volume, variable point sampling is an efficient method for estimating frequency of occurrence, volume and/or economic value. Using a 10-factor wedge prism for sampling, it can be shown that each tree selected within the variable plot represents 10 square feet of basal area per acre, hence the term 10-factor point sample.

Using a 10-factor wedge prism, ESA tallied and measured trees that fell within the data station. Additional information collected at each data station included:

- Percent canopy closure and tree species observed including relative dominance,
- Percent and species of shrubs,
- Percent and species of forest floor covered by herbaceous plants,
- Percent of forest floor covered by downed woody debris,
- The presence or absence of exotic or invasive species.

ESA used these data to estimate the number of trees per acre, per each one-inch diameter class, and to describe each forest stand's composition, structure, condition, function, retention potential and management recommendations. Completed data sheets and a forest stand summary are included in Appendix A and Appendix B, respectively. The forest stand map in Appendix C shows the location of forest stands and the forest stand data stations.

In addition, ESA field verified the Planning Department's wetland and waters GIS data. ESA classified all wetlands and waters per the U.S. Fish and Wildlife Service's (USFWS) *Classification of Wetlands and Deepwater Habitats of the United States*. A Wetlands and Waters Classification Map is in Appendix C.

Lastly, ESA conducted a rare plant survey. For the purpose of performing this study, ESA made a written request to the Maryland Department of Natural Resources (DNR) Wildlife and Heritage Service and U.S. Fish and Wildlife Service (FWS), Annapolis Field Office, requesting a formal review for the documentation of any State and/or Federal rare, threatened or endangered (RTE) plant or animal species known to occur on-site or nearby of similar habitat.

Field work for the forest stand delineation, wetland verification and classification and rare plant survey were performed by ESA botanists and an environmental technician in Spring 2020.

## RESULTS

ESA delineated forest stands, located rare plants, and classified wetlands and waters at Cosca Regional Park. The prepared maps include several layers of information that in digital format can be turned on or off as needed. Appendix C includes maps utilizing the following layers: property boundary, two-foot contours, slopes of 15 to 25% and 25% and greater, soils and soil descriptions, prime agricultural soils, roads and authorized park trails, forest stand types and their data stations, 100-year floodplain, Waters of the United States classifications, wetlands and wetland buffers, forest interior, approximate locations of rare, threatened and endangered plant species [removed from this document], and potential old growth forest based on 1938 aerial mapping.

A total of 198 plant species were observed through the seven days of field work, including 34 tree species, 19 shrub species, 17 vine species, 98 forb species, 10 fern species and 17 grass, sedge and rush species, and of which, 34 of these plant species being considered non-native. Please reference Appendix D for an all-species list by common and Latin name.

### Forest Stands/Natural Communities

Cosca Regional Park contains approximately 621 acres of forest that ESA separated into three forest stands:

- the upland, mature mixed hardwood American Beech, White Oak, Northern Red Oak, Tulip Poplar, American Holly and Christmas Fern Forest
- the Butler Branch and Piscataway floodplain and bottomland Tulip Poplar, Red Maple, Boxelder, American Sycamore, Ironwood, Jumpseed Forest, and
- the mid-seral, disturbed Virginia Pine Successional Forest.

The forest stand names are based on a publication entitled *The Natural Communities of Maryland, Natural Community Classification*, MD DNR, Wildlife and Heritage Service, Natural Heritage Program, 2016, Publication #03-662016-597. The purpose of *The Natural Communities of Maryland, Natural Community Classification* publication is to present the current natural community classification framework of 79 ecological community groups and 226 ecological community types recognized by the Natural Heritage Program as occurring in Maryland.

The Maryland natural community classification is a fine-scaled classification system that uses an ecologically based hierarchy of grouping levels to organize community types in a logical manner. It is based on previous classifications developed by the Natural Heritage Program (Berdine 1999) and the Virginia Natural Heritage Program (Fleming et al. 2016).

Ecological community groups are best described as recurring assemblages of plants found in particular physical environments, and ecological community types or associations are an assemblage of plants having ecologically similar requirements and include one or more dominant species from which it derives a definite character.

The ecological community groups observed at Cosca Regional Park include:

- Mesic Forest - This class is characterized by diverse forests throughout Maryland with moist, well-drained soils regimes often supporting lush vegetation. A variety of groups comprise this class which range from northern hardwoods at higher elevations in the mountains to basic mesic forests of the coastal plain.

- Dry-Mesic Forests and Woodlands - This class is characterized by forests throughout Maryland with intermediate soil moisture regimes. They are widespread and commonly comprised of oak and hickory species over a number of geological substrates.
- Alluvial Wetlands - This class consists of groups related to river and stream floodplains with non-tidal flooding regimes. Most groups within this class are characterized by productive and diverse forests.
- Non-Alluvial Wetlands - This widely variable class accommodates swamps, seeps and vernal pools controlled by groundwater seepage. Hydrological regimes vary from perennial to seasonal.

The refined level, ecological communities found at Cosca Regional Park include:

### **American Beech, White Oak, Northern Red Oak, Tulip Poplar, American Holly and Christmas Fern Forest**

Mesic Mixed Hardwood Forest (Cosca Stand Formation Type - Mature Mixed Hardwoods)

This forest of mesic to dry-mesic, well-drained soils occurs in the Piedmont and Coastal Plain of Maryland. It is characteristically a mixed forest dominated by American beech, white oak, red oak, and tulip poplar in various proportions. Overstory associates over the range include black oak, southern red oak, scarlet oak, sweetgum, red maple, black gum, mockernut hickory, pignut hickory, and white ash. The subcanopy is characterized by young American beech, red maple, ironwood, flowering dogwood, and sassafras. American holly is particularly characteristic and abundant on the Coastal Plain. The shrub layer varies from very sparse to well-developed and can include pawpaw, maple-leaf viburnum, arrowwood viburnum and American strawberry bush. Heath shrubs, such as highbush blueberry and lowbush blueberry, may be common but not abundant. Vines are common, including Virginia creeper, common greenbrier, cat brier, and poison ivy. The herb layer is composed of Christmas fern, New York fern, perfoliate bellwort, pink lady slipper, partridgeberry, crane-fly orchid, rattlesnake plantain, white wood aster, striped wintergreen, Indian cucumber-root, lady fern, beechdrops, Canada mayflower, naked-flowered tick trefoil, smooth Solomon's-seal, mayapple, Jack-in-the-pulpit, and false Solomon's-seal.

### **Tulip Poplar, Red Maple, Boxelder, American Sycamore, Ironwood, Jumpseed Forest**

Coastal Plain - Piedmont Bottomland Forest (Cosca Stand Formation Type - Forested Floodplain and Bottomlands)

This community occupies floodplains and terraces of medium-sized streams. These floodplains are moderately extensive and subject to overflow, but topographically fairly homogeneous. In these habitats, the alluvial landforms are poorly developed or occur at very small scales. Hydrologic regime is temporarily flooded. Soils are generally alluvial silt loams and sands washed from various upland soils.

This association is dominated by tulip poplar in variable combinations with other trees. Boxelder, red maple, or both are characteristic in the overstory or understory. Sycamore varies from codominant to absent. Other trees that may be important in some stands include black walnut, green ash, white ash, bitternut hickory, slippery elm, river birch, and pin oak. Spicebush, ironwood and blackhaw viburnum dominate the shrub layer. Vines of poison ivy and other species may occur. Relatively diverse herb layers are composed of both mesophytic and hydrophytic species. The most constant herbs include Jack-in-the-pulpit, white avens, jumpseed, enchanter's nightshade, wingstem, jewelweed, false nettle, common blue violet, and calico aster. Although less constant, Virginia wildrye, spring beauty, and yellow trout lily form dominance patches in some stands. Because land-use effects frequently disturb the habitat, the herb layer is often weedy and is commonly dominated by the exotic grass *Microstegium vimineum*.

## Virginia Pine Successional Forest

Successional / Modified Terrestrial Forest (Cosca Stand Formation Type - Mid-Seral Disturbed)

This Virginia pine forest of the Maryland coastal plain occurs in areas where canopy removal has created dry, open conditions and bare mineral soil, allowing for the establishment of Virginia pine. These habitats include old fields, old pastures, clear-cuts, and eroded areas; soils are typically dry, acidic, and infertile. It is common on abandoned farmland. This forest typically has a dense canopy of Virginia pine and little understory vegetation. The dense canopy may also include mixtures of other pine species (e.g., loblolly, pitch, white) or other early-successional deciduous trees (e.g., red maple, sweetgum, black cherry, tulip poplar, ash, sassafras, black gum and mixed oak species). Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species. Shrub and herb layers are frequently sparse. Stands are short-lived, generally less than 75 years. Japanese honeysuckle and multiflora rose may be common.

The herb layer is characterized by weedy natives and exotics such as club moss (running ground cedar), yarrow, hawkweed, and Chinese lespedeza. Shrub and herb strata, where present at all, are usually sparse in coverage. Some stands may have a dense ericaceous shrub stratum containing blueberry and mountain laurel. This community contains many exotics species such as mimosa, Japanese honeysuckle, and kudzu. The associated species in all strata may be highly variable.

## ***Forest Stand #1 - Mature Mixed Hardwoods***

### **American Beech, White Oak, Northern Red Oak, Tulip Poplar, American Holly and Christmas Fern Forest**

Forest Stand #1 is the largest of the three forest types at Cosca Regional Park and consists of approximately 418-acres of primarily mature American beech and mixed oak species, throughout the upland slopes of the park. This stand has an estimated 152 trees per acre, with a mean size class of about 11-inches diameter. The stand has a basal area of 133 and is considered slightly over-stocked. American beech is the dominant indicator species, averaging 23 per acre, with overstory species averaging 11-inches plus diameter. Their frequency of occurrence within the stand is 15%, and with an approximate age of 66-years. The stand averages 5% down and dead woody debris and with two standing habitat snags per acre, and with a canopy closure of between 70 and 75%.

Species observed within the stand included American beech, American holly, black cherry, black gum, chestnut oak, ironwood, loblolly pine, mockernut and pignut hickory, northern red oak, red maple, southern red oak, sweetgum, tulip poplar, Virginia pine, white oak, eastern redbud, flowering dogwood, high and lowbush blueberry, maple-leaf viburnum, mountain laurel, English ivy, Japanese honeysuckle, multiflora rose, common (round-leaf) greenbrier, beech drops, catchweed bedstraw, crane fly orchid, false Solomon seal, heart's-a-bustin', Jack-in-the-pulpit, mayapple, partridgeberry, purple deadnettle, running ground cedar, Solomon seal, spring beauty, striped wintergreen, white avens, yellow trout lily, adders tongue fern, Christmas fern, grape fern, New York fern, and spleenwort.

Based on the 1938 aerial photo, there is a significant sub-set of the currently mature 418-acre mixed hardwoods that shows larger-crowned mixed hardwoods through much of the woods west of Butler Branch, south and west of what becomes the overhead electric utility right-of-way, and south to Thrift Road, including the woods where Clearwater Nature Center resides. These areas are noted by having rolling topography and areas of steep slopes. A second area of mixed hardwoods is the Piscataway floodplain. The

1938 photo shows well established forest composition (crown-touching), suggesting that the mixed hardwoods may well have been 30 or more years old in 1938, making the 2020 stand in excess of 100-years old since the last time it was clear cut or other major disturbance ( $2020 - 1938 = 82 + 30 = 112$  years). Once a forest is 100-years and older it begins to emulate some of the attributes of old-growth forest, similar to that of the nearby Belt Woods Natural Environmental Area, located in Upper Marlboro, MD.

The other areas of the Park in the 1938 photo show significant blocks of tightly-spaced conifer Virginia pine, and younger sapling-stocked, smaller-crowned and younger, early seral hardwoods, which are only now being considered mature and in the 50 to 70-year range.

American beech (*Fagus grandifolia*) is pronounced within the park and therefore worth an expanded discussion of the species. Beech is a large, native, deciduous tree. It normally grows 65 to 80-feet tall but can grow up to 130 feet and can live to over 300 years old. The bark is a smooth blue gray. The leaves are yellow green during the growing season. The branches are stout and horizontal, or ascending, with interlocking leaves forming a dense crown. The root system is shallow and spreading. The fruit is a bur, usually containing two nuts.

Beech nuts are eaten by a variety of birds and mammals, including turkey, mice, squirrels, chipmunks, deer, fox, duck, bear, and blue jay. Deer do not prefer beech, which has helped beech trees expand in number. Wild turkey favor beech nuts and appreciate the open understory that beech-dominated forests provide, as they would often prefer to run, rather than fly, as flying expends significant energy.

Beech begin producing seed when 40 years old and by 60 years old may produce large quantities. Beech produce seed at 2-to 8-year intervals. Most seeds drop to the ground. A few are carried by rodents, but dispersal is limited. Blue jays may transport seeds several miles. Most of the seeds will germinate in the 1st year; after that, the seeds lose viability. Fruiting occurs from September to October. Seeds are released in October or November after frost.

American beech is a climax species that grows slowly underneath an overstory of conifers or hardwoods. Beech grows faster in canopy openings and eventually ascends into the overstory. Thin bark renders beech highly vulnerable to injury by fire. In Maryland, beech is most associated with oak, poplar and hickory.

Beech often grows clonally in the forest, forming patches of genetically identical trees through the formation of root sprouts. Young trees are conspicuous in the winter woods due to their tendency to retain their straw-colored leaves throughout the winter. Beech trees are frequently accompanied by beech drops (*Epifagus virginiana*), non-photosynthetic flowering plant that parasitizes the trees roots. Beech drops can be seen year-round, wherever beech grow, and is common within the park.

Allelopathic plants are those which secrete harmful chemicals into the environment. They do this as a means of enhancing their own survival chances. Plants that compete with other plants for soil moisture, nutrients, and light are at a disadvantage. By secreting chemical toxins to inhibit the growth of other plants, the allelopathic plant increases its chances of survival. Several plant families exhibit allelopathic abilities. Among those are the American beech and black walnut. The non-native, invasive Tree of Heaven (*Ailanthus altissima*) is also extremely allelopathic. Plants that are documented as being tolerant of allelopathic conditions exuded from beech include white and red oak, eastern red cedar, Virginia pine, boxelder, sweetgum, tulip poplar and sycamore. (*McArdles Blog, April 12, 2012, Allelopathic Plants*).

High-grading is a forestry technique, where a selective harvest is performed, typically removing high-valued oak, poplar and other hardwoods. Historically when a high-grade is performed, beech may be left behind, as they are not as favorable as other species. When selective high-grading may occur through several generations or over a century, a forest may become artificially dominated by beech. We observed

that some mature oak and poplar had twin-boles (trunks) throughout the northern and western portions of the park, indicative of historic timber operations, and long-standing high-grading may have played a role in the expression of forest cover that we see today.

## ***Forest Stand #2 - Forested Floodplain and Bottomlands***

### **Tulip Poplar, Red Maple, Boxelder, American Sycamore, Ironwood, Jumpseed Forest**

Forest Stand #2 is the second largest of the three forest types, consisting of approximately 137 acres of tulip poplar dominated woodlands. This forest type occurs throughout the central and southernmost portion of the Park, and is associated with Butler Branch and Piscataway Creek, perennial, riparian stream corridors. This stand has an estimated 193 trees per acre, with a mean size class of 9.3-inches diameter. The stand has a basal area of 137 square feet per acre and is considered slightly over-stocked. Tulip poplar is the dominant indicator species, averaging 13 per acre, with overstory species averaging 19.3-inches diameter. Their frequency of occurrence within the stand is 7%, and with an approximate age of 48-years. The stand averages 4% down and dead woody debris and with 3 standing habitat snags per acre, and with a canopy closure of approximately 70%, due to the pulse disturbance of the active floodplain.

Based on a review of the 1938 aerial, portions of the bottomland, floodplain and side slopes contain forest structure that may exceed 100-years old.

Species observed within the stand included pin oak, American beech, American holly, black gum, ironwood, mockernut hickory, northern red oak, pignut hickory, red maple, trident maple, river birch, southern red oak, swamp chestnut oak, sweetgum, sycamore, tulip poplar, Asiatic barberry, blackhaw viburnum, spicebush, Japanese honeysuckle, Oriental bitterweet, poison ivy, common greenbrier, blue violet, catchweed bedstraw, henbit, mayapple, purple deadnettle, spring beauty, wild garlic, yellow trout lily, New York fern and wood reed grass.

Because much of the forestry data collection occurred at the onset of the growing season, the non-native Asiatic barberry was quite apparent throughout the Butler Branch floodplain and lower side slopes. Extensive aggregates of reed canary grass were also observed throughout the Butler Branch floodplain. Controversy abounds in literature as to whether or not reed canary grass is considered a nuisance native or non-native species. In the case of Cosca Regional Park, the plant behaves as a weedy invasive.

## ***Forest Stand #3 - Mid-Seral Disturbed***

### **Virginia Pine Successional Forest**

Forest Stand #3 is the smallest of the three forest types, consisting of approximately 67-acres of Virginia pine dominated woodlands. This forest type is scattered throughout the northernmost portion of the Park, in areas of former surface mining, sand and aggregate gravel operations. Other disturbed woodlots included in this forest stand are a beaver “eat-out” located on the west side of the lake and the hedgerows between the agricultural fields at the Miller Farm operations. This stand has an estimated 183 trees per acre, with a mean size class of 9-inches diameter. The stand has a basal area of 93.3-square feet per acre and is considered fully stocked. Virginia pine is the dominant indicator species, averaging 118 per acre, with overstory species averaging 8.6-inches diameter. Their frequency of occurrence within the stand is 65%, and with an approximate age of 35-years. The stand averages 7% down and dead woody debris (pine recycling) and with typically four standing habitat snags per acre, and with a canopy closure of only 55%.

Species observed within the stand included American beech, American holly, black cherry, boxelder,

callery (Bradford) pear, eastern red cedar, tulip poplar, Virginia pine, Asiatic barberry, autumn olive, spicebush, Japanese honeysuckle, mile-a-minute, multiflora rose, Oriental bittersweet, catchweed bedstraw, chickweed, mayapple, Japanese stiltgrass, reed canary grass and wood reed grass.

## Site Soils

The dominant soil type in the uplands of Cosca Regional Park are Beltsville Silt Loam (BaB) and Croom-Marr Complex (CwC) on the flatter ground, and which are both considered prime agricultural soils with 180 to 210 growing days. Most of the flatter ground at Cosca Regional Park is developed as recreational amenities and/or in active, rotational agriculture leased to Miller Farms. The forested slopes are dominated by Grosstown Gravelly Silt Loam (GgC), as expressed on slopes of terraces and divides. The highly disturbed woodland areas are mapped as Reclaimed Gravel Pits (UDgB), and the active floodplains of Butler Branch and Piscataway Creek are mapped hydric Widewater and Issue soils (WE). WE soils are frequently flooded, and typically occur on floodplains and drainageways, channels on floodplains and back swamps on floodplains. They are poorly drained soils consisting of loamy alluvium, silt loam, loam and fine sandy loam. Appendix C includes a map of all of the soil types and boundaries documented at Cosca Regional Park, and which expands on their soil descriptions, agricultural uses, runoff class and soil groups.

## Hedgerows

Several hedgerows, landscape beds and small clusters of trees are located on the property, however they do not necessarily meet the criteria to be defined as forested, as they are less than 10,000 square feet and/or only one to two trees wide, and are therefore not included in the Forest Stand Map. Hedgerow locations are typically associated with the developed areas of the Park and agricultural farm operations.

## Specimen Trees

A specimen tree is defined as any tree having a diameter at breast height of 30-inches or greater, or within 75% of a champion of the species. ESA was not responsible to perform a specimen tree survey of the Park, although numerous trees of 30-inches diameter and greater were observed with regularity.

One particular tree caught our attention as being quite grand in appearance. In the westernmost section of agricultural fields at Miller Farm, and in the southwest corner, the edge of the field contains an open grown, specimen, white oak tree (reference photo in Appendix E) on Park property. The tree is just on the outside of the perimeter deer protection fencing, and is approximately 70-inches diameter, 65 to 70-feet tall, and with a crown spread of approximately 65-feet, near equally broad as tall. The tree appears healthy, except for some selective lower limb pruning. From a distance this tree has a stunning, grand appearance and should be evaluated and cataloged as possibly being near a County Champion in size and quality. Stephanie Jacob, Park Naturalist, was shown the tree.

## Wetlands and Waters of the US

Appendix C includes a map that classifies all of the observed wetlands and waters of Cosca Regional Park. The perennial Butler Branch runs from north to south, through the Park, containing the in-line Cosca Lake, in the central portion of the Park, and with four headwater tributaries that flow into Butler Branch. Butler Branch flows into the perennial Piscataway Creek in the southern end of the Park. ESA identified ephemeral, intermittent (R4), and perennial (R2) streams and rivers within the park. ESA also identified

palustrine forested nontidal wetlands (PFO) and palustrine herbaceous nontidal wetlands (PEM) in addition to Cosca Lake, palustrine open water (POW).

Several seasonal spring seeps and quality vernal pools were noted within the Butler Branch floodplain, especially upstream (northeast) of the overhead electric utility right-of-way. Having walked all of Butler Branch, we note two locations in the Park where stream restoration efforts have occurred. In the north end of the Park, just downstream of where the fiber-optic line crosses Butler Branch, restoration has been performed, likely associated with an imbedded utility. The work includes outside meander bend stabilization using imbricated rip-rap on the south, riffle grade control and rock vanes on the center and north side of the stream. Tree planting was also observed. In the south end of the Park, south of Thrift Road and along West Boniwood Turn, an outside meander bend of Butler Branch has been stabilized using imbricated rip-rap. The assumption in this case was to protect the support slope of Boniwood Turn Road proper.

## Rare, Threatened, and Endangered Species

FWS's letter stated that northern long-eared bat (*Myotis septentrionalis*) may occur at Cosca Regional Park, but no critical habitat has been designated for this species. Additional consultation with FWS would be needed if more than 15 acres of forest are to be cleared.

DNR determined that there are records for the state rare (S2)/watchlist (S3) wildflower Large Twayblade (*Liparis lillifolia*). Given that this species is potentially vulnerable to collection, DNR asked that the specific data locations not be made public. The environmental review also mentioned that based on remote analysis, the Park likely contains forest interior dwelling bird habitat and that master planning should consider conserving this type of habitat.

DNR goes on to state that Butler Branch, Lake, and Piscataway Creek support several resident fish species. There are records of yellow perch spawning downstream from the park location, and that no in-stream work should be performed from February 15 through June 15 of any given year to protect spawning grounds.

ESA photographed lily-leaved twayblade at Cosca Regional Park. The RTE Map [removed from this document] shows the plant locations and it is recommended that this map not be made public, as anonymity will help protect the plant from illegal collection.

The flower blooms of the orchid are a mauve color and somewhat translucent, do not have a noticeable scent, and bloom from the bottom to the top of the flower stalk. Lily-leaved twayblade requires specific fungus in the soil, known as *Rhizoctonia* and *Tulasnella* mycorrhiza to exist. The six-inch stem rises from the center of two broad basal leaves. It supports up to 20 reddish purple flowers, each composed of a broad, pointed, translucent lip, and string-like dark red petals that hang to the side and below. The plant is primarily pollinated by flies. The word *Liparis* means greasy, referring to the slick appearance of the leaves, and *lillifolia* referring to the leaves that resemble lily-of-the-valley, known as *Lilia*. The word *twayblade* refers to the pairs of leaves in the middle of the stem. This native upland plant occurs throughout the northeast United States and prefers mature, rich, open woodlands, and along stream banks.

The survey team also observed four other orchid species within the three-acre polygon including Puttyroot (*Aplectrum hyemale*), downy rattlesnake plantain (*Goodyera pubescens*), and crane fly orchid (*Tipularia discolor*), and showy orchis (*Galearis spectabilis*). The first three orchids listed were not in flower during ESA's field visits.

No other puttyroot plants were observed by ESA in the Park. Approximately 150 showy orchis were found in the park. Hundreds of crane-fly orchid and ten or so rattlesnake plantain were observed throughout the Park.

Another plant observed was large-seeded forget-me-not (*Myosotis macrosperma*), a former Maryland state rare (S2) plant that was de-listed in 2019 and is now considered uncommon. We observed in excess of 50 of these plants.

ESA did not perform netting or seining of fish, as this task would have been out of scope for contract deliverables. We did however directly observe fish in Butler Branch and Piscataway Creek, along numerous areas of preferred habitat including deep pools, undercut banks, large woody debris, debris jams and riffles that provide habitat support for the guild of fisheries such as dace, shiners, minnows, chubs and darters.

On April 6, 2020, ESA observed fish breeding on the Tier II Butler Branch immediately northeast of the utility right-of-way. The fish were either Creek Chub Suckers or River Chub. They were all in the 10 to 14-inch, one-pound range (same size as a mature MD DNR released trout). They rest in deep pools with overhanging cover, build rocky nests in gravel, but breed in the riffles. They were observed lining-up together in the riffles and aggressively splashing their tails in a mating exercise, doing this repeatedly. Some of the fish show red breeding colors along their sides. Both species are indicators of higher water quality. A critical stream temperature and day-length trigger this brief phenomenon.

## Forest Interior

Forest interior as applied to planning is a basic building block of a green infrastructure network, which contain large natural areas that provide habitat for native plants and animals, and the hubs and/or corridors that connect them. Large areas of interior forest and wetlands are an essential component of a green infrastructure network. Interior forest is generally defined as forest found at least 300 feet from the forest edge. Forest interior habitat is a higher quality forest habitat because it is generally more isolated, typically with a closed canopy that creates moist, shaded growing conditions with fewer invasive species. Forest interior habitat is a rarer forest environment in urbanized areas, because development has fragmented remaining forests into smaller forest patches.

The following presents the criteria for mapping interior forests, wetlands, and protected lands included into hubs of green infrastructure networks. Hubs within a network include:

- Interior forests of 50 acres or larger with a 300-foot buffer,
- Wetlands of 25 acres or larger, including marsh, ponds and lakes and, with a 100-foot buffer,
- State and County parkland and open space that contain these interior forests and wetlands,
- Adjacent forest, parkland and open space.

ESA has created a Potential Old Growth Forest map (Appendix C) that documents 180 acres of closed canopy forest interior within Cosca Regional Park based on the above-mentioned criteria. These interior forests are in the core of the park, and which includes Cosca Lake and the Nature Center, and areas north and east of the overhead utility right-of-way, and along Piscataway Creek. Additional forest interior acreage outside of the park, occurs west of the nature center, north of the park boundary to the north and areas of the Piscataway stream valley corridor.

## CONCLUSIONS & RECOMMENDATIONS

Through the years, the majority of relatively flat ground within the park was developed for recreational purposes (i.e. parking lots, ball fields, tennis courts, campgrounds, maintenance yard), and the remaining ground with steep slopes, highly erodible soils, and active floodplain were kept as natural areas.

**Whitetail Deer Management** - Recent studies have suggested direct relationships of deer overabundance and the spread of Japanese stilt grass (*Microstegium vimineum*). Much of the park's forest has good structure with matrices of overstory, dominant, co-dominant, and associate trees, a substantial and diverse shrub layer, and representative forbs, vines, ferns, grass, sedge and rush species, which indicates that deer may well be within acceptable carrying capacity thresholds. We strongly recommend that deer be actively managed where their population does not exceed approximately ten deer per square mile. This standard is important to track, and is necessary to sustain high quality woodlands, especially when managing for native wildflower populations and vegetative diversity.

**Invasive Plant Management** - The active floodplain is subject to continual disturbance by floodwaters, beaver activity, and edge effect that can favor invasive plant intrusion. The Butler Branch stream valley has a fair amount of Asiatic barberry (*Berberis thunbergii*) and Reed Canary Grass (*Phalaris arundinacea*), as well as a lesser extent of Japanese knotweed (*Fallopia japonica*, formerly known as *Polygonum cuspidatum*). Suppression activities are recommended for these species.

The park has a limited amount of Japanese stilt grass and no observed *Ranunculus ficaria*, lesser celandine, which is quite common in most other greater Washington area parklands. Suppression activities are recommended for these species as observed. However, based on work by various regional natural resource managers, it may be nearly impossible to effectively manage *Microstegium* once it is well established (entrenched). It is hard for this plant to occupy mature, interior woodlands and should be managed as seen along forested trails and along roadsides, where it can follow drainage courses into interior woodlands.

**Lake Management** - Cosca Lake is a major feature of the Park. Hiking, jogging, dog-walking, nature observation and fishing are frequent daily activities occurring at the Lake. Studies dating from 1988, 1999, 2010 and 2017 have all recommended that the pre-treatment forebays at the head of the Lake be retrofitted and that at a minimum, the upper half of the Lake be dredged. Both of these routine maintenance obligations are long overdue and should be addressed.

Cosca Lake is an in-line pond, meaning that the perennial Butler Branch has been dammed to create the Lake, which is generally no longer allowed per Maryland Department of the Environment regulations, but in the case of Cosca Lake is protected through grandfathering. The purpose of a pre-treatment forebay is to capture sediment at the head of the pond as the stream may be carrying a silt load primarily during storm events and running along a one or two-percent slope in the stream channel. As the flow enters the Lake at a near zero-percent slope, the bulk of the sediment drops out of suspension behind the forebay. The forebay will continue to capture sediment until the design capacity of the pool is silted in. At that point, water flows over the top of the forebay and/or vegetation grows within the shallow forebay. Once a forebay begins to fill in, periodic maintenance is required to remove the spoil and reconstitute the design capacity and function of the forebay. A functioning and maintained forebay will greatly decrease the amount of silt that enters the Lake proper, and will prevent delta formation, which is currently evident at Cosca Lake.

A delta of silt has formed from the head of the Lake to near the middle of the Lake, just upstream of the antiquated Boat House. Spot elevations throughout the upper half of the Lake are near the 130-foot normal pool elevation, where a paddle boat or canoe can be beached, and little fisheries habitat occurs. This siltation makes the size of the lake available to overwintering fisheries much smaller and decreased overall dissolved

oxygen available for fisheries. If a dredge is not performed within the next several years, the upper half of the lake will convert into an emergent marsh likely dominated by submerged, floating and emergent aquatic vegetation, ultimately converting to cattail and *Phragmites*.

Based on casual conversations with fishermen, the release of MD DNR annual trout is greatly enjoyed by local residents and park visitors. Outside of the trout, we observed one bluegill and a catfish taken from the pond through several days of field work. When a larger game fish is caught, such as a largemouth bass, crappie, or perch, we suspect they would be taken, rather than released. It is for this reason that Parks may want to perform a creel survey documenting fish species and ratios, to develop an on-going stocking program in support of recreational fishing. It is strongly suspected that snakehead will be introduced to the lake which will influence and affect the balance of existing fisheries. Snakehead will likely become the dominant pond fish of the future.

Other lake improvements could include an aeration bubbler system to provide enhanced dissolved oxygen during the higher water temperature summer months, a telephone pole nesting platform for osprey or bald eagle, the installation of underwater habitat features such as concrete culvert piping or lunger structures to promote fish breeding cover and habitat. Osprey and bald eagle were observed foraging the lake during the spring nesting period.

During the growing season, about two-thirds of the Lake's littoral shoreline consists of floating marsh pennywort (*Hydrocotyle ranunculoides*), an aggressive native obligate. Five species of pennywort occur in Maryland, with floating marsh pennywort behaving as both a floating (FAV) and emergent (EAV), and which is known to be invasive. A plant growing throughout the forebay area was parrot's feather (*Myriophyllum aquaticum*), an invasive non-native type of emergent aquatic vegetation (EAV). These plants should be managed. Nature will want to fill a void and some recommended backfill plants along the shoreline would include the following native species, all of which are "obligated" to growing in persistently saturated and inundated ground include sweet flag, water plantain, swamp milkweed, marsh hibiscus, blue flag iris, arrow arum, pickerelweed, duck potato, bur-reed, green bulrush, woolgrass, blue lobelia, New York ironweed, blue vervain and cardinal flower. Most of these same plants could be considered for a small area near the dam emergency spillway where bald cypress has been planted, with these wetland forbs planted within the zone of the cypress knees. A few more basking logs would be beneficial for the resident turtle population. The logs should be attached to the shoreline to ensure they do not float out in a storm event.

The blue trail along the backside (woodland west side) of the pond consists of a well-worn foot trail with some areas of uneven treadway and exposed roots. A boardwalk deck or cut/fill/crib may be a more appropriate walking surface for such a heavily used portion of trail.

The contoured rip rap of the dam face has some areas that may be sloughing or cavitating, and should be evaluated and sealed with chinking crush and run, and/or soil and seeded as necessary. The lake's intake drain appears in order but captures and hold large woody debris at its top. This floating debris should be periodically removed so that it does not go vertical and further impede base and storm flow and compromise the internal turnstiles that manage the flow discharge rate. According to our review of the lake files, the intake may be scheduled for an upgrade soon, including a trash rack. The backside of the dam is functional with no signs of weeping at the toe of slope. As it should be, it is devoid of trees and maintained in lawn. The outfall discharge is heavily armored, with no signs of channel downcutting or widening at the outfall. The grass lined emergency spillway is well managed and functional.

**Beaver Management** - ESA documented an area on the west side of the Cosca Lake, where historically, beaver activity has been so concentrated, as to have caused an "eat-out." Reference the Forest Stand Map (Appendix C), forest stand data station 7 (mid-seral disturbed) for the exact location. An approximate one-

acre area has had many trees removed by historic beaver activity, which allowed for invasive plants and vine to intrude. The canopy light gap has allowed autumn olive, Asiatic barberry, Japanese honeysuckle, multiflora rose and Japanese stilt grass to dominate within the gap. This area is a priority for invasive plant management. The impacted section of forest bifurcates an area of priority mature woodlands along the west slope of the Lake, where an exceptional concentration of wildflowers, including five species of native orchid occur.

This area is in a valley uphill from a current beaver lodge located along the bank of Cosca Lake. To protect the western forested slopes of Cosca Lake, as they contain priority natural area, it is important to monitor the Lake for beaver, and move them away from this area as they are observed. Beaver can create wetlands and are keystone species. However, they are impacting priority forest habitat and may be more useful in other sections of the park, possibly north of the utility right-of-way or within the Piscataway stream valley. Beaver will be naturally attracted to the west side of the lake, as that is where available forest cover occurs for feeding, lodge and dam building. The east side of the lake is more undesirable for beaver lodging as it is more developed with lawn areas, paved trail, heavier visitor use and woodland setback.

**Trail Connections** - It is desirable to have a trail connection to Piscataway Creek Stream Valley Park in the southern end of Cosca Regional Park. A logical alignment would be along Butler Branch, where a trail connection from the red trail at the Nature Center park entrance and across Thrift Road, would then follow the stream to its confluence with Piscataway Creek. The ground on the east side of Butler Branch is too narrow and abuts residential houses, and the west side of Butler Branch is an active floodplain that backs into steep slopes and contains extensive wetlands, spring bench seeps, and floodplain. An extensive and costly boardwalk would be required. The best probable option for a north/south trail connection to join Piscataway Park, would be to run a trail along the top-of-slope of the Wyoming and Miller Farm. A few culverts or bridge deck crossings would be needed, and it would be necessary to negotiate with Mr. Phil Miller, the lease farm operator, as he has installed deer exclusion fencing along the entire perimeter of the farm operations. The fence along the top of the eastern slope would need to be moved into the interior of the farm slightly, to allow for a trail access right-of-way. This option seems more tenable than asking permission to use the farm's interior road network for a pass-thru trail within the active agriculture, and with a gate system to deny deer.

On the west side of Cosca Lake the blue trail runs along the shoreline of the Lake and the orange trail runs parallel, but higher on the forested slopes. At least two if not three volunteer trails, like steps of a ladder, run from east to west, connecting the north/south orange and blue trails. It is recommended that aggressive efforts be made to abandon these volunteer trails, as they run through the priority retention forest, with the exceptional wildflower aggregations.

**Pollinator Meadows** - ESA recommends that the Park consider developing pollinator meadows along the trail of the overhead utility line (north side of Thrift Road) and at the former surface mine location in the northernmost portion of the Park. At present these locations are treeless, and dominated by tall fescue, reed canary grass, *Lespedeza* and other grass and forb dominated weed species. M-NCPPC may need to negotiate with the utility for use rights, but there are numerous locations where utilities have allowed managed meadows and gardens developed and maintained by others within rights-of-way.

Successional and modified herbaceous natural communities do exist throughout the Maryland coastal plain and are typically broomsedge dominated grasslands or ryegrass, Indian grass, bluestem grass, and ruderal weeds from old fields. The definition of a pollinator meadow is that it has a blend of nectar-rich flowering native plants, with overlapping bloom times from March through November, complimented with a selection of warm and cool season grasses. A pollinator meadow is designed to promote habitat diversity for insects, butterflies, small mammals such as mole, vole, shrew, mice, rabbit, and ground nesting and old-field bird species.

To create a meadow, ESA recommends mowing the field as low as possible, running tractors over the ground several times to finely chop all above-ground growth. Planting will depend on eradicating weeds before seeding. Glyphosate herbicide (i.e. Round-Up Pro with tracer dye, surfactant sticker/spreader) should be used starting in early spring, with multiple repeat applications throughout spring, summer and early fall (as needed), adequate to effectively sterilize the surface soil of viable weed seed.

The Park could rent or borrow a no-till drill seeder to get the seed into the ground, inserted at approximately ¼-inch deep. Popular seed companies include Ernst Seeds of Meadville, PA and Pinelands Nursery & Native Seed, Columbus NJ. Proposed seed mixes should sustain seasonal color and interest, using native and local species. Drill seed installation should be performed via aggregation to promote drifts and sweeps of seasonal aspect dominance, rather than by homogeneous coverage. Seeding can be complimented with flats of pint-sized specialty aggregate plantings along trails, trail heads, trail intersections and exterior viewpoints. Seeding is typically performed in the autumn of the year, as many native species' seeds require cold stratification.

A meadow plan should include provisions for on-going maintenance in the form of mowing, before and after establishment. With a large meadow, portions can be mowed in rotation (quarters, thirds or halves), leaving sections of un-mowed meadow available to ensure that beneficial insects still have protected areas to provide them shelter and forage. A section can be mowed once every 2-years, and no shorter than 8-to 10-inches. Spot treatments with herbicide will occasionally be necessary to eliminate undesired aggregates and non-native invasive species. Backfill seeding may also be required.

**Fiber Optic Right-of-Way** - A fiber optic cable right-of-way (ROW) occurs along the east side of the Park, and which runs along the east side of the campgrounds, under Thrift Road, east of the ball fields and then straight north through the Park, crossing under Butler Branch and exiting the Park. The ROW is used as a trail and has several blow-downs preventing emergency ATV access. At each blow down, a volunteer trail pass-around has formed, which expands and denudes the trail perimeter. The ROW has several areas of an exposed, heavy gauge, copper wire that runs the exact center of the ROW and may be some form of tracer or marker for the underground cable. The wire is a tripping hazard at multiple locations. The ROW trail on the south side of the Butler Branch crossing has erosion that should be addressed.

**Feral Cats** - ESA photographed a total of four feral cats (*Felis catus*) in January, April, and May of 2020, observed in the Side B parking lot, which serves picnic shelters 1 through 6. It is this general location, where cats appear to congregate.

None of the four photographed cats were ear-tipped. Ear-tipping is a process by which the tip of one, usually the left, cat's ear is removed. It is done under general anesthesia at the same time that the cat is spayed/neutered. It heals very quickly, causing minimal pain and recovery. Ear-tipping is effective in helping to identify a spayed or neutered and vaccinated feral cat. One can easily see at a distance that the cat has already been ear-tipped, thus eliminating the need for further trappings and surgeries. The cats avoid being traumatized by repeated trappings and groups that help feral cats preserve their limited resources.

Feral cats are non-native to North America, have a high reproductive rate, relatively low mortality, and high dispersion rates. When cats are first released into the environment, they are generally referred to as strays and can be reincorporated into domestication with little difficulty. As the generational gap increases between domesticated and non-domesticated, adult feral cats are less likely to be re-domesticated.

Cats are not part of the native food web in Maryland and can wreak havoc on an ecosystem. It is believed that between 50 and 100 million feral cats roam the United States, with 70 million being a conservative consensus among experts. Small mammals such as mice and moles make up much of their prey. Even with

their ability to fly, birds, especially nestlings or fledglings, make up approximately 20% of a feral cat's prey. During a study of feral cats in Wisconsin, a single cat averaged 3.1 animal kills each day. If each cat kills one animal each day, up to 36.5 billion animals could be killed by feral cats each year. Feral cats can take a toll on native wildlife, decimating populations already under stress due to habitat shrinkage. Their hunting abilities are used on rodents, birds, insects, reptiles, amphibians, and even fish. Failure to control a highly predatory, non-native species that has proven to kill many of the small native species is a necessity to preserve the overall balance of an ecosystem, especially lands that may be managed as parklands or natural areas.

The two most common control measures are trap-euthanize or trap-neuter-return (TNR). Euthanizing feral cats is used primarily by government institutions as it provides control with the lowest cost. TNR is the procedure most recommended by feral cat advocates. (*Feral Cats, Maryland Invasive Species Council, Brian Clark, University of Maryland Extension, April 2010*)

**Spotted Lanternfly** - Over the years Cosca Regional park and other area woodlands have had to contend with various forest disease and pest insects such as American chestnut blight, Dutch elm disease, which has more or less wiped out the American elm, flowering dogwood anthracnose, gypsy moth defoliation of oak, and the recent emerald ash borer and its devastating impact to green ash mortality within our bottomlands and floodplains. The "new" pest on the horizon is the spotted lanternfly (*Lycorma delicatula*). This pest has been confirmed as breeding in southeastern and south-central Pennsylvania, northern Virginia, northern Delaware and including Cecil and Harford counties in Maryland and is expected to spread. Updates on spotted lanternfly in Maryland can be found at: <https://mda.maryland.gov/plants-pests/Pages/spotted-lantern-fly.aspx>

The spotted lanternfly causes serious damage in trees including oozing sap, wilting, leaf curling, and tree dieback. In addition to tree damage, when spotted lanternflies feed, they excrete a sugary substance, called honeydew, that encourages the growth of black sooty mold. This mold is harmless to people; however, it causes damage to plants. In counties infested and quarantined for spotted lanternfly, residents report hundreds of these insects that affect their quality of life and ability to enjoy the outdoors during the spring and summer months. Spotted Lanternflies will cover trees, swarm in the air, and their honeydew can coat trail and play equipment. In natural areas, the pest has been observed feeding on cherry, hickory, maple, oak, pine, sycamore, walnut and willow.

**Former Sand and Gravel Surface Mine** - Access to the former surface mine operations within the northernmost area of the Park is from a service gate located on Brandywine Road. All land to the south of the service road is parklands. The service road ends in a loop, and it is this area that includes the remains of a wooden shed type building, electric poles and lines and concrete pads and walls. These physical remains should be considered for removal, as little cultural interpretive value may be derived from them. The road itself has select dumping from neighbors, and the remains of a car (1950's era Rambler station wagon) is in a ravine, just a few hundred feet from the service gate, on the south side of the service road. It is recommended that the treeless clearing area be considered for meadow conversion. This area may also be well-suited for the dumping of woody storm and tree debris, as the current location along Thrift Road is aesthetically displeasing and should be removed and restored. ESA did not find evidence of active erosion coming from this area, and the side slopes appear stable. Piles of surface pea gravel still exist on some of the side slopes that create microhabitat for select bryophytes and mosses.

**Natural Resources Management Plan** - While collecting background information for the Master Plan, it became apparent that the Park lacks an integrated natural resources management plan (INRMP) at the Park level. The M-NCPPC has documents that are more regional in scope but may lack park-specific guidance. To this end, it is recommended that select park staff have the role of effectively being a natural resources manager, responsible for updating and implementing an INRMP. A few areas that a management plan can

address may include the identification of natural communities and environmentally sensitive areas, vegetation and invasive plant management, deer, beaver and other wildlife management issues, trails management, and aquatic resources (lake and streams) management. The Park may be lacking in baseline inventory studies for mammals, birds, reptiles, amphibians, fish, and vegetation, being able to address and respond to natural resources threats, concerns and hazards, and prioritization of natural area work orders.

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