

**Select Environmental Inventory  
and  
Impact Analysis  
for  
Amphibians, Forest Birds, Rare Flora,  
& Significant Habitats  
in  
North Germantown Greenway  
&  
Great Seneca Park**

**in the vicinity of the proposed  
M-83 Highway Alignment  
Middlebrook Road to Brink Road,  
Montgomery County, Maryland**

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## TABLE OF CONTENTS

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<b>Introduction</b>	1
<b>Study Area</b>	3
<b>Amphibian Survey</b>	5
<b>Forest Dwelling Bird Survey</b>	7
<b>Rare and Uncommon Flora Survey</b>	10
<b>Significant Habitats Survey</b>	14
Large Forest Tracts	15
Bedrock Outcrops	17
Wetlands	18
Glades	21
<b>Impact Analysis</b>	23
Amphibian Impacts	24
Forest Dwelling Bird Impacts	26
Rare and Uncommon Flora Impacts	28
Significant Habitat Impacts	30
<i>Bedrock Outcrops</i>	30
<i>Wetlands</i>	31
<i>Glades</i>	32
<i>Forest</i>	33
<b>Appendices</b>	
Appendix A: Amphibians	
Appendix B: Forest Dwelling Birds	
Appendix C: State-Listed Rare Species	
Appendix D: Rare and Uncommon Flora, Woody and Herbaceous	
Appendix E: Woody and Herbaceous Flora of the Study Area	
Appendix F: Allard Article on Black Ash	
Appendix G: Frye and Lea, Bristle-stalked Sedge	
Map 1: Study area (1977 USGS map)	
Map 2: Study area (1994 ADC map)	
Map 3: Study area (2002 ADC map)	
Glossary	
Bibliography	

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## INTRODUCTION

This survey and impact analysis was conducted at the request of the Dayspring Silent Retreat Center to assess some of the ecological values and potential damages to the natural environment that would occur if the proposed Mid-County Highway (M-83) were built.

Dayspring Silent Retreat Center (Dayspring), owned and operated by The Church of The Saviour, is a 200-acre property located in Neelsville, Maryland (see location on Map 1). Bounded by Wayfarer Rd. on the east, Neelsville Church Rd. on the south, and suburban housing on the west, Dayspring's ecological lifeline is North Germantown Greenway Park, the northern property border of Dayspring. For over 50 years, Dayspring has served as a sanctuary for guests seeking spiritual replenishment in a natural environment. Dayspring also serves as a sanctuary for the local flora and fauna and is managed for the benefit of native plants and wildlife. Indeed the very qualities that foster spiritual replenishment at Dayspring are inextricably linked to preserving their natural environment.

The Montgomery County Department of Public Works and Transportation is currently studying a proposal to extend the Mid-County Highway (M-83) in north-central in Montgomery County, from Montgomery Village Avenue, west and north across Great Seneca Park and northwest across the North Germantown Greenway (see highway route on Map 1). The 1989 Germantown Master Plan describes M-83 as a six lane major highway with a 150' minimum right-of-way width. The proposed route of abuts the Dayspring property for approximately 1,500 feet along Wayfarer Rd. M-83 would bisect North Germantown Greenway, severing Dayspring's ecological lifeline to Great Seneca Park. At the southeast corner, the Dayspring property is separated from Great Seneca Park by the intersection of Wayfarer and Watkins Mill roads. Because of the great threat of the proposed highway, the Church contracted us to survey the amphibians, forest dwelling birds, rare plants and significant habitats on lands potentially impacted by the M-83 highway proposal and assess the ecological impacts of the proposed highway.

Over the past two decades Dayspring has witnessed their rural property become completely surrounded on the west and south sides by suburban development (See Maps 2 and 3). Construction of M-83 would completely sever the remaining natural corridors to the north and

east of their property and effectively isolate the retreat center. In effect the Center would become a habitat island and suffer the ecological effects of this isolation. The construction and operation of M-83 would have multiple and irreversible negative impacts to the ecological values of the Dayspring property, Great Seneca Park and the North Germantown Greenway due to the direct linkage between these three natural areas. This report documents species and habitats and the harm they would suffer if the proposed highway were constructed.

## STUDY AREA

The study area extends a distance of approximately two miles from north to south, comprising portions of North Germantown Greenway and Great Seneca Park (see Map 1). Most of this area is forested. The dominant forest type in the dry uplands of the North Germantown Greenway is the Chestnut Oak Association (Brush et al., 1976), while the Tulip Poplar Association occupies the moist (mesic) uplands in the Greenway and the Great Seneca portion of the study area. The relatively flat riparian areas in each park are occupied by the Sycamore, Green Ash, Box Elder, Silver Maple Association. The North Germantown Tributary cascades down the Germantown Ridge, traversing a large tract of forest within the Greenway, and creating a steep ravine with numerous spring seeps, rock outcrops and heath glades before flowing into Great Seneca Park near Blunt Rd. The Brandermill Tributary flows into Great Seneca Park and joins Great Seneca Creek south of Watkins Mill Rd.

The specific areas that were studied and described in this report include the footprint of the M-83 alignment as shown in the Environmental Documentation Report for the Proposed Germantown-Montgomery Village Connector – October 1991. The surveys also covered an area extending outward approximately 500 feet from each edge of the proposed M-83 road right-of-way to take into account potential indirect ‘edge effect’ impacts to flora and fauna. All surveys were conducted within the boundaries described below (see Maps 2 and 3).

- North terminus – Intersection of Brink Road and Wildcat Road at the northwest corner of the North Germantown Greenway.
- South terminus – Intersection of Middlebrook Road with Mid-County Highway and eastward within Great Seneca Park but west of Great Seneca Creek.
- Western border – West border of Great Seneca Park from Middlebrook Road north to Watkins Mill Road. And within the North Germantown Greenway from the Brink/Wildcat Road intersection south to the Dayspring property.

- East border – Westside of Great Seneca Creek in Great Seneca Park from the vicinity of Middlebrook Road north to Watkins Mill Road - and west of the park border between North Germantown Greenway and Great Seneca Park northwest of Blunt Road.

This report does not describe potential impacts to Great Seneca Park between Montgomery Village Avenue and Middlebrook Road on the east-west alignment. The Montgomery Village Avenue to Middlebrook Road portion is no less important to study – it is however beyond the scope of the area studied for this report.

## IMPACT ANALYSIS

This analysis describes the ecological impacts that would result from the construction of the proposed M-83 highway on the flora and fauna of the Great Seneca Park and North Germantown Greenway. This analysis also describes the impacts from M-83 on the ecological integrity of the Dayspring Silent Retreat Center, whose very purpose is inextricably linked to preserving their natural environment.

Because the large forest tracts of the Great Seneca Park and North Germantown Greenway encompass all of the species and habitats described in this report, there is necessarily overlap in describing these impacts. A useful approach to fully characterize the overall ecological impact is to describe the separate impacts on each of the species and habitat categories. While at times repetitive, this approach more fully describes the ecological impacts on amphibians, forest dwelling birds, rare and uncommon flora, and four significant habitats – bedrock outcrops, wetlands, glade habitat, and forests.

The impact on the ecological integrity of Dayspring arises because the large contiguous forest that the Dayspring property shares with the North Germantown Greenway is Dayspring's only direct link to the expansive Great Seneca Park. Over the past three decades suburban sprawl development has nearly completely surrounded the Dayspring property, leaving the forest of the North Germantown Greenway as Dayspring's only significant natural link remaining to facilitate the dispersal of native flora and fauna to and from the Dayspring property. Construction of M-83 would bisect the North Germantown Greenway and Great Seneca Parks, permanently destroying portions of each park, while severing Dayspring's ecological lifeline to natural habitats.

A description of the direct and indirect ecological impacts that Dayspring and the two parklands would suffer follows.

### **Amphibian Impacts**

Ten amphibian species were found in the study area (see Appendix A), eight of which were found at various places within the proposed M-83 alignment. If built, M-83 would result in a direct and permanent loss of habitat for the 8 amphibian species found within the highway's

footprint, leading to reductions in the number of individuals. All eight species (American Toad, Wood Frog, Gray Treefrog, Spring Peeper, and Redback Salamander, Pickerel Frog, Green Frog, Dusky Salamander) were observed in bottomland habitats, and five (the first five in the list above) of the eight were observed in upland forest habitat. Spotted Salamander and the Bullfrog were observed near but outside of the M-83 alignment area.<sup>1</sup>

Nine of the 10 amphibians require wetlands for breeding. M-83 would directly destroy forested breeding wetlands on the floodplain of the North Germantown Tributary and the Brandermill Tributary. Furthermore, M-83 would present a barrier to the movement of amphibians to and from breeding wetlands **not** destroyed by highway construction.

Populations of amphibians worldwide are in decline. Researchers cite factors such as disease, pollution, pesticides, global warming, and increased road density and traffic as likely causes (National Park Service-CFR Title 30). The chief urban barriers to seasonal movements and population dispersal of herptiles (amphibians and reptiles) are roadways (Campbell, 1973). In areas where roads or highways separate breeding ponds from upland non-breeding habitat, road mortality can be a serious threat to amphibian populations. Road mortality does not just affect the occasional animal that wanders onto the highway. In many instances entire breeding populations are forced to cross roads. Breeding adults are subjected to road mortality twice (incoming and outgoing), and young-of-the-year must also cross roads when they disperse from the ponds (Jackson, 1996). From 2000-2002 the National Park Service (National Park Service - CFR Title 30) performed studies to document road-kill impacts on a park road in the Delaware Water Gap National Recreation Area in eastern Pennsylvania. They found that during one March night in 2002, approximately 700 frogs and salamanders (representing three species) were killed attempting to cross a 200-yard section of the road. The three species impacted, Spring Peeper, Wood Frog, and Spotted Salamander were migrating from the adjacent uplands to mate in the wetlands across the road.

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<sup>1</sup>It is likely that the Spotted Salamander lives in the upland forest in the path of the alignment, but they are difficult to detect because they live underground and are rarely found except during the short breeding season.



Impacts to amphibians occur indirectly as well. If M-83 is constructed, a new forest edge will be created and likely result in microclimate alterations similar to forest clear-cuts. A study by two University of Maine researchers (Demagnadier and Hunter, 1998) “demonstrated that several amphibian species in Maine were negatively affected by clear-cutting at depths of 25-35m (80-115 ft) inside forests adjacent to clear-cuts. Among the species affected were Spotted Salamander, Redback Salamander, Blue-spotted Salamander and Wood Frogs.” These impacts were the result of a change in microclimate on the forest floor – a drying effect – due to increased exposure to sunlight and wind near the newly created forest edge in what was a relatively moist forest interior. Furthermore, road construction runoff and highway runoff can contaminate aquatic habitats adjacent to the road and negatively impact breeding wetlands by smothering these habitats with unhealthy amounts of sediment and chemical pollutants. Similar indirect impacts can be expected if M-83 is built through forested amphibian habitats in the North Germantown Greenway and Great Seneca Parks.

The construction of M-83 would sever ecological connectivity across the landscape and compromise the long-term viability of amphibian populations on the Dayspring property and in the portions of the North Germantown Greenway and Great Seneca Park that would become isolated. When small populations are cut-off from larger more viable populations, they are less resilient to the effects of drought, disease and other negative factors.

According to Jackson (1996), the viability of amphibian populations is probably dependent on gene exchange and the supplementation of populations via dispersal from other populations. Given their reliance on small, temporary ponds, many amphibian populations may be vulnerable to local extinction events during periods of unusually dry weather. Over time, these populations are probably maintained via a process of supplementation or re-colonization. The exchange of individuals among populations and its role in gene exchange, supplementation of populations and re-colonization of populations following extinction events is probably vital for maintaining regional, or metapopulations, of amphibians. M-83 would restrict the ability of amphibians to disperse and could cause severe population declines, leading to local extinctions. Also, a reduced amphibian population can disrupt food chain dynamics, which can lead to reductions in the abundance of wildlife species that depend upon amphibians for sustenance.

M-83 would render the Dayspring Silent Retreat Center and isolated portions of both parklands particularly vulnerable to the impacts described above.

### **Forest Dwelling Bird Impacts**

All forest-interior dwelling birds in these large forest tracts would suffer a direct loss of habitat if M-83 were built. During the course of the survey, 21 species of forest dwelling birds were observed, 14 of which are forest-interior dwelling species (FIDS) (see Appendix B).<sup>2</sup> The fourteen FIDS would be particularly vulnerable because their specific habitat requirements include large tracts of forest. M-83, if built, would undermine and destroy the functional values supporting this biodiversity. There are absolutely no benefits for forest interior dwelling species if M-83 is constructed. Rather, these species would suffer permanent adverse impacts as a result of highway construction and are much more likely to be eliminated from the species pool by disturbance of their habitat (Robbins, 1979).

The 1991 Environmental Documentation Report for M-83 (MC-DOT 1991) indicated as much as 8.60 acres of forest to be removed in the North Germantown Greenway to construct M-83. This figure alone comprises a significant taking of forest habitat. But it tells only part of the story because it does not take into account “edge effect” impacts to forest-interior dwelling bird species. M-83 would fragment the existing interior forest and create new edges along the remaining forest fragments. Studies show that nesting success of the forest-interior birds is greatest at distances greater than 100 meters from the nearest edge (Robbins, 1996). The total impact area of a road cut needs to account for 100 meters (328 ft) of edge effect on both sides of the road cut. For example if the road cut is 150 feet wide, the impact zone could be 800 feet wide. This huge swath of forest loss and edge effects translate into a significant degradation to forest-interior habitats. Anderson (1979) showed that altering habitat from forest-interior to edge resulted in the disappearance of forest-interior species such as Scarlet Tanager, Blue-gray Gnatcatcher, Pine Warbler and Yellow-billed Cuckoo. The same study showed that other forest dwelling species such as Carolina Chickadee, Tufted Titmouse, Wood Thrush, and Blue Jay might also decline.

Forest fragmentation into units less than 100 acres often results in loss of the entire unit as breeding habitat for forest-interior dwelling birds (Robbins et. al., 1989). Studies indicate that areas of at least 250 acres are needed to maintain some forest-interior bird communities (MD Partners In Flight, 1997). Neotropical migrants are the most vulnerable of the breeding birds to forest fragmentation (Robbins et al, 1989). Nine of the fourteen FIDS identified in this survey are neotropical migratory songbirds. If M-83 were built, the remaining sections of forest in Great Seneca Park and in the North Germantown Greenway would be unable to support as many species of forest interior dwelling birds, and it is probable that the number of forest dwelling birds would decrease dramatically.

The small tracts of forest remaining after highway construction would also likely result in an increase in forest bird nest predation. Nest predators, such as crows, grackles, raccoons and opossums, are more abundant near forest edges compared to forest interiors and disproportionately threaten nests in the edge zone (MD Partners In Flight 1997). Wilcove (1985) demonstrated that long narrow forest tracts, even if connected to larger forest tracts, have nest predation rates as high as 48 percent. This is due to easy access by edge dwelling predators into the interior of the narrow forest.

Yet another negative impact of forest fragmentation is increased nest parasitism by Cowbirds. The Cowbirds lay their eggs in the nests of other birds including forest interior dwelling birds. The Cowbird chicks hatch in the nests of forest-interior dwelling species and out-compete the FIDS chicks for food resulting in fewer successful broods.

In sum, clearing and fragmentation of the forest due to M-83 would directly destroy forest-interior habitats, leading to significant declines in the populations of forest-interior dwelling species. Some species could be eliminated entirely.

### **Rare And Uncommon Flora Impacts**

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<sup>2</sup>The large tract of forest that connects the Dayspring property and the North Germantown Greenway harbors at least 20 forest dwelling bird species. Summer Tanager was found in Great Seneca Park only. Thirteen of the species are

The four state-listed rare plant species found during the survey (see Appendix C) occur in a variety of habitats. Impacts to these four species include direct losses of their habitat and indirect alteration of their habitats due to ‘edge effects’ and other factors.

Bashful Bulrush (*Scirpus verecundus*) was found growing amidst forested rock outcrops in Great Seneca Park high above the Brandermill Tributary. This species would suffer both direct and indirect impacts from the construction of M-83. The population of Bashful Bulrush occurs along the edge of the proposed M-83 alignment. Some of the plant’s habitat would be destroyed for road construction, and its remaining habitat would likely suffer degradation as a result of an ‘edge effect’ due to the construction of M-83. Invasive plant species are well known to favor edge habitats and can dominate the outcrop habitat in which the plant occurs. The long-term viability of the Bashful Bulrush population at this location is unlikely if M-83 is constructed as planned.

American Chestnuts (*Castanea dentata*), both nut-bearing and non nut-bearing trees, are directly threatened by the highway. American Chestnuts occur in several locations directly in the proposed alignment of M-83 in upland forest habitats of Great Seneca Park and the North Germantown Greenway and would suffer a direct loss of existing trees and upland forest habitat as a result of highway construction. Alteration of the remaining forest structure and invasion of non-native plant species can be expected within the newly fragmented forest. These ‘edge effect’ impacts pose a serious threat to any surviving chestnuts due to increased competition for space and light along the new forest edges.

Butternut (*Juglans cinerea*) grows in rich well-drained alluvial soil on the floodplain of the Brandermill Tributary. This location lies just outside and upstream of the proposed M-83 crossing of this tributary. The Butternut would not suffer a direct taking of existing trees as a result of highway construction. However, it would suffer a direct loss of floodplain habitat if M-83 were to be constructed as planned. Alteration of the riparian forest structure and subsequent invasion by non-native plant species can be expected as a result of forest fragmentation. Again, ‘edge effect’ impacts can cause increased competition for space and light to the detriment of the Butternut, which is already in severe decline throughout its range.

Black Ash (*Fraxinus nigra*) grows in association with spring-fed wetlands along the North Germantown Tributary in the North Germantown Greenway. All the Ashes are located in the vicinity of the tributary, upstream and to the west of where the proposed M-83 would cross the tributary. The road would parallel the stream after crossing it. While the Black Ashes would not suffer any direct tree takings as a result of highway construction, they would be susceptible to indirect impacts. Black Ash is a tree of northern and montane habitats. It is growing here at the extreme southeastern edge of its range and survives in the ravine along the North Germantown Tributary because it has a cool wet/moist micro-niche. Any actions that increase the temperature of this cooler stream valley micro-climate could jeopardize the long-term viability of this species at this location. The Environmental Documentation Report (EDR) (MC-DOT, 1991 p.IV-52 ) cites Lovejoy et al. (1986) in describing micro-climate changes related to the creation of new forest edges. Lovejoy found that newly created openings have micro-climatic changes up to 328 feet inside the forest, such as increases in light, temperature, exposure to wind (desiccation), and decreases in humidity. Road construction would contribute these warming effects to the forest micro-climate due to the close proximity (as close as 200') of the alignment to the stream. In addition, drainage from the road would flow down the existing slope and into the ravine where the Ashes grow. This runoff could negatively impact the Ash's by conveying sediment directly to wetland habitats that are presently free from sedimentation. Runoff would also contribute stormwater to the seepages that is much warmer than the groundwater that currently feeds them. All of these cumulative indirect impacts described above can alter the Ash's habitat in negative ways and result in extirpation of this species.

Up to 50 species considered uncommon to rare in Montgomery County (see Appendix D) would be adversely affected by M-83. Most of these species were found in association with three significant habitats that are described in more detail in the "significant habitat" section of the report. The three habitats are bedrock outcrops, wetlands, and glades. Potential impacts to these specific habitats include direct impacts and indirect impacts as described below.

## **Significant Habitats Impact Analysis**

### ***Bedrock Outcrop Habitat Impacts***

The massive ground disturbances associated with the construction and operation of M-83 would impose direct and indirect impacts that would destroy or severely degrade the bedrock outcrop habitats. Bedrock outcrops occur in both parks on the slopes of the Brandermill and North Germantown tributaries. These rock outcrops either support individual species that are rare or harbor an assemblage of plant species that are uncommon or rare in Montgomery County. The State-listed Bashful Bulrush, described in the previous section, occurs in a rock outcrop area along the Brandermill Tributary. The potential impacts to the Bashful Bulrush outcrop area from highway construction pose a serious threat to the long-term survivability of this plant. Other outcrops occur in Great Seneca Park near the M-83 alignment but were not found to support rare or uncommon plant species.

The North Germantown Greenway contains several bedrock outcrops that support species uncommon in Montgomery County. None of these habitats are located in the footprint of the proposed M-83 alignment. However, these special habitats are threatened with impacts associated with the 'edge effect.' Currently most of these outcrop communities are located well within the interior of the forest and are free of non-native invasive plant species. If M-83 is constructed through the interior of the forest, the fragmentation will create an edge effect that will cause a significant shift in the structure and species composition of the plant community and increase the likelihood of non-native invasive species penetrating well within the remaining forest fragments. This phenomenon is already adversely impacting a few rock outcrop communities that occur near a narrow power-line right-of-way that cuts across the Greenway. Stilt-grass (*Microstegium vimineum*), Asiatic Bittersweet (*Celastrus orbiculatus*), and Multiflora Rose (*Rosa multiflora*) are some of the most pernicious non-native species present that are disrupting native plants in and around the power-line cut. These and other non-native invasive species thrive in disturbed edge habitats. The extensive forest clearing and soil disturbances associated with the construction and operation of M-83 would serve as an entry corridor for numerous non-native invasive species that would spread into previously unaffected areas, severely degrading bedrock outcrops and other forest habitats.

### ***Wetland Habitat Impacts***

Two large palustrine forested wetland complexes are located within the proposed M-83 alignment along the Brandermill and North Germantown tributaries. According to the Environmental Documentation Report (Montgomery County-DOT, 1991), the Brandermill wetland would be impacted by 1.70 acres of “unavoidable fill.” The North Germantown wetland is described as having 2.90 acres of “unavoidable fill.” Obviously these two wetlands would be greatly impacted, if not destroyed, by the construction of M-83. Both of these wetlands contain important breeding habitats for amphibians. Amphibians observed in these wetlands include the Wood Frog, Pickerel Frog, Green Frog, Spring Peeper, Gray Treefrog, American Toad, and Dusky Salamander. Furthermore, these wetlands support a diversity of hydrophytic plant species that provide important foraging and sheltering habitat for mammals, birds, reptiles, and insects. Therefore, these wetlands are valuable for maintaining local and regional biodiversity.

An extensive area of high-quality seepage slope wetlands found along the North Germantown Tributary upstream of the proposed M-83 stream crossing would not be directly impacted by M-83. However, the exceptional biodiversity of these wetlands would be indirectly threatened by ‘edge effect’ impacts and polluted stormwater runoff. Currently these spring-fed wetlands are relatively pristine and undisturbed. They occur within the forest and support a remarkable assemblage of plant species considered rare and uncommon in Montgomery County. Black Ash, a state-listed species, and Bristle-stalked Sedge are two examples of unusual and disjunct species found in this special habitat. Road construction would create soil disturbance and light gaps that would encourage non-native invasive species to penetrate into forested habitats where these wetlands occur. Furthermore, these wetlands occur down-slope of the proposed road cut and could receive polluted storm-water conveying thermal, chemical, nutrient, and sediment runoff. Pollutants and non-native invasive species can severely damage these seepage wetlands, compromising the existing native flora and fauna.

As discussed in the Amphibian impact analysis, the construction of M-83 would sever connectivity between wetlands occurring up and downstream of the road crossing. This severance would isolate species populations that depend on wetlands (e.g. amphibians, hydrophytic plants, etc.) and potentially prevent the dispersal of these species to and from

existing wetland habitats. The consequence of this isolation is a reduction or elimination of genetic exchange between both faunal and floral populations. Furthermore, roads are a barrier that reduce or prevent the supplementation of populations via dispersal from other populations. Thus isolation of wetland habitats due to road construction increases the probability that native biodiversity will be diminished over time. If M-83 is built, wetland habitats on the Dayspring property and in isolated portions of the North Germantown Greenway and Great Seneca Park will likely suffer a loss of biodiversity from direct “footprint” impacts and subsequent isolation.

### ***Glade Habitat Impacts***

The construction of M-83 would destroy or degrade the few and unique glades that occur in the study area. Glade habitats were observed the North Germantown Greenway but not in the Great Seneca Park portion of the study area. A small area of this unusual habitat occurs north of the North Germantown Tributary, along with dry Chestnut Oak forest at the edge of a small electric utility corridor. This area lies directly in the path of the proposed M-83 alignment and would be destroyed. Several plant species were observed at this location that were not found elsewhere in the study area (see p. 21). Many of these species are considered uncommon in Montgomery County. Destruction of this site would mean a loss of unusual habitat and a loss of native species diversity in the North Germantown Greenway.

‘Edge effect’ impacts threaten another significant glade habitat located outside of the proposed M-83 alignment on a dry rocky slope north of the North Germantown Tributary. This special site lies down-slope of the proposed M-83 alignment. Currently this habitat is free of non-native invasive species and supports several plant species considered uncommon in Montgomery County. The construction of M-83 would create a disturbance corridor, allowing the dispersal of non-native invasive plants into what is now a large tract of mature upland forest. The spread of these invasive plant species would severely degrade this unusual habitat.

The loss and/or degradation of unusual glade habitats would result in the extirpation of species from the North Germantown Greenway, resulting in a further decline in the County’s native biodiversity



### ***Forest Habitat Impacts***

Forest habitat loss due to M-83 would have a significant direct impact on native flora and fauna. The large tracts of forest in the Great Seneca Park and North Germantown Greenway encompass all of the species and habitats described in this report, providing critical habitat for amphibians, forest interior dwelling birds, and a diverse flora. These forests also provide critical habitat for mammals, reptiles, and other animal species not described in this report. Forest interior nesting birds are declining in population in the eastern United States due to the loss and fragmentation of forest habitats (Robbins, 1996). Populations of amphibians are in decline worldwide due to habitat loss, as well as other factors including pollution, pesticides, global warming, increased road density and traffic (National Park Service-CFR, 2003). Inevitably, destruction and degradation of large forested tracts in the Great Seneca Park and North Germantown Greenway would translate into a decline in the population of the species that currently live there.

Prior to the arrival of Europeans, Montgomery County's land area was nearly 100 percent forest cover (Montgomery County, 2000). Over the past 30 years, the County's forest cover has declined precipitously, from 45 percent in 1973, to 28 percent in 2000 (Montgomery County, 2000). This loss of forest has meant a corresponding loss of habitat for forest dwelling species of all kinds, which inevitably translates into a decline in species' populations. There is every reason to expect this trend to continue. Between 1985 and 1997 Montgomery County lost 9,854 acres of forest, and the County is projected to lose over 14,000 in the next two decades (Maryland Department of Planning, 2001). Further loss of Montgomery's forest however great or small is significant when considered in light of past, present and future trends.

This massive loss of forest cover over the last 30 years is the result of countless forest-clearing projects to accommodate expanding urbanization. While each project individually may not have seemed significant because the loss appeared small relative to total forest loss, the cumulative effect of these projects has taken a considerable toll on Montgomery County's forests.

Cumulative effects are now considered important to describe as a part of environmental analyses. The Presidents Council on Environmental Quality defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person

undertakes such other actions.” (Council on Environmental Quality, 1997) In essence, Montgomery’s forest loss can literally be described as *death by a thousand cuts*.

Almost all of the loss of forest cover in the County has resulted from development on private properties. With publicly-owned forests<sup>3</sup> constituting only 10 percent of Montgomery County’s land area, it is imperative that the remaining public forest land be protected if Montgomery’s native biodiversity is to be preserved for future generations.

M-83 would clear-cut public forests across both parklands to provide a corridor for the highway. Inevitably, this new corridor would lead to the dispersal of non-native flora and fauna into the remaining forest and would alter forest structure and species composition well inside the newly created forest edge. The resulting alteration of forest interior habitats, adjacent to the new road, would mean a significant loss of habitat for forest dwelling flora and fauna, particularly amphibians, birds, and forest flora. The 150 foot wide road cut coupled with an ‘edge effect’ impact extending at least 100 meters (328 ft) on either side of the road cut would result in a loss of habitat equivalent to a 806 foot wide swath. This massive forest clearing and ‘edge effect’ would make the remaining forest cover less suitable for sustaining forest dwelling species. The smaller parcels of remaining forest would no longer provide enough habitat area to support viable populations of many of these species, especially forest interior dwelling birds, and could lead to the extirpation of these species.

The Dayspring Silent Retreat Center forest would suffer the same adverse impacts because it is part of the same large contiguous forest that would be fragmented by M-83. Construction of M-83 would sever the ecological corridor connecting Dayspring to both parks. In effect Dayspring would become completely isolated and suffer a decrease in the numbers and kinds of forest dependent species that are currently found on their property

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<sup>3</sup>According to Montgomery County Department of Environmental Protection (2000), 64% of Montgomery County’s forests are privately owned and 36% are publicly owned (DEP, 2000). However, only 10% of Montgomery County’s land area is publicly owned forests, while 18% is privately owned forest cover.

## GLOSSARY

**Biodiversity.** The variety and abundance of species, their genetic composition, their communities, and the ecosystems and landscapes of which they are a part. In this report, biodiversity refers to native biological diversity, therefore, increases in species diversity resulting from the introduction of nonnative species would not constitute an increase in biodiversity.

**Disjunct.** Discontinuous, separated, not contiguous; usually refers to spatially isolated populations that were formerly parts of a large wide-ranging population. In this report, 'disjunct' applies specifically to the Black Ash (*Fraxinus nigra*) whose present contiguous range lies to the north and northwest of Maryland. Scattered isolated populations of Black Ash occur in Maryland mostly in the Blue Ridge Mountains and in the Appalachian Plateau Province.

**Edge effect.** The influence of two communities on populations in their adjoining boundary zone or ecotone, affecting the composition and density of the populations in these bordering areas. In this report 'edge effect' refers to negative effects to forest dwelling species and their habitats resulting from a road cutting through forest interior habitats. For example, 'edge effect' refers to fragmentation and consequent disruption to forest habitats due to the subsequent: 1) invasion by nonnative species, 2) increased predation of forest dwelling bird species, 3) increased nest parasitism of forest birds by cowbirds, and 4) introduced micro-climate impacts on forest dwelling flora and fauna.

**Epipetric.** Growing on rocks

**Facultative wetland species.** Pertaining to species that usually occurs in wetlands (estimated probability 67%-99%) but occasionally found in nonwetlands.

**Forest interior dwelling species.** Bird species which require large tracts of unfragmented forest in order to maintain viable populations.

**Heath.** A plant of the Heath Family (*Ericaceae*); blueberries (*Vaccinium spp.*), huckleberries (*Gaylussacia spp.*), Mountain Laurel (*Kalmia latifolia*), Trailing Arbutus (*Epigaea repens*)...etc.

**Micro-climate.** The local climate of a small site; this may vary from the climate of the larger, surrounding area due to aspect, tree cover, elevation, wind exposure, and other local factors.

**Montane.** Of, growing in, or inhabiting mountain areas.

**Neo-tropical migratory songbirds.** Insectivorous bird species whose populations winter primarily outside of the United States in the Caribbean, Mexico, or Central/South America. These species are declining in the eastern United States because of loss and fragmentation of forest habitats.

**Nonnative invasive species.** Plant species that are introduced into an area in which they did not evolve, and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes.

**Obligate wetland species.** Pertaining to species that occurs almost always (estimated probability >99%) under natural conditions in wetlands.

**Palustrine Forested Wetland.** A type of nontidal wetland according to the U.S. Fish & Wildlife Service's *Classification of Wetlands and Deepwater Habitats of the United States* – 1979.

**Relict.** An organism or community that has survived while related ones have become extinct; often applied to plants or vegetation that formerly had much wider distributions and have survived locally through periods of unfavorable conditions in a region. In this report 'relict' applies to the Black Ash and several herbaceous species that occur in a cool micro-niche along the North Germantown Tributary in the North Germantown Greenway.

**Riparian.** Located on or near the bank of a natural watercourse. In this report riparian refers to streamside areas including the streambank and adjacent floodplain zone.

**Saprolite.** A soft, earthy decomposed (disintegrated) rock composed of clay, silt, or other rock remnants which formed in place by chemical weathering.

**Seepage.** An area of groundwater discharge supporting characteristic herbaceous and woody wetland vegetation.

**Surficial.** Of, occurring on, or relating to the earth's surface

**Upland.** The higher parts of a tract of land. In this report 'upland' refers to hilltops and the upper half of slopes.

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