



# District of Columbia Wildlife Action Plan

2015 UPDATE

District Department of the Environment

July 2015

DISTRICT  
DEPARTMENT  
OF THE  
ENVIRONMENT





## Acknowledgements

### Coordinator and Lead Author

Damien Ossi, DDOE \ Fisheries and Wildlife

### Lead Authors

Dan Rauch, DDOE \ Fisheries and Wildlife

Lindsay Rohrbaugh, DDOE \ Fisheries and Wildlife

Shellie Spencer, DDOE \ Fisheries and Wildlife

### Climate Change Vulnerability Assessments

Jennifer L. Murrow, University of Maryland, Department of Environmental  
Science and Technology

### Editor

Sherry Schwechten, DDOE \ Natural Resources

Updating h \ Y \ 8 ] g h f ] Wh \ c Z \ 7 c \ i a V ] U Ñ g \ C e d g u i d a n c e ] \ X \ ] Z \ V  
technical analysis, review, and editing from technical committees, internal  
groups, and sister agencies.

Members of the DDOE review team were Jonathan Champion, Julia Robey  
Christian, Adriana Hochberg, Kate Johnson, Hamid Karimi, Bryan King, Karim  
Marshall, Daniel Ryan, Steve Saari, Mary Searing, and Matt Weber.

Individuals from local, regional, and federal agencies ; academia ; and  
conservation organizations provided invaluable input concerning species,  
ecosystems, habitats, threats, conservation challenges, and solutions for the  
District.



## Preface

The District of Columbia is a rapidly growing city, known in part for its beautiful parks and green spaces. With large sites like Rock Creek Park, Fort DuPont Park, the National Arboretum, and the Chesapeake and Ohio Canal Historical Park and smaller places like Pope Branch, Alger, Linnean, and Hillcrest Parks, the District has the second highest amount of green space per capita of any city in the country. H \ Y g Y ' g d U W Y g ' d f c j ] X Y ' [ f Y U h ' j U ` i Y ' h c ' h \ Y visitors, but they also act as homes or refuges for somewhat less apparent residents. Bald eagles nest overlooking the Anacostia River. American shad and rockfish swim thousands of miles to spawn in the Potomac River. Spotted turtles swim through the marshes of Kenilworth Park and Aquatic Gardens, and five lined skinkstread the boardwalk on Analostan Island (also known as Theodore Roosevelt Island). Monarchs find milkweed in meadows and backyards, and rocky, ice-scoured forests along the Potomac River retain plants typically found on the Great Plains. Oxon Run Park is home to globally rare magnolia bogs, and h \ Y ' < U m Ñ g ' G d f ] b [ ' U a d like crustaceans, lives in a few springs at Rock Creek Park and nowhere else in the world.

H \ Y ' 8 ] g h f ] W h ' 8 Y d U f h a Y b h ' c Z ' h \ Y ' 9 b j ] f c b a Y b h Ñ g ' manages these diverse wildlife resources. The District is unique in that it is the only completely urban jurisdiction required to manage its wildlife as a state. This aspect provides a host of novel challenges and opportunities that are addressed in this plan.

Th] g ' i d X U h Y ' c Z ' h \ Y ' 8 ] g h f ] W h Ñ g ' K ] ` X ` ] Z Y ' 5 W h ] c b ' m Y U f g ' c Z ' W c b g Y f j ] b [ ž ' g i g h U ] b ] b [ ž ' U b X ' d f c h Y W h ] for the benefit and enjoyment of residents and visitors. It is an adaptable document that allows agencies, landowners, and natural resource managers to adjust methods to meet emerging threats, and it provides metrics to measure the effectiveness of conservation actions. The Wildlife Action Plan also serves as a companion to the Sustainable DC plan and other citywide plans that aim to d f c h Y W h ' U b X ' Y b \ U b W Y ' h \ Y ' 8 ] g h f ] W h Ñ g ' b U h i f U ` ' g m

The update to this plan also provides an opportunity to strengthen relationships and cooperation with federal, regional, and local partners and with sister agencies. Success will depend on coordinating the goals, plans, and conservation efforts of numerous partners and stakeholders.

Success also depends on public input and participation. This plan includes rewarding opportunities for residents to play a role that has significant benefits for local wildlife. These opportunities include participating in the citizen science d f c [ f U a Ñ g ' W c h h c b h U ] ` ' f U V V ] h ' g i f j Y m ž ' d ` U b h ] b [ ' backyard habitats.

Working together to implement this Wildlife Action Plan will ensure the District of Columbia is not only a sustainable city, but continues to be a living city for the enjoyment of current and future generations.

# Contents

<b>Acknowledgements</b> .....	<b>iii</b>
<b>Preface</b> .....	<b>v</b>
<b>List of Tables</b> .....	<b>xii</b>
<b>List of Figures</b> .....	<b>xiv</b>
<b>Chapter 1 Introduction</b> .....	<b>1</b>
1.1 Sustaining Biodiversity .....	1
1.2 DDOE Jurisdiction.....	2
1.3 X ã • ã [ } Á ~ [   Á c @ ^ . Á . Ö . ã . • . c . ! . ã . & . c . • . Á . Y . ã .   . á .   . ã . ~ . ^ . . . . .	3
1.4 State Wildlife Grant Program .....	3
1.4.1 Required SWAP Elements.....	4
1.4.2 Summary of Key Changes from SWAP 2005 .....	5
1.5 SWAP 2015 Approach .....	6
1.5.1 SWAP Development Team and Technical Committees .....	6
1.5.2 Designating SGCN and Critical Habitats .....	7
1.5.3 Threats, Actions, and Effectiveness Measures .....	8
1.5.4 Stakeholder and Public Input.....	9
1.5.5 Conclusion.....	10
<b>Chapter 2 Species of Greatest Conservation Need</b> .....	<b>11</b>
2.1 Ö ã • c   ã & c Á [ ~ Á Ô [   ~ { à . ã . æ . • . Á . Y . ã .   . á .   . ã . ~ . ^ . Á . Ö . ã . q . r ^   • ã c ^	
2.1.1 Terrestrial Wildlife Diversity .....	11
2.1.2 Aquatic Wildlife Diversity .....	12
2.1.3 Wildlife Ecology .....	13
2.2 What is an SGCN?.....	14
2.3 Selection Process for SGCN.....	15
2.3.1 Millsap Process .....	15
2.3.3 Vertebrate SGCN Selection.....	17
2.3.4 Invertebrate SGCN Selection .....	17
2.4 Prioritization Process for SGCN.....	19
2.5 SGCN Designations.....	19
2.6 Changes from SWAP 2005 .....	27
<b>Chapter 3 Habitats</b> .....	<b>30</b>

3.1	Local Context	30
3.1.1	Local Context	30
3.1.2	Northeast Regional Context	33
3.2	Process for Defining and Describing Habitats	33
3.3	Habitat Descriptions	36
3.3.1	Critical Habitat and Vegetation Systems	38
3.3.2	Vegetative Systems	40
3.3.3	Semi-natural Systems	51
3.3.4	Aquatic Habitat Systems	52
3.3.5	Developed Systems	61
3.4	Condition of Vegetative Habitats	62
3.4.1	Core Habitats/ Invaded Habitat Data Layer	63
3.4.2	SGCN Richness and Abundance Data Layers	65
3.4.3	Soil Data Layer	65
3.4.4	Tree Canopy Data Layer	69
3.4.5	Deer Browse Data Layer	71
3.4.6	Ranking Process for Habitats	73
3.4.7	Final Map	73
3.4.8	Results and Discussion	74
3.5	Condition of Aquatic Habitats	78
3.6	Conservation Opportunity Areas	80
<b>Chapter 4</b>	<b>Threats to SGCN and Critical Habitats</b>	<b>85</b>
4.1	Overview: What will impact wildlife and habitats?	85
4.2	Regional Threats	86
4.3	Threat Selection and Prioritization	86
4.4	Resource Deficiencies and Programmatic Threats	88
4.5	Habitat-Based Threats	88
4.5.1	Invasive Species	94
4.5.2	Urban Wastewater	94
4.5.3	Nutrication/Sedimentation	95
4.5.4	Problematic Native Species	95
4.5.5	Other Top Habitat-Based Threats	96



4.6	Species-Based Threats.....	97
4.6.1	Diseases and Pathogens.....	97
4.6.2	Invasive Animal Species.....	99
4.6.3	Other Threats .....	100
4.7	Development and Redevelopment.....	100
4.8	Climate Change .....	101
<b>Chapter 5</b>	<b>Climate Change Vulnerability Assessments .....</b>	<b>102</b>
5.1	Introduction .....	102
5.2	Climate Change Predictions.....	102
5.3	Global Predictions.....	103
5.4	Regional Predictions .....	104
5.5	Climate Change Threats to the District of Columbia Region.....	105
5.5.1	Temperature .....	106
5.5.2	Precipitation and Severe Storms .....	107
5.5.3	Sea-level Rise .....	109
5.6	Species and Habitats at Greatest Risk and Most Vulnerable to Climate Change .....	111
5.6.1	Habitats .....	111
5.6.2	Species.....	113
5.7	General Biological Responses, Adaptations, and Actions for SGCN and Their Habitats.....	117
5.7.1	General Actions .....	117
5.7.2	Upland Forests .....	117
5.7.3	Wetlands/Vernal Pools/Riparian Forests .....	117
5.7.4	Meadows .....	118
<b>Chapter 6</b>	<b>Conservation Actions.....</b>	<b>119</b>
6.1	Overarching Actions.....	120
6.1.1	Invasive Species.....	120
6.1.2	Urban Wastewater .....	122
6.1.3	Nitrification/Sedimentation.....	123
6.1.4	Problematic Native Species.....	124
6.1.5	Recreational Activities and Infrastructure .....	125
6.1.6	Ecosystem Modifications .....	125

6.1.7	Inventory and Monitoring .....	126
6.2	Regional Actions and Coordination.....	127
6.3	Conservation Actions by Habitat.....	127
6.4	Non-Habitat/Species Based Actions .....	145
6.4.1	Invasive Species.....	145
6.4.2	Diseases and Pathogens.....	146
6.4.3	Endocrine Disruption .....	147
6.4.4	Noise Pollution.....	147
6.4.5	Light Pollution .....	147
6.4.6	Collisions with Glass and Buildings .....	147
6.5	Focal Conservation Actions .....	148
6.5.1	Meadow Restoration.....	148
6.5.2	Tidal Wetland Restoration .....	153
6.5.3	Native Plant Propagation .....	156
6.5.4	Vernal Pool Creation .....	156
6.5.5	Artificial Nesting Structures and Opportunities .....	157
6.5.6	Trustee for Natural Resources.....	158
6.5.7	Citizen Science Program .....	158
6.5.8	Wildlife Corridors .....	159
<b>Chapter 7</b>	<b>Monitoring and Adaptive Management.....</b>	<b>161</b>
7.1	Planned Monitoring and Adaptive Management .....	161
7.1.1	Ongoing Species Monitoring Programs .....	163
7.1.2	Ongoing Habitat Monitoring/Restoration Programs .....	164
7.2	Potential New Monitoring/Restoration Programs .....	164
7.3	Important Data Gaps.....	165
7.4	Periodic Plan Review and Revision .....	165
<b>Chapter 8</b>	<b>Stakeholder and Government Participation .....</b>	<b>167</b>
8.1	Stakeholder Participation .....	167
8.2	Public Participation .....	170
8.3	Successful Implementation of SWAP 2005.....	171
8.4	Implementation .....	172
<b>Resources for Residents</b>	<b>.....</b>	<b>173</b>

<b>References</b>	.....	<b>175</b>
<b>Abbreviations</b>	.....	<b>189</b>
<b>Glossary</b>	.....	<b>193</b>
Appendix A	Millsap Avian Ranking .....	<b>A-1</b>
Appendix B	Millsap Mammal Ranking .....	<b>B-1</b>
Appendix C	Millsap Herpetofauna Ranking .....	<b>C-1</b>
Appendix D	Millsap Fish Ranking .....	<b>D-1</b>
Appendix E	Invertebrate SGCN Ranking .....	<b>E-1</b>
Appendix F	Habitat Threat Ranking.....	<b>F-1</b>
Appendix G	Public Comments .....	<b>G-1</b>

List of Tables

Table 1 Revisions to the District Species List and Additions to the District Species List ..... 16

Table 2 District of Columbia Species of Greatest Conservation Need 2015 (Additions to SWAP 2015 are shown in green.) ..... 22

Table 3 SGCN Removed from SWAP 2015 ..... 28

Table 4 Formations and Macrogroups Comprising the Northeast Terrestrial Wildlife Habitat Classification System from *The Northeast Lexicon* (Crisfield and NEFWDTC 2013) ..... 35

Table 5 Area and Percent of Developed Land and Habitat Areas in the District Categorized by Formation Class from the Northeast Terrestrial Wildlife Habitat Classification System ..... 37

Table 6 Area of District of Columbia Habitat Systems ..... 41

Table 7 Area of District of Columbia Aquatic Habitats ..... 54

Table 8 IUCN Hierarchy of Conservation Threats in the District ..... 87

Table 9 Threat Characteristics and Categorical Ratings ..... 90

Table 10 Threat Priority Ranking of Vegetative and Aquatic Macrogroup Habitats ..... 92

Table 11 Conservation Actions to Address Threats to Central-Oak Pine Habitat in the District ..... 128

Table 12 Conservation Actions to Address Threats to Northern Hardwood and Conifer Habitat in the District ..... 129

Table 13 Conservation Actions to Address Threats to Early Successional Habitat in the District ..... 130

Table 14 Conservation Actions to Address Threats to Coastal Plain and Swamp Habitat in the District ..... 131

Table 15 Conservation Actions to Address Threats to Northeastern Floodplain Forest Habitat in the District ..... 132

Table 16 Conservation Actions to Address Threats to Emergent/Modified Managed Marsh Habitat in the District ..... 133

Table 17 Conservation Actions to Address Threats to Urban Landscapes Habitat in the District ..... 135

Table 18 Conservation Actions to Address Threats to Great River Habitat in the District ..... 137

Table 19 Conservation Actions to Address Threats to Creeks and Headwater Habitat in the District ..... 138

Table 20 Conservation Actions to Address Threats to Embayed River Areas Habitat in the District ..... 139

Table 21 Conservation Actions to Address Threats to Pond Habitats in the District .. 140

Table 22 Conservation Actions to Address Threats to Intertidal Shore Habitat in the District ..... 142

Table 23 Conservation Actions to Address Threats to Reservoir Habitat in the District ..... 143

Table 24 Conservation Actions to Address Threats to Vernal Pool Habitat in the District ..... 144

Table 25 Conservation Actions to Address Threats to Spring and Seep Habitats in the District ..... 145

Table 26 District of Columbia Highest Priority Meadow Restoration Sites ..... 152

Table 27 Identified Conservation Targets and Indicators of Success..... 162

Table 28 Technical Committee Participants and their Affiliations ..... 169

V æ à | ^ Á G J Á Á T ã | | • æ ] Á Ü æ } \ ã } . \* Á ~ [ . ! Á c . @ ^ Á Ö ã • c A 7 ã & c • Á

Table 30 Millsap Ranking ~ [ ! Á c @ ^ Á Ö ã • c . ! ã & c ..... Á . T . æ { . { . æ | . • B-7

Table 31 Millsap Herpetofauna Ranking ..... C-7

V æ à | ^ Á H G Á Á T ã | | • æ ] Á Ü æ } \ ã } . \* Á ~ [ . ! Á c . @ ^ Á Ö ã • c d 7 ã & c • Á

Table 33 Invertebrate SGCN Ranking.....E-4

## List of Figures

Figure 1	Level III and IV Ecoregions hierarchical classification system. (EPA Western Ecology Division, 2015) ...	32
Figure 2	District of Columbia habitat formation map.....	38
Figure 3	District of Columbia vegetative habitats and land use classified into Habitat System categories.....	42
Figure 4	Vegetative habitats and land use in the upper Anacostia River area of the District of Columbia, classified into Habitat System categories.....	43
Figure 5	Vegetative habitats and land use near Rock Creek Park in the District of Columbia, classified into Habitat System categories.....	44
Figure 6	Vegetative habitats and land use near the upper Potomac River and northwest sections of the District of Columbia, classified into Habitat System categories. ....	45
Figure 7	Aquatic Habitat Systems of the District. ....	53
Figure 8	Aquatic Habitat Systems of the upper Potomac River in the District. ....	57
Figure 9	Aquatic Habitat Systems of the upper Anacostia River in the District. ....	60
Figure 10	An example of large native street trees, wooded residential areas, and forest canopy in upper northwest Washington, DC. ....	62
Figure 11	Habitat areas of the District ranked by value.....	64
Figure 12	Species richness in the District by SGCN. Number of species per point converted to a surface using a quadratic kernel function. ....	66
Figure 13	Species abundance in the District by SGCN. Number of SGCN observations per point, normalized by unit of effort and extrapolated to a surface using a quadratic kernel function. ....	67
Figure 14	Soil types in the District ranked by type and disturbance. Disturbed soils (such as those in dredge and fill areas) and urban complex soils were ranked lowest. Undisturbed soils were ranked higher. ....	68
Figure 15	Wooded areas of the District. Mature tree canopy from classification of aerial imagery by DCGIS, combined with native street tree canopy. 1 = no canopy; 10 = canopy. ....	70
Figure 16	Areas of the District ranked by impact of deer browse. Areas where no or few deer browsed ranked high, while habitats impacted by overabundance of deer ranked low. Commercial, industrial, and high density residential areas were excluded.....	72
Figure 17	Model for determining values for final District map.....	74
Figure 18	Raw output of the habitat condition assessment (3.4.7a). Map of habitat condition using the previous six data layers weighted and summed. Highest value habitats are blue. ....	76
Figure 19	Output of the habitat condition assessment ranked into three tiers (3.4.7b). 77	

Figure 20 Conservation opportunity areas in the District..... 83

Figure 21 Sea, Lake, and Overland Surges from Hurricanes (SLOSH) hurricane storm surge inundation predictions for Washington DC for present-day Category 1, 2, and 3 storms (North Atlantic Coast Comprehensive Study data) ..... 108

Figure 22 Relative sea level rise inundation predictions in Washington, DC from the North Atlantic Coast Comprehensive Study (U.S. Army Corps of Engineers). High sea level rise scenario for years 2018, 2068, and 2100..... 110

Figure 23 Potential District-owned meadow restoration sites prioritized by habitat connectivity and estimated size..... 151

Figure 24 An approximation of the original extent of the wetlands of the upper Anacostia River in the District based on historic maps. Blue circles indicate six potential tidal wetland restoration sites in locations that may contain natural historic wetland soils. .... 155





# Chapter 1 Introduction

The District of Columbia is a developed urban city that is also home to abundant and diverse wildlife and habitats. The District is the only completely urban jurisdiction required by federal law to manage its fisheries and wildlife resources. There are significant challenges to managing wildlife diversity in an urban area that has seen rapid growth in its human population and continued urbanization and development. The District is a part of a federal grant program that funds efforts to prevent the extinction of rare species and to prevent common species from becoming rare. All 50 states, the District, U.S. territories, and many Native American tribes participate in the State Wildlife Grant (SWG) program.

The State Wildlife Grant program supports the conservation and management of non-rare and declining wildlife are designated as Species of Greatest Conservation Need (SGCN). These species and their critical habitats are targeted for management in the State Wildlife Action plans (SWAPs). Each SWAP designates SGCN and critical habitats and assesses the threats to both. The SWAP identifies conservation actions that will be implemented to reduce and mitigate the threats to SGCN actions range from habitat restoration to land acquisition and from wildlife inventory to regulations. SWAPs and SWGs are used regionally and nationally to enhance coordination of landscape management and efforts to prevent species from becoming threatened or endangered.

The District of Columbia developed its first SWAP in 2005. At that time, the District Department of Health, Environmental Health Administration, Fisheries and Wildlife Division (FWD) worked with partners and stakeholders to prepare the 2005 Wildlife Action Plan (SWAP 2005) (Pfaffko and Palmer 2006). The Fisheries and Wildlife Division now resides in the Natural Resources Administration of the District Department of the Environment (DDOE). The District developed a new SWAP in 2015 (SWAP 2015) to meet the requirements of the SWG program. This is a comprehensive update based on a foundation of ten years of research, management, and monitoring.

## 1.1 Sustaining Biodiversity

The District of Columbia is a developed urban city that is also home to abundant and diverse wildlife and habitats. The District is the only completely urban jurisdiction required by federal law to manage its fisheries and wildlife resources. There are significant challenges to managing wildlife diversity in an urban area that has seen rapid growth in its human population and continued urbanization and development. The District is a part of a federal grant program that funds efforts to prevent the extinction of rare species and to prevent common species from becoming rare. All 50 states, the District, U.S. territories, and many Native American tribes participate in the State Wildlife Grant (SWG) program.

The District of Columbia is a 68-square-mile city located at the junction of the Anacostia and Potomac Rivers at the geologic fall line between the Appalachian Piedmont and Atlantic Coastal Plain. The District has a temperate/subtropical climate and is 78% developed land and 12% undeveloped land. The remaining 10% of the District is open waters of the Potomac and Anacostia Rivers. There are more than 6,700 acres of land protected as National Parks and 900 additional acres of District-owned park land. The forests, waters, meadows, and wetlands in the District provide habitat for approximately 240 species of birds, 78 fish, 29 mammals, 21 reptiles, amphibians, and thousands of invertebrates. Abiotic factors such as landform, climate, and soils have driven the evolution of diverse plant communities including ice-scour floodplains scrub forests along the Potomac River and the globally rare endemic magnolia bogs in the hills east of the Anacostia River.

The District has an abundance of notable wildlife, including nesting bald eagles; the federally threatened northern long-eared bat; recovering populations of American shad; and a variety of other species.

The continued and successful growth of the District as a global, metropolitan, and urban city highlights the challenge of sustainably managing human encroachment into precious natural areas while allowing or encouraging some uses. The District is home to approximately 650,000 people – its highest population since the 1980s. Since 2010, the District has experienced a sustained period of 9.5% population growth – nearly three times the national average of 3.3% (U.S. Census Bureau 2015). Beyond the proximate threats of urban development and land use, climate change will affect nearly every aspect of natural resource management, land use planning, and future development in the long term. The District's Climate Change Adaptation Plan (DDOE 2015a, in prep.) and Sustainable DC Plan (2012) call for actions that provide access to green spaces; preserve natural systems, wildlife, and landscapes; ensure the resilience of natural and human systems; and encourage District residents to value the benefits of a healthy relationship with natural resources and the environment.

## 1.2 DDOE Jurisdiction

The management of fisheries and wildlife is a state function. DDOE serves as a state agency in this regard and has jurisdiction over the conservation and management of fish, wildlife, and habitats in the District of Columbia. Currently, DDOE is limited in the authority to protect and manage threatened or endangered species or to acquire and designate wildlife areas. These deficiencies are addressed in this plan.

Although DDOE is not legally the state trustee agency for fish and wildlife resources, it is responsible for providing biological expertise to review and comment on environmental documents and impacts relating to development, infrastructure, and other projects that may impact federally listed species or SGCN.

### 1.3 Urban Wildlife Resource Management

Through SWAP 2015, DDOE seeks to conserve the wildlife and habitats of the Washington, DC-based wildlife resource management actions that address the unique issues that wildlife face in an urban city and the significant challenge of climate change. This plan is based on the best available science and remains flexible so actions can be implemented and adapted as situations change. Implementation relies on making conservation information more accessible to resource managers, conservation organizations, and the public. The development of this plan relied on partnerships with a broad array of government agencies, organizations, businesses, and citizens. The effectiveness of this plan will rely on ongoing input and assistance from the same array of partners. The value in the District over the next decade. The strategies and actions laid out in this plan establish the framework for ongoing conservation for future generations.

### 1.4 State Wildlife Grant Program

The SWG Program was created by the Department of the Interior and Related Agencies Appropriations Act of 2002, Title I, Public Law 107-3. It was developed with support from Teaming with Wildlife, a bipartisan coalition working to increase state funding for wildlife conservation. This program provides funding to prevent wildlife population declines and keep common species common. The funds are intended to work in conjunction with other funding sources and are only a small portion of the funding that is actually required to implement the SWAP conservation actions. The other necessary funds will be matched by partners.

Taken as a whole, SWAPs represent a massive effort to bring together the best science available to conserve priority fish and wildlife and their habitats through innovative public-private partnerships. The SWG program is the primary funding source available for state fish and wildlife agencies and their conservation partners to restore and actively manage. Although it does not have a dedicated funding stream, financial backing has continued at relatively modest annual levels for each state and territory. Without the SWG program, funding for state fish and wildlife diversity programs to prevent endangered species listings may be greatly curtailed or eliminated.

Overall, the SWAPs have identified more than 12,000 species that are at risk of becoming endangered . They have offered a diverse set of conservation actions to address threats to wildlife. The SWG program has had strong bipartisan backing in Congress, and is supported by over 6,300 conservation organizations and businesses that make up the Teaming with Wildlife coalition ([www.teaming.com](http://www.teaming.com)). The coalition was founded to advocate for the creation of the SWG program and continues to advocate for dedicated funding to ensure this successful program continues.

#### 1.4.1 Required SWAP Elements

Each SWAP must be approved by the U.S. Fish and Wildlife Service (USFWS) director and must consider the broad range of fish and wildlife and associated habitats, with priority given to those species with the greatest conservation need. The states must review and, if necessary, revise their SWAPs at least every ten years. Revisions to each SWAP must follow the guidance issued in the July 12, 2007 letter from the USFWS director and the president of the Association of Fish and Wildlife Agencies (AFWA). To satisfy this guidance, SWAP 2015 must address the eight elements of a comprehensive wildlife conservation strategy required by Congress:

##### Element 1: Species Distribution and Abundance

Information on the distribution and abundance of species of wildlife, including low and declining populations as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the U h Y Ñ g ` k ] ` X ` ] These species are referred to as Species of Greatest Conservation Need (SGCN).

##### Element 2: Critical Habitats and Habitat Condition

Descriptions of locations and relative condition of key habitats and community types essential to conservation of SGCN.

##### Element 3: Threats to Wildlife and Wildlife Habitats, and Research Needs

Descriptions of problems that may adversely affect SGCN and their critical habitats and priority research and survey efforts needed to identify factors that may assist in restoration and improved conservation of SGCN and habitats.

##### Element 4: Conservation Actions and Priorities

Actions necessary to conserve SGCN and habitats and priorities for implementing such actions.

##### Element 5: Monitoring and Adaptive Management

A plan for periodic monitoring of SGCN, habitats, and the effectiveness of the conservation actions in Element 4 and for adapting these conservation actions to respond appropriately to new information or changing conditions.

#### Element 6: SWAP Review and Update Process

Procedures to review the SWAP at intervals not to exceed 10 years.

#### Element 7: Coordination with Conservation Partners

Provisions for coordinating the development, implementation, review, and revision of the SWAP with federal, state, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats.

#### Element 8: Public Participation Strategies

Provisions to provide the necessary public participation in the development, revision, and implementation of its strategy.

### 1.4.2 Summary of Key Changes from SWAP 2005

SWAP 2015 has been substantially updated and revised from SWAP 2005. Some changes and inclusions are based on guidance documents for the revision process from USFWS (2007) and AFWA (2009, 2011, and 2012). Updates to SGCN lists are based on nearly a decade of occurrence data on current SGCN and other animal species in the District. SWAP 2005 described how DDOE was data deficient for many animal taxa; therefore, the primary goal of SWAP 2015 is to improve

Key changes to SWAP 2015 include the following:

- § A new, more rigorous, quantitative approach to determine the status of SGCN
- § A three-tiered prioritization scheme for SGCN
- § Detailed analysis of habitat types
- § Detailed analysis of habitat condition with prioritization of critical habitats
- § Designation of Conservation Opportunity Areas in critical habitats
- § Systematic identification and ranking of threats
- § Integration of threats and issues related to climate change
- § Prioritization of resource management actions over species inventory and monitoring
- § Focal Conservation Actions that cut across SGCN and habitats
- § Renewed emphasis on partnerships and collaboration
- § Effectiveness measures for conservation strategies and adaptive management

## 1.5 SWAP 2015 Approach

DDOE approached the SWAP 2015 update with a focus on quantitative management projects that will improve whole ecosystems. Conservation actions focus on habitat improvements, creation, conservation of endemic habitats and plant communities, and new opportunities for research and monitoring in both critical habitats and developed areas. The District will increase its overall ecological integrity by creating and expanding habitat areas and improving and enhancing whole systems at a large scale. Wildlife, plants, habitats, abiotic factors and processes. This approach will benefit all wildlife, including SGCN. Landscape-scale and ecosystem-based management will also help to enhance water quality, reduce erosion, and develop greater resilience for species and habitats in addition to enhance societal, aesthetic, and health values.

### 1.5.1 SWAP Development Team and Technical Committees

Using the eight required elements as an outline, DDOE began its update of the plan with analyses of the SWAP 2005 SGCN list and recent trend data and a search for external data. The SWAP Coordinator and Internal Working Group in DDOE led all aspects of SWAP 2015 development. Technical committees for birds, fish, reptiles and amphibians, mammals, invertebrates, and habitats assisted with these tasks.

SWAP Coordinator Damien Ossi, DDOE Fish and Wildlife Biologist

Internal Working Group DDOE Fisheries and Wildlife Division

Daniel Ryan	Fisheries Research Branch Chief
Dan Rauch	Fish and Wildlife Biologist
Lindsay Rohrbaugh	Fish and Wildlife Biologist
Shellie Spencer	Fish and Wildlife Biologist
Sherry Schwechten	Program Analyst

Associate Director, DDOE Fisheries and Wildlife Bryan King

The SWAP Coordinator was to oversee and coordinate the SWAP update, represent the District in regional SWAP meetings, working with the Internal Working Group to develop SWAP 2015. The group met formally and informally as necessary. During the development phase, the following tasks included, but were not limited to the following:

- § Searching, collecting, and mapping species, habitat, and climate data
- § Convening technical committees

- § Analyzing species data
- § Ranking and prioritizing SGCN
- § Analyzing habitat condition
- § Assessing and prioritizing threats
- § Assessing, prioritizing and developing conservation actions
- § Developing effectiveness measures and adaptive management plans
- § Planning and conducting stakeholder outreach
- § Planning and conducting outreach to encourage public participation
- § Incorporating comments from partners, stakeholders, and the public

### Technical Committees

DDOE fish and wildlife biologists led technical committees, including representatives from federal, state, and local agencies; conservation organizations; academic institutions; natural resource-based businesses; and private citizens. They provided valuable data, guidance, and expertise to assess threats, select SGCN, identify priority habitats, and recommend conservation actions and monitoring protocols. The technical committees also provided essential knowledge of existing programs of agencies and organizations in the region. DDOE integrated this information in SWAP 2015 to ensure that it would be comprehensive and effective. See Chapter 8 for more information about the technical committees and other stakeholder outreach.

#### 1.5.2 Designating SGCN and Critical Habitats

The Internal Working Group and technical committees analyzed data for species master lists that included 387 current or historically resident vertebrate species and approximately 315 current or historically resident invertebrate species. They used a quantitative scoring and ranking system to analyze vertebrate populations and set criteria for listing species as SGCN. Ultimately, the listing criteria varied slightly between each taxon (birds, mammals, fish, reptiles, and amphibians) based on regional wildlife priorities and input from the technical committees. The criteria for listing vertebrates were based on recent occurrence data, state and regional rankings, federal status under the Endangered Species Act, and national or regional population trends. The criteria also varied for listing each invertebrate taxon (dragonflies, damselflies, butterflies, bees, amphipods, copepods, crayfish, snails, mussels, and sponges) and were based largely on input from the technical committee.

SGCN were prioritized based on several factors including the feasibility of implementing species and habitat conservation strategies, estimations of

available resources and the economic feasibility of recovery, and the expectation of a reasonable chance of improving conservation status. The selection and prioritizations processes are described in detail in Sections 2.3 and 2.4.

Wildlife habitat data were collected, categorized, and analyzed. Habitat data included maps and other spatial data provided by the National Park Service, DDOE, and the Columbia Geographic Information System, as well as vegetative data DDOE collected. Habitats were classified into a hierarchical system that conforms to regional and national standards so that these data can be integrated into regional projects and plans in the future. Habitats were classified into various natural systems based on vegetative plant communities and into developed land use systems based on human density and the built environment.

DDOE used a variety of spatial data and maps to assess the condition of habitats and score and rank them. This assessment included data for SGCN diversity, SGCN abundance, the degree and extent of invasive plants, soil quality, the impact of deer browse, and the extent of tree canopy. Each data set was scored, weighted, and summed. The output of the habitat condition analysis indicates specific locations where habitat quality is high. The output was categorized into tiers to indicate areas that are critical, extremely significant, and highly significant to SGCN.

National and regional guidance recommends that states designate discrete, spatially distinct areas that offer the best opportunities and potential for SGCN conservation. These are called Conservation Opportunity Areas. DDOE selected eight Conservation Opportunity Areas that include high SGCN diversity, endemic species and rare vegetative communities. Habitat, habitat conditions, and Conservation Opportunity Areas are described in detail in Chapter 3.

### 1.5.3 Threats, Actions, and Effectiveness Measures

The Internal Working Group and technical committees identified threats to wildlife and wildlife habitats. These threats were categorized based on international and national hierarchies that correlate specific conservation actions to specific threats. Threats were separated into those that will affect habitats and impact wildlife that use those habitats (such as invasive plants or urban wastewater) and those that impact wildlife independent of their habitats (such as diseases and pathogens). Threats were ranked as having high, moderate, or low impacts using characteristics such as severity, immediacy, and spatial extent. High-ranking threats to both aquatic and terrestrial habitats are prioritized and described in Chapter 4.



The threats and impacts of climate change on SGCN and habitats were assessed separately. A fine-scale climate change vulnerability assessment was performed. Climate, precipitation, and soil moisture were modeled to predict changes in vegetative habitats and how those changes would impact certain SGCN. Results showed that sea level rise and changes in soil moisture will impact vulnerable habitats, such as emergent wetlands, upland forests, and vernal pools. These models, the predicted impacts, and the actions that may increase the resiliency of habitats are addressed in Chapter 5.

The threats that are prioritized in Chapter 5 are addressed with specific conservation actions in Chapter 6. Under the threat hierarchies, each particular threat is tied directly to a corresponding conservation action that has been determined to be the most effective way to mitigate or reduce that threat. Each threat is mapped directly to an individual action. DDOE addressed the highest priority habitat-based threats with six overarching actions and identified actions for all additional threats to each habitat. Specific actions are listed, with the lead agency and any partners that may assist with implementation. Non-habitat based actions are similarly detailed.

Additionally, DDOE selected a number of Focal Conservation Actions (FCA). These are broad-scale conservation efforts that may apply to many habitat types and species and represent on-the-ground natural resource management and desire to improve existing wildlife habitat by restoring reclaimed wetlands, creating vernal pools, and propagating native plants. But FCAs also represent the need to accommodate wildlife and expand their access to habitat in developed areas. That need is expressed in: 75 Nig gi W\ U g Wf Y U h ] b [ ' b meadow habitat, creating artificial nesting opportunities, citizen science initiatives, and native plant propagation.

A monitoring program will be developed to determine the effectiveness that any conservation actions have in redi W] b [ ' h \ Y ' h \ f Y U h g ' Z U W] b [ ' h \ wildlife and habitats. Indicators of success will be used to assess the status of those conservation targets. Adaptive management techniques will allow flexibility for improving the status of SGCN and achieving SWAR goals.

#### 1.5.4 Stakeholder and Public Input

The creation of this document included comprehensive conservation planning and coordinated efforts to involve stakeholders and the public. The SWG program is meant to supplement state level programs that aim to improve habitats and populations of both game and non-game wildlife species, but DDOE cannot lead and implement all of the conservation actions in this document alone. Implementation will require significant additional planning

and coordination efforts. The many partners, landowners, and members of the public who have contributed to the development of the SWAP must continue to be involved throughout the entire process. The public is the focus of many of the conservation actions, such as education and outreach, and can assist with the implementation of additional conservation actions.

Conservation and wildlife stakeholders were engaged in the SWAP 2015 update through individuals and organizations who participated as subject matter experts on technical committees. These stakeholders made significant contributions to the development of this plan.

### 1.5.5 Conclusion

The District's face unique and varied challenges. The purpose of SWAP 2015 is to identify those challenges and recommend the actions necessary to conserve wildlife in the District. As this plan shows, the tools and ability to improve the condition of wildlife populations in the District already exist. This expertise spans a variety of networks and partnerships that can be tapped as necessary.

SWAP 2015 is a community document designed for public use. It is a plan for the District as a whole—federal landowners, park managers, conservation organizations, legislators, business leaders, educators, and concerned individuals—not solely District government agencies. SWAP 2015 can provide a strong foundation and inspiration for anyone who seeks to conserve wildlife in the District. By itself, SWAP 2015 cannot guarantee the future of wildlife in the District, which has been—and will continue to be—under threat from many directions. However, it can help any agency or person who desires to undertake the necessary and important steps toward that goal.

# Chapter 2 Species of Greatest Conservation Need

## 2.1 District of Columbia Wildlife Diversity

Despite being a highly urbanized city, the District of Columbia has unexpectedly high wildlife diversity which is due, in part, to the wide variety of habitats found throughout the city and a large amount of undeveloped land. This chapter and the process used to select and rank SGCN for SWAP 2015. One hundred ninety-eight animal species have been listed as SGCN in SWAP 2015 (see Table 1). Thirty-seven species were removed and eighty-eight species were added as SGCN as a result of the selection process described in this chapter, which is based on 10 years of wildlife inventory and monitoring projects.

Table 1. Species of Greatest Conservation Need (SGCN) in the District of Columbia, 2005-2015

Taxa	SGCN 2005	SGCN 2015	Removed	Added
Birds	35	58	4	27
Mammals	11	21	2	12
Reptiles	23	17	6	0
Amphibians	16	18	2	4
Fish	12	12	4	4
Dragonflies & Damselflies	9	26	2	19
Butterflies	13	10	6	3
Bees	0	4	N/A	4
Mollusks	9	13	0	4
Crustaceans	19	22	6	9
Sponges	0	2	N/A	2
Total	147	208	32	89

### 2.1.1 Terrestrial Wildlife Diversity

The District has a substantial number of terrestrial animal species and diverse natural communities provide an extensive variety of habitat settings for wildlife. Twenty-four Habitat System support the terrestrial animal species including

central Appalachian dry oak-pine forests, Potomac River floodplains, and old-field meadows. Some species are habitat generalists, able to survive in many different conditions and to make use of many resources to meet their needs for survival. Other species are habitat specialists, needing specific habitat conditions and plant communities that can be rare in natural areas surrounded by urbanity.

Washington, D.C. is home to 19 amphibian species, 240 bird species, and 29 mammal species. Invertebrate diversity is more difficult to quantify. More than 2500 insect species have been identified in a local collection (Smithsonian 2002). A BioBlitz in Rock Creek Park in 2007 identified 154 insect species and 44 other invertebrates (National Geographic 2007). Many of these species, including all of the amphibians and all Odonata (dragonflies and damselflies), use both aquatic and terrestrial habitats for parts of their life cycle.

The District has notable native fauna including three nesting pairs of bald eagles, the rare and declining spotted turtle, the recently federally listed northern long-eared bat (listed as threatened), and recovering populations of American beaver. Recent reports of coyotes have also become prominent, as this predator begins to establish in urban settings.

### 2.1.2 Aquatic Wildlife Diversity

The District exhibits a wide range of aquatic habitats, which similarly drives the diversity of aquatic animals. Nine Habitat Systems support a diverse array of wildlife including perennial rivers and creeks, ephemeral streams, vernal pools, tidal wetlands, and submerged aquatic vegetation. Two major rivers flow through the District: the Potomac River and the Anacostia River. Tidal and non-tidal freshwater wetlands provide important wildlife habitat and critical ecological services by sequestering and transforming polluted runoff, controlling floods, moderating sediment delivery, promoting groundwater recharge, sequestering carbon, and protecting shorelines from erosion (Wohlgemuth 1991). Some wetlands remain saturated year round; others may evaporate during the dry season. Vernal pools are one type of seasonal wetland that is important to many specially adapted crustaceans, amphibians, insects, and plants occur only in vernal pools.

Washington, D.C. is home to 19 amphibian species, and many other species of birds, mammals, and reptiles. Aquatic habitats are important to invertebrate diversity as well. Freshwater mussels and snails, crayfish, sponges, aquatic crustaceans, and aquatic insects are all represented on Washington, D.C. is home to 19 amphibian species, and many other species of birds, mammals, and reptiles. Aquatic habitats are important to invertebrate diversity as well. Freshwater mussels and snails, crayfish, sponges, aquatic crustaceans, and aquatic insects are all represented on

Importantly, many of the species mentioned as notable native fauna make use of aquatic habitats as well as terrestrial habitats. Bald eagles and spotted turtles both nest on land, but use aquatic habitats to forage. Spotted turtles are primarily aquatic. Northern long-eared bats hunt for insects above streams in the evening. Beaver are ecosystem engineers that create ponds and forage on land. Other notable aquatic species include restored populations of American sand darters and American brook stickleback, which is endemic to the District.

### 2.1.3 Wildlife Ecology

#### Birds

Birds are adapting to the urban environment with nearly 20% of all known species living in cities (Aronson et al 2014). DDOE has recorded 256 bird species since 2005 and is home to an average of 230 species of birds annually. It is part of the Mid-Atlantic Flyway and serves as a stopover point for a large number during migration. More than 60 species breed in the District, and its rivers are wintering locations for thousands of waterfowl. The District became a U.S. Fish and Wildlife Service Urban Bird Treaty City in 2011.

#### Mammals

32 species of mammals have been observed in the District since 2005. Twenty-one species of mammals are listed as SGCN. Several taxonomic groups are represented, including bats. The northern long-eared bat has shown huge population declines as a result of white nose syndrome (WNS) and was recently listed as threatened under the Endangered Species Act. Some mammals found in the District are habitat generalists and are widespread, but even habitat generalists can be rare. Virginia opossum and Eastern chipmunk are both listed as SGCN. Habitat specialists are limited to locally appropriate habitat, which can make them more vulnerable to a host of threats. The only mammal that is currently managed in the District is the white-tailed deer.

#### Reptiles and Amphibians

DDOE has observed and recorded 21 reptile species and 19 amphibian species since 2005. These unique groups of species occupy both terrestrial and aquatic habitats in the District, making the taxa vulnerable to threats within both systems. Species in both groups are most frequently found in forested and freshwater wetland habitats. Some reptiles and amphibians found in the District are generalists and utilize a variety of habitats, while others are more specialized, making them more vulnerable to a host of threats. Emerging diseases such as ranavirus and snake fungal disease, threaten both amphibian and reptile

species, making them one of the selection criterion for the new SGCN. In the revised SWAP, 17 reptiles and 18 amphibians were listed as SGCN.

### Fish

Fish are a wellstudied group of animals in the District. They use a wide variety of aquatic habitats from the deep channel in the Potomac River to shallow vegetated wetlands and steep streams. There are 78 species of fish documented in the District. Many species are actively monitored as game fish or for restoration projects. The District is the upper limit of tidal waters on the Potomac River. Several species of anadromous fish, including striped bass, white perch, American shad, hickory shad, gizzard shad, blueback herring, and alewife, spawn in the Potomac and Anacostia Rivers and their tributaries.

### Invertebrates

Invertebrates use a wide variety of habitats in the District: tree canopy, forest floor, soil, air, groundwater, mudflats, riverbeds and more. The District has observed and recorded more than 65 species of invertebrates since 2005. Forty four insects, 13 mollusks, 22 crustaceans, and two sponges are listed as SGCN. The wide variety of invertebrate species makes it difficult to summarize their ecology, beyond mentioning their ubiquity in every habitat and their basis as the foundation of the food chain for most vertebrates.

## 2.2 What is an SGCN?

Element 1 requires that the District provide information on the distribution and abundance of species that are indicative of the diversity and health of the District, including low and declining populations. As such, the following section lists those species.

all types of wildlife species, including birds, mammals, reptiles, amphibians, fish, and invertebrates. The District is located such that it is a stopover point for many migratory species. Maintaining the integrity of migratory stopover points benefits the entire migration path of the species. Conserving habitats located within the District is

vital to supporting the efforts made by other states that share these migratory pathways.

Two endemic amphibian species, the Hellbender (*Amphibian*) and the Hellbender (*Stygobromus haydeni*), have been found only in the Rock Creek Valley. They are restricted to shallow groundwater communities in only five springs along Rock Creek (Pavek 2002). As endemic species, the District has the sole responsibility for ensuring their persistence. There are six federally threatened or endangered wildlife species protected by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884, as amended), with current or historical ranges that include the District. They include the northern long-eared bat, bog turtle, Atlantic sturgeon, shortnose sturgeon, dwarf crayfish, and the Hellbender. The District has no federally threatened or endangered amphibian or avian SGCN.

### 2.3 Selection Process for SGCN

The selection of SGCN for SWAP 2005 was made using the best possible information and expertise at the time. Over the past 10 years, DDOE Fisheries and Wildlife Division biologists have inventoried and monitored species identified as SGCN in the original plan, as well as other nongame species in the District. The resulting data was used as the primary source of information to assess species population trends to select SGCN for SWAP 2015.

#### 2.3.1 Millsap Process

Due to the variety of national, regional, and local data that was available for different taxa, each technical committee used several selection processes to select SGCN. The backbone of qualitative selection for most taxa was based on the process described in *Setting Priorities for the Conservation of Fish and Wildlife Species in Florida* (Millsap et al 1990). This monograph (henceforth referred to as Millsap) describes a ranking process for wildlife species developed by the Florida Game and Fresh Water Fish Commission. Millsap uses Biological Variables, Action Variables, and Supplemental Variables to score and rank species.

#### Biological Variables

- § Population size – Estimated number of adults throughout North America
- § Population trend – Overall trend throughout the Hellbender Valley in the last two decades
- § Range size – The area over which a species is distributed when most restricted

- § Distribution trend – Percent change (since European settlement) in the range occupied by the taxon
- § Population concentration – Degree to which populations congregate at specific locations
- § Reproductive potential for recovery – Ability of a species to recover from serious population declines
- § Ecological specialization – Degree to which the species is dependent upon environmental factors

Action Variables for the District

- § Distribution in the District
- § Population trend in the District
- § District population limits
- § Ongoing management activities in the District

Supplemental Variables

- § Population trend and/or Percent of Occupied Area (POA) of taxon in the District
- § Last documented
- § Range size/concentration throughout the District/POA
- § Impacted by known emerging disease
- § Habitat specialization within the District

Due to the limited geographic size of the District, variables were added to the Millsap selection process, which relies on national and regional data, to balance the process with local observations and trends. The Millsap criteria were augmented with the following variables: Distribution in the District, Population trend in the District, District population limits, Ongoing management activities in the District, Population trend and/or Percent of Occupied Area (POA) of taxon in the District, Last documented, Range size/concentration throughout the District/POA, Impacted by known emerging disease, and Habitat specialization within the District. The Millsap ranking process was used for birds, herpetofauna, mammals, and fish. Invertebrate selection relied upon regional and state data. See Appendices A-I for the variable scores and final ranks for birds, mammals, herpetofauna, and fish and for the criteria used to select dragonflies, damselflies, butterflies, bees, mussels, amphipods, copepods, and sponges.



### 2.3.3 Vertebrate SGCN Selection

#### Avian SGCN Selection

Species were sorted based on their aggregate Millsap score, ranging from the American woodcock (82) to the mallard (3) and Canada goose (3), which tied with the lowest scores. Ranked avian species were broken out into guilds based on habitat association. From these habitat guilds, those species with the highest ranking scores were selected as candidate SGCN for 2015.

#### Mammal SGCN Selection

Species were sorted based on their aggregate Millsap scores, ranging from the northern long-eared bat (85) to the southern bog lemming (32.7). Species with the highest ranking scores were selected as SGCN for 2015, with the lowest score for selection as SGCN set at 40.

#### Herpetofauna SGCN Selection

Species were sorted based on their aggregate scores ranging from the queen snake (89.9) to the eastern hognose snake (29). Species with the highest ranking Millsap scores were selected as SGCN for 2015. The lowest score for inclusion as SGCN for reptiles was 40 and the lowest score for inclusion as SGCN for amphibians was 50.

#### Fish SGCN Selection

Species were scored individually by biological, action variables, and supplemental variables. Biological scores ranged from 2 to 41.3 with a median of 4. Action scores ranged from 0 to 31 with a median of 10. Supplemental scores ranged from 10 to 19 with a median of 13.

SGCN above the median Millsap biological score (4) were considered for inclusion as SGCN. Action and supplemental scores from Millsap were used to exclude or include certain species with a good historical record or those considered to be stable within the District of Columbia. Conversely, species that are considered highly vulnerable but could not be scored due to lack of data, such as the bowfin, were included as SGCN. Multiple conservation assessments (IUCN Red List, federal listings, and ranks) were used to further identify SGCN.

### 2.3.4 Invertebrate SGCN Selection

#### Dragonfly and Damselfly SGCN Selection

Species were selected based on five criteria: occurrence data in the District (three or fewer locations since 2005), the NatureServe water rank S3 or lower (NatureServe Explorer 2015; Faber-Langendoen et al 2012), the regional rank (R3 or lower) (White et al 2014), listing as SGCN in Maryland (Ng & \$ %) · G K 5 D · i d X U h Y (unpublished, preliminary data), and listing as SGCN by the District in 2005. Species were listed if they met three of the five criteria. A few species were

included as SGCN if they met only two of the above criteria. These were included, based on expert opinion, as populations that are declining locally or are locally (but not regionally) rare or as species tied to rare endemic habitats with historical records in the District.

### Butterfly SGCN Selection

Species were selected based on five criteria: occurrence data in the District (3 or fewer locations since 2005), the NatureServe District rank S3 or lower, the BUHIF YGYFj Y`AUf m`Ub X`ghUhY`fUb`flG``cf``ckYfL 2015 SWAP update, or listing as SGCN by the District in 2005. Species were listed if they met two of the five criteria. A few species were included as SGCN based on regional or national rarity or decline, such as the monarch, and species that are targeted for conservation by the Mid-Atlantic states.

### Bee SGCN Selection

Species were listed if they met three criteria: a contemporary record in the District, an estimated state rank of S3 (Nature Serve rank adjusted by expert opinion), and proposed for listing as SGCN in Maryland in 2015 (only species whose range includes the District).

### Mussel SGCN Selection

The list of freshwater mussels is unchanged from SWAP 2005. No recent occurrence data exists.

### Amphipod SGCN Selection

Species were listed based on their global rank, state rank in the District and Maryland, the Maryland state endangered species list, species to be listed as SGCN by Maryland in 2015, and species listed as SGCN by the District in 2005.

### Copepod SGCN Selection

Species were listed if they were globally ranked G1-G3, District ranked S1-S3, a candidate species for listing under the Endangered Species Act, listed as SGCN by Maryland in 2015, or if records showed the species was limited to certain habitats.

Three crayfish are listed as SGCN. Species were included based on range maps from the *Maryland Key to the Crayfish of Maryland* (Swecker 2010). One species, Acuminate crayfish (*Cambarus acuminatus*), is also listed as an SGCN in Maryland.

Four terrestrial snails were added as SGCN. These were included based on recent discovery in the District (Steury and Pearce 2014), state rank in Maryland or Virginia, and proposed listing in Maryland in 2015. One aquatic snail, Appalachian springsnail (*Fontigena bottimeri*), remains listed.

### Sponge SGCN Selection

Two freshwater sponge species were added to the SWAP 2015. Freshwater sponges are extremely rare in the District, with few recorded occurrences in Rock Creek Park.

## 2.4 Prioritization Process for SGCN

Species selected as SGCN were ranked into a three-tiered system with the input from the technical committee members. The tiers are based on several factors, including the ability to implement species and habitat conservation strategies, available resources, estimated economic feasibility, and the expectation of a reasonable chance of improving conservation status.

### Tier 1: Management Species

- § Species observed in more than one location and/or in a variety of habitats
- § Habitat can be improved with management or other conservation efforts
- § Conservation efforts are economically feasible
- § High probability of successful improvement of habitat and species population

### Tier 2: Species Seen on Occasion

- § Recent observations exist, but the species is rarely recorded in formal surveys
- § Habitat may be improved with management or other conservation efforts
- § Conservation efforts are not as economically feasible
- § Lower probability of successful improvement of habitat and species population

### Tier 3: Historical Species

- § Reliable historical documentation, but there were no recent observations in the District
- § Habitat requirements may be lacking or nonexistent
- § Minimal probability of observation; species are listed mainly due to a case of incidental observation so that conservation actions can be applied if observed

## 2.5 SGCN Designations

Table 2 lists SGCN for the District. Highlights from the species listing process are described by taxa in this section

### Bird SGCN

Out of 213 species of birds, 58 ranked high enough to be considered SGCN. Species were selected using the Millsap criteria, with additional variables, such as regional species of conservation needs status (RSGCN), *2nd Atlas of the Breeding Birds of Maryland and the District of Columbia* (Ellison 2010), population trends, management in the District, and the *State of the Birds 2014* (North American Bird Conservation Initiative 2014) report. The American woodcock (*Scolopax minor*) was the highest ranked SGCN. Top ranked species were divided into associated habitat guilds. Species that were well documented and had a high chance of positive impacts through economically sound conservation actions were listed as Tier 1. Eastern meadowlark (*Sturnella magna*), grasshopper sparrow (*Ammodramus savannarum*), and bobolink (*Dolichonyx oryzivorus*) are all Tier 1 species that can benefit from meadow creation. The eastern screech-owl (*Megascops asio*) and red-headed woodpecker (*Melanerpes erythrocephalus*) are both Tier 2 species. They have recent records in the District and should be targeted for inventory, but not any formal conservation actions at this time. The eastern whippoorwill (*Caprimulgus vociferous*) is a cryptic goatsucker and Tier 3 species. Since there is only one record of detection since 2000, more research is needed to determine population status and trends.

### Mammal SGCN

Out of the 32 species of mammals, 21 ranked high enough to be considered SGCN through the scoring in Section 2.3.3 with additional resources such as NatureServe and other historical species accounts from the Smithsonian Museum Collections (Smithsonian National Museum of Natural History, 2015). The highest ranked species was the northern long-eared bat, scoring 85. Overall, bat species scored high in the ranking process, largely in part due to WNS, which hit the Northeast U.S. in 2007 and has decimated bat populations. All selected SGCN were placed in Tier 1. With ongoing monitoring and management, attempts can be made to recover the bat populations. Other mammals such as the northern short-tailed shrew (*Blarina brevicauda*), meadow vole (*Microtus pennsylvanicus*) and eastern cottontail rabbit (*Sylvilagus floridanus*) can benefit from habitat restoration and meadow creation. Aquatic mammals such as the northern river otter (*Lontra canadensis*) and American mink (*Neovison vison*) can be expected to benefit from wetland restorations and water quality improvement actions.

### Reptile and Amphibian SGCN

Out of the 21 species of reptiles and 19 species of amphibians, 17 and 18, respectively, ranked high enough to be considered SGCN. Species were scored

using the system described in Section 2.3.3, with additional resources such as NatureServe and other historical species accounts from the Smithsonian Museum Collections. The two highest ranked reptiles are the queen snake (*Regina septemvittata*) and the spotted turtle (*Clemmys guttata*). The highest ranked amphibians are the spotted salamander (*Ambystoma maculatum*) and the wood frog (*Lithobates sylvatica*). The majority of the species were selected to be in Tier 1 because they were expected to benefit from habitat management and restoration, such as stream restorations (incorporating vernal pool designs) and meadow creations. Tier 2 species included the marbled salamander (*Ambystoma opacum*) and the wood turtle (*Glyptemys insculpta*). Both species have been documented in recent years, but not with enough numbers to consider them a strong candidate for recovery. Tier 3 species included the green tree frog (*Hyla cinerea*) and the bog turtle (*Glyptemys muhlenbergii*). The green tree frog was documented calling in 2013 on one occasion. As the climate continues to change and become further unstable, it is expected to see shifts in species ranges such as in the case of the green tree frog. The bog turtle has not been documented in the city in recent history, but given its federal status as endangered, it remains an SGCN on the chance it is sighted.

#### Fish SGCN

Out of 78 species of fish, 12 ranked high enough to be considered SGCN. Species were scored using the Millsap criteria. Fish species with a high biological score were classified as SGCN, and species with high action or complementary scores were reevaluated as to their inclusion/exclusion as SGCN. Commonly occurring species, such as American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), and alewife (*Alosa pseudoharengus*), are listed as Tier 1 species. These species are the most likely to succeed from both conservation and a management aspect. Tier 2 included species that have rarely been encountered within the District. Bowfin (*Amia calva*) and shortnose sturgeon (*Acipenser brevirostrum*) are listed as Tier 2 species. The Atlantic sturgeon (*Acipenser oxyrinchus*), which is federally listed as endangered or threatened, received a Tier 3 rank due to its absence in the District. Species that have never been encountered but are not federally ranked were also included as Tier 3 species. These historical species include pearl dace (*Margariscus margarita*) and bridle shiner (*Notropis bifrenatus*). The inclusion of species that have never been encountered within the District was extrapolated from historical species maps of the area and expert opinion.

#### Invertebrate SGCN

Forty-three insects, 16 mollusks, 13 crustaceans, and two sponges are listed as SGCN. Species from several new taxa were added, including four bee species,

## Chapter 2 Species of Greatest Conservation Need

four terrestrial snails, two freshwater sponges, and three crayfish. Federally listed species known to occur in the District were ranked as Tier 1 species. Species that are targeted for regional conservation, such as the monarch (*Danaus plexippus*), and Baltimore checkerspot (*Euphydryas phaeton*) were also listed as Tier 1 species. Tier 2 included many species that should be targeted for inventory, but not any formal conservation actions. These include numerous dragonfly and damselfly species that have been observed rarely and many species in the newly added taxa (bees, crayfish, and sponges). Several Tier 3 species have never been encountered within the District or have not been encountered in more than 75 years, but they were included in case of discovery.

Table 2 District of Columbia Species of Greatest Conservation Need 2015 (Additions to SWAP 2015 are shown in green.)

Species	Common Name	Tier Priority
Birds		
<i>Aix sponsa</i>	Wood Duck	1
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	1
<i>Anas rubripes</i>	American Black Duck	1
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	3
<i>Botaurus lentiginosus</i>	American Bittern	2
<i>Cardellina canadensis</i>	Canada Warbler	2
<i>Catharus fuscescens</i>	Veery	1
<i>Certhia americana</i>	Brown Creeper	2
<i>Chaetura pelagica</i>	Chimney Swift	1
<i>Chordeiles minor</i>	Common Nighthawk	2
<i>Cistothorus palustris</i>	Marsh Wren	2
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	2
<i>Colinus virginianus</i>	Northern Bobwhite	3
<i>Dolichonyx oryzivorus</i>	Bobolink	1
<i>Egretta caerulea</i>	Little Blue Heron	1
<i>Empidonax traillii</i>	Willow Flycatcher	1
<i>Euphagus carolinus</i>	Rusty Blackbird	1
<i>Falco peregrinus</i>	Peregrine Falcon	1
<i>Falco sparverius</i>	American Kestrel	1
<i>Gallinago delicata</i>	Wilson's Snipe	1
<i>Geothlypis formosa</i>	Kentucky Warbler	2
<i>Haliaeetus leucocephalus</i>	Bald Eagle	2
<i>Helmitheros vermivorum</i>	Worm-eating Warbler	2
<i>Hylocichla mustelina</i>	Wood Thrush	1
<i>Icteria virens</i>	Yellow-breasted Chat	2

Chapter 2 Species of Greatest Conservation Need

Species	Common Name	Tier Priority
<i>Icterus galbula</i>	Baltimore Oriole	1
<i>Ixobrychus exilis</i>	Least Bittern	3
<i>Megascops asio</i>	Eastern Screech-Owl	2
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	2
<i>Mniotilta varia</i>	Black-and -white Warbler	1
<i>Nyctanassa violacea</i>	Yellow-crowned Night Heron	1
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	1
<i>Parkesia motacilla</i>	Louisiana Waterthrush	1
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	1
<i>Piranga olivacea</i>	Scarlet Tanager	1
<i>Porzana carolina</i>	Sora	2
<i>Progne subis</i>	Purple Martin	1
<i>Protonotaria citrea</i>	Prothonotary Warbler	2
<i>Rallus limicola</i>	Virginia Rail	2
<i>Scolopax minor</i>	American Woodcock	1
<i>Seiurus aurocapilla</i>	Ovenbird	1
<i>Setophaga caerulea</i>	Black-throated Blue Warbler	1
<i>Setophaga castanea</i>	Bay-breasted Warbler	2
<i>Setophaga cerulea</i>	Cerulean Warbler	2
<i>Setophaga citrina</i>	Hooded Warbler	1
<i>Setophaga discolor</i>	Prairie Warbler	1
<i>Setophaga fusca</i>	Blackburnian Warbler	1
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	2
<i>Setophaga virens</i>	Black-throated Green Warbler	1
<i>Spizella pusilla</i>	Field Sparrow	1
<i>Sterna forsteri</i>	Forster's Tern	2
<i>Sturnella magna</i>	Eastern Meadowlark	1
<i>Toxostoma rufum</i>	Brown Thrasher	1
<i>Tringa flavipes</i>	Lesser Yellowlegs	2
<i>Vermivora chrysoptera</i>	Golden -winged Warbler	1
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	2
<i>Vireo flavifrons</i>	Yellow-throated Vireo	2
<i>Vireo griseus</i>	White-eyed Vireo	1
Mammals		
<i>Myotis septentrionalis</i>	Northern Long-Eared Bat	1
<i>Myotis leibii</i>	Eastern SmallFooted Bat	1
<i>Myotis lucifugus</i>	Little Brown Bat	1
<i>Perimyotis subflavus</i>	Tricolored Bat	1
<i>Lontra canadensis</i>	Northern River Otter	1
<i>Mephitis mephitis</i>	Striped Skunk	2

## Chapter 2 Species of Greatest Conservation Need

Species	Common Name	Tier Priority
<i>Lasiurus cinereus</i>	Hoary Bat	1
<i>Nycticeius humeralis</i>	Evening Bat	1
<i>Neovison vison</i>	American Mink	2
<i>Lasiurus borealis</i>	Eastern Red Bat	1
<i>Ondrata zibethicus</i>	Muskrat	1
<i>Eptesicus fuscus</i>	Big Brown Bat	1
<i>Lasionycteris noctivagans</i>	Silver Haired Bat	1
<i>Castor canadensis</i>	Beaver	2
<i>Tamias striatus</i>	Eastern Chipmunk	1
<i>Glaucomys volans</i>	Southern Flying Squirrel	1
<i>Urocyon cinereoargenteus</i>	Gray Fox	1
<i>Didelphis virginiana</i>	Virginia Opossum	1
<i>Blarina brevicauda</i>	Northern Shorttailed Shrew	1
<i>Microtus pennsylvanicus</i>	Meadow Vole	1
<i>Sylvilagus floridanus</i>	Eastern Cottontail	1
Reptiles		
<i>Agkistrodon contortrix</i>	Northern Copperhead	1
<i>Carphophis amoneous</i>	Eastern Worm Snake	1
<i>Chrysemys picta picta</i>	Eastern Painted Turtle	1
<i>Clemmys guttata</i>	Spotted Turtle	1
<i>Crotalus horridus</i>	Timber Rattlesnake	3
<i>Diadophis punctatus</i>	Northern Ringneck Snake	1
<i>Glyptemys insculpta</i>	Wood Turtle	2
<i>Glyptemys muhlenbergii</i>	Bog Turtle	3
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	1
<i>Opheodrys aestivus</i>	Rough Green Snake	1
<i>Plestidon faciatus</i>	Five-lined Skink	1
<i>Pseudemys rubriventris</i>	Eastern Redbelly Turtle	1
<i>Regina septemvittata</i>	Queen Snake	1
<i>Sternotherus odoratus</i>	Common Musk Turtle	1
<i>Storeria dekayi dekayi</i>	Northern Brown Snake	1
<i>Terrepene carolina carolina</i>	Eastern Box Turtle	1
<i>Thamnophis sirtalis</i>	Eastern Garter Snake	1
Amphibians		
<i>Ambystoma maculatum</i>	Spotted Salamander	1
<i>Ambystoma opacum</i>	Marbled Salamander	2
<i>Anaxyrus americanus</i>	American Toad	1
<i>Anaxyrus fowleri</i>	Fowler's Toad	1
<i>Desomognathus fuscus</i>	Northern Dusky Salamander	1
<i>Eurycea bislineata</i>	Northern Twolined Salamander	1



Chapter 2 Species of Greatest Conservation Need

Species	Common Name	Tier Priority
<i>Hyla chrysoscelis</i>	Cope's Gray Tree Frog	1
<i>Hyla cinerea</i>	Green Tree Frog	3
<i>Hyla versicolor</i>	Gray Tree Frog	1
<i>Lithobates clamitans</i>	Green Frog	1
<i>Lithobates palustris</i>	Pickerel Frog	1
<i>Lithobates sphenoccephalus</i>	Southern Leopard Frog	1
<i>Lithobates sylvatica</i>	Wood Frog	1
<i>Notopthalmus viridescens</i>	Eastern Newt	1
<i>Plethodon cinereus</i>	Redback Salamander	1
<i>Pseudacris crucifer</i>	Northern Spring Peeper	1
<i>Pseudacris feriarum</i>	Upland Chorus Frog	1
<i>Pseudotriton ruber</i>	Northern Red Salamander	1
Fish		
<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	2
<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	3
<i>Alosa aestivalis</i>	Blueback Herring	1
<i>Alosa mediocris</i>	Hickory Shad	1
<i>Alosa pseudoharengus</i>	Alewife	1
<i>Alosa sapidissima</i>	American Shad	1
<i>Ameriurus nebulosus</i>	Brown Bullhead	1
<i>Amia calva</i>	Bowfin	2
<i>Anguilla rostrata</i>	American Eel	1
<i>Margariscus margarita</i>	Pearl Dace	3
<i>Morone saxatilis</i>	Striped Bass	1
<i>Notropis bifrenatus</i>	Bridle Shiner	3
Dragonflies and Damselflies		
<i>Anax longipes</i>	Comet Darner	2
<i>Archilestes grandis</i>	Great Spreadwing	1
<i>Argia sedula</i>	Blue-ringed Dancer	2
<i>Argomphus villosipes</i>	Unicorn Clubtail	1
<i>Cordulegaster erronea</i>	Tiger Spiketail	1
<i>Enallagma aspersum</i>	Azure Bluet	2
<i>Enallagma basidens</i>	Double -striped Bluet	2
<i>Enallagma divagans</i>	Turquoise Bluet	1
<i>Enallagma traviatum</i>	Slender Bluet	2
<i>Erpetogomphus designatus</i>	Eastern Ringtail	2
<i>Gomphus exilis</i>	Lancet Clubtail	2
<i>Gomphus vastus</i>	Cobra Clubtail	2
<i>Hagenius brevistylus</i>	Dragonhunter	1
<i>Ischnura kellicotti</i>	Lilypad Forktail	1

## Chapter 2 Species of Greatest Conservation Need

Species	Common Name	Tier Priority
<i>Ischnura ramburii</i>	Rambur's Forktail	2
<i>Lestes forcipatus</i>	Sweetflag Spreadwing	2
<i>Lestes inaequalis</i>	Elegant Spreadwing	2
<i>Nasiaeschna pentacantha</i>	Cyrano Darner	1
<i>Nehalennia gracilis</i>	Sphagnum Sprite	3
<i>Nehalennia irene</i>	Sedge Sprite	3
<i>Neurocordulia obsoleta</i>	Umber Shadowdragon	2
<i>Somatochlora filosa</i>	Fine-lined Emerald	3
<i>Somatochlora linearis</i>	Mocha Emerald	1
<i>Somatochlora tenebrosa</i>	Clamp -tipped Emerald	2
<i>Stylogomphus albistylus</i>	Eastern Least Clubtail	2
<i>Stylurus plagiatus</i>	Russettipped Clubtail	1
Butterflies		
<i>Callophrys irus</i>	Frosted Elfin	3
<i>Danaus plexippus</i>	Monarch	1
<i>Euphydryas phaeton</i>	Baltimore Checkerspot	1
<i>Hesperia leonardus</i>	Leonard's Skipper	1
<i>Lycaena hyllus</i>	Bronze Copper	2
<i>Polites origenes</i>	Crossline Skipper	1
<i>Pompeius verna</i>	Little Glassywing	3
<i>Satyrrium edwardsii</i>	Edwards' Hairstreak	3
<i>Speyeria cybele</i>	Great Spangled Fritillary	2
<i>Speyeria idalia</i>	Regal Fritillary	2
Bees		
<i>Bombus affinis</i>	Rustypatched Bumble Bee	2
<i>Lasioglossum michiganense</i>	A Sweat Bee	2
<i>Protandrena abdominalis</i>	A Mining Bee	2
<i>Pseudopanurgus virginicus</i>	A Slender Tricolor Mining Bee	2
Mussels and Snails		
<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	3
<i>Alasmidonta undulata</i>	Triangle Floater	2
<i>Alasmidonta varicosa</i>	Brook Floater	2
<i>Anguispira fergusonii</i>	Coastal -plain Tigersnail	2
<i>Anodonta implicata</i>	Alewife Floater	2
<i>Fontigens bottimeri</i>	Appalachian Springsnail	3
<i>Lampsilis cariosa</i>	Yellow Lampmussel	2
<i>Lasmigona subviridis</i>	Green Floater	2
<i>Leptodea ochracea</i>	Tidewater Mucket	2
<i>Ligumia nasuta</i>	Eastern Pondmussel	2
<i>Oxyloma effusum</i>	Coastal -plain Ambersnail	2

Species	Common Name	Tier Priority
<i>Oxyloma subeffusum</i>	Chesapeake Ambersnail	2
<i>Stenotrema barbatum</i>	Bristled Slitmouth	2
Crustaceans		
<i>Acanthocyclops columbiensis</i>	Copepod sp.	1
<i>Attheyella (Mrazekiella) carolinensis</i>	Copepod sp.	2
<i>Attheyella (Mrazekiella) obatogamensis</i>	Copepod sp.	2
<i>Attheyella (Mrazekiella) spinipses</i>	A harpacticoid copepod	2
<i>Bryocamptus zschokkei alleganiensis</i>	Copepod sp.	2
<i>Bryocamptus (Bryocamptus) hutchinsoni</i>	Copepod sp.	2
<i>Bryocamptus (Bryocamptus) minutus</i>	Copepod sp.	2
<i>Bryocamptus (Limocamptus) nivalis</i>	Copepod sp.	2
<i>Cambarus acuminatus</i>	Acuminate crayfish	2
<i>Cambarus diogenes</i>	Devil Crawfish	2
<i>Cambarus dubius</i>	Upland Burrowing Crayfish	2
<i>Diacyclops harryi</i>	Copepod sp.	2
<i>Diacyclops navus</i>	Copepod sp.	2
<i>Eucyclops elegans</i>	Copepod sp.	2
<i>Macrocyclus albidus</i>	Copepod sp.	2
<i>Paracyclops poppei</i>	Copepod sp.	2
<i>Skistodiaptomus pallidus</i>	A calanoid copepod	2
<i>Stygobromus hayi</i>	Hay's Spring Amphipod	1
<i>Stygobromus kenki</i>	Kenk's Amphipod	1
<i>Stygobromus pizzinii</i>	Pizzini's Cave Amphipod	2
<i>Stygobromus sextarius</i>	Capital Area groundwater amphipod	2
<i>Stygobromus tenuis potomacus</i>	Potomac Groundwater Amphipod	1
Sponges		
<i>Ephydatia sp.</i>	A Freshwater Sponge	2
<i>Spongilla sp.</i>	A Freshwater Sponge	2

## 2.6 Changes from SWAP 2005

The large amount of data collected from the surveying species in the District drove the addition and removal of a number of species to the 2015 SGCN list. Species were removed or added for a variety of reasons. Species were removed if recent occurrence data indicated that the species populations were secure or if historical and contemporary data showed that the species had been extirpated long-term. Other species were removed if there were no records of

## Chapter 2 Species of Greatest Conservation Need

that species ever existed in the District. See Table 3 for a complete list of the species that were removed and why.

Species were scored based on the Millsap ranking criteria where recent local or regional data suggested declining populations or new data was available for species that were not assessed in 2005. Finally, some new taxa (bees, terrestrial snails, crayfish, and sponges) have been added based on local and regional data and conservation goals.

Table 3 SGCN Removed from SWAP 2015

Species	Common Name	Reason for Removal
Birds		
<i>Bubo virginianus</i>	Great Horned Owl	District and regional populations stable and increasing
<i>Buteo lineatus</i>	Red-shouldered Hawk	
<i>Buteo platypterus</i>	Broad-winged Hawk	No longer breeding in District, uncommon migrant
<i>Empidonax virescens</i>	Acadian Flycatcher	District and regional populations stable and increasing
Mammals		
<i>Neotoma magister</i>	Allegheny Woodrat	No historical records of ever being documented in the city
<i>Synaptomys cooperi</i>	Southern Bog Lemming	No historical records of ever being documented in the city
Reptiles		
<i>Thamnophis sauritus</i>	Eastern Ribbon Snake	No current records of occurrence
<i>Elaphe guttata</i>	Corn Snake	No current records of occurrence
<i>Cemophora coccinea</i>	Scarlet Snake	No current records of occurrence
<i>Sceloporus undulatus</i>	Eastern Fence Lizard	No current records of occurrence
<i>Heterodon platirhinos</i>	Eastern Hognose Snake	No current records of occurrence
<i>Coluber constrictor</i>	Black Racer	No current records of occurrence
Amphibians		
<i>Acris crepitans</i>	Cricket Frog	No current records of occurrence
<i>Pseudotriton montanus</i>	Mud Salamander	No historical records of ever being documented in the city
Fish		
<i>Campostoma anmalum</i>	Central Stoneroller	District and regional populations stable and increasing
<i>Ericymba buccata</i>	Silverjaw Minnow	
<i>Etheostoma blennioides</i>	Greenside Darter	
<i>Lepomis gulosus</i>	Warmouth	

## Chapter 2 Species of Greatest Conservation Need

Species	Common Name	Reason for Removal
Dragonflies and Damselflies		
<i>Lestes dryasa</i>	Emerald Spreadwing	No historical records of ever being documented in the city
<i>Tachopteryx thoreyi</i>	Grey Petaltail	No historical records of ever being documented in the city
Butterflies		
<i>Erynnis martialis</i>	Mottled Duskywing	No historical records of ever being documented in the city
<i>Euptoieta claudia</i>	Variegated Fritillary	District and regional populations stable and increasing
<i>Polygonia comma</i>	Eastern Comma	
<i>Polygonia interrogationis</i>	Question Mark	
<i>Pyrgu wyandot</i>	Appalachian Grizzled Skipper	No historical records of ever being documented in the city
<i>Vanessa atalanta rubria</i>	Red Admiral	District and regional populations stable and increasing
Bees		
N/A		
Mollusks		
None removed		
Crustaceans		
<i>Acanthocyclops villosipes</i>	Copepods	Questions about taxonomy
<i>Attheyella villosipes</i>		
<i>Attheyella (Canthocamptus) illinoisensis</i>		No recent or established trends or overall threats to this species/group
<i>Attheyella (Mrazekiella) illinoisensis</i>		
<i>Attheyella (Mrazekiella) obatogamen</i>		
<i>Paracyclops fimbriatus chiltoni</i>		
Sponges		
None removed		

# Chapter 3 Habitats

## 3.1 Introduction

The District is a fully developed urban city that also contains significant wildlife habitat in its parks and other natural areas. There are dense commercial areas, moderately dense suburban areas, and two large rivers, all located directly adjacent to permanently protected natural areas. The dichotomy between developed areas and undeveloped habitats, coupled with the small total area of the District, creates a unique dynamic between wildlife and habitat conservation and human use of local natural areas. It also presents opportunities to view and study the urban and suburban parts of the District as integral components of the habitats that SGCN require. District includes more than 900 acres of city parks and more than 6,700 acres of national parkland (District of Columbia Office of Planning 2006). While it can be difficult for humans and wildlife to coexist within the borders of one city, the early protection of large areas of the city (Rock Creek Park in 1890 and Fort Circle Parks in 1925) and the location of the city at the geographic fall line has led to an unexpectedly wide diversity of wildlife and habitats. This combination of developed and natural areas leads to interesting dynamics in terms of the interface between humans and wildlife.

Habitat type is ultimately driven by abiotic factors such as soil and climate. This section provides brief descriptions of abiotic factors that underlay the vegetative habitats of the District. The District is bisected by two physiographic regions, which define and influence the local habitat context. The geologic fall line separates the Appalachian Piedmont region and the Mid-Atlantic coastal plain. This fall line marks a boundary between the two regions. Soils, geography, topography, and hydrology support a variety of plant communities that provide habitat for animal wildlife. This chapter identifies these habitats, provides an assessment of their condition, and details the selection of key habitat areas (Conservation Opportunity Areas) that will be the targets of direct conservation actions. In the context of this plan, habitat is defined as the place where an animal normally lives or spends time while it is present in the District. This includes broad categories such as river or forest, specific natural and semi-natural vegetative communities, and developed areas that may support some wildlife.

### 3.1.1 Local Context

Habitat type is ultimately driven by abiotic factors such as soil and climate. This section provides brief descriptions of abiotic factors that underlay the vegetative habitats of the District.

The District is bisected by two physiographic regions, which define and influence the local habitat context. The geologic fall line separates the Appalachian Piedmont region and the Mid-Atlantic coastal plain. This fall line marks a

transitional zone where the sedimentary rock, softer soils, and sloping hills of the coast intersect with more resilient, steeper, metamorphic rocks of the piedmont. This split provides an increased variety of habitats and the animal species associated with those habitats. The physiographic regions are further classified into smaller ecoregions based on both abiotic and biotic factors. An ecoregion is defined by the World Wildlife Fund as a large area of land or water that contains a geographically distinct assemblage of natural communities that share a large majority of species and ecological dynamics, share similar environmental conditions, and interact ecologically in ways that are critical for longtime persistence. They can also be described as a composition of biotic and abiotic phenomena, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology, that affect or reflect differences in ecosystem quality and integrity (Wiens 1986; Omernik 1987, 1995).

The Environmental Protection Agency (EPA) created a hierarchical categorization of ecoregions with four levels of detail. The level III and IV ecoregions for the Mid-Atlantic states are shown in Figure 1. Above the fall line, the western part of the District is in the EPA level III Ecoregion 64: Northern Piedmont. The Northern Piedmont includes the foothills of the Appalachian Mountains in the Mid-Atlantic region. It extends from Virginia to northern New Jersey and covers approximately 66,491 square kilometers in total. The region is bordered by Mid-Atlantic coastal plain to the east and the Appalachian Mountains to the west. From the geographic fall line at approximately 60 meters elevation, the Piedmont extends west to the Blue Ridge and the Ridge and Valley regions of the Appalachian Mountains, reaching elevations of 300–600 meters. The topography of the Piedmont is descending rolling hills and the soils and underlying bedrock are composed of erosion-resistant igneous and metamorphic rock (Kearney 2003). Below the fall line the eastern part of the District is in the EPA level III Ecoregion 65: Southeastern Plains. This section of the Mid-Atlantic coastal plain extends into Virginia, Maryland, Delaware, Pennsylvania and New Jersey and it covers approximately 56,220 square kilometers. The region is bordered by the Atlantic Ocean to the east and the Piedmont to the west. The region exists as a result of alluvial deposition of eroded rock and clay from the Piedmont and Appalachian mountains. Steep, high energy rivers that arise in the Appalachian Mountains slow down below the fall line and release sediment onto the Coastal Plain. The lowlying plain begins at an elevation of less than 80 meters and extends down to sea level. The lowest elevations are characterized by bays and tidal rivers, such as the Chesapeake Bay and Potomac River. The soils are primarily derived from the slow-draining clay sediments deposited from the mountains, leading to the development of many types of expansive wetlands (Watts 1999).

In 1995, Bailey provided descriptions of the ecoregions of the U.S. Forest Service classification system (McNab and Avers 1994, Bailey 1995). The Nature

## Chapter 3 Habitats

Congressional planning effort (Groves 2002). The District falls within two Bird Conservation Regions: the Piedmont (BCR #29) and the England/Mid-Atlantic Coast (BCR #30) (Kearney 2003, Watts 1999).

The District shares these ecoregions with the surrounding states of the Mid-Atlantic region, including Maryland, Virginia, Pennsylvania, and New Jersey, making the District geographically similar to those states. This has many important implications for conservation planning. Issues important to habitats within the District are also important to the surrounding states. Therefore, coordination with those states should be a central component to developing conservation strategies.

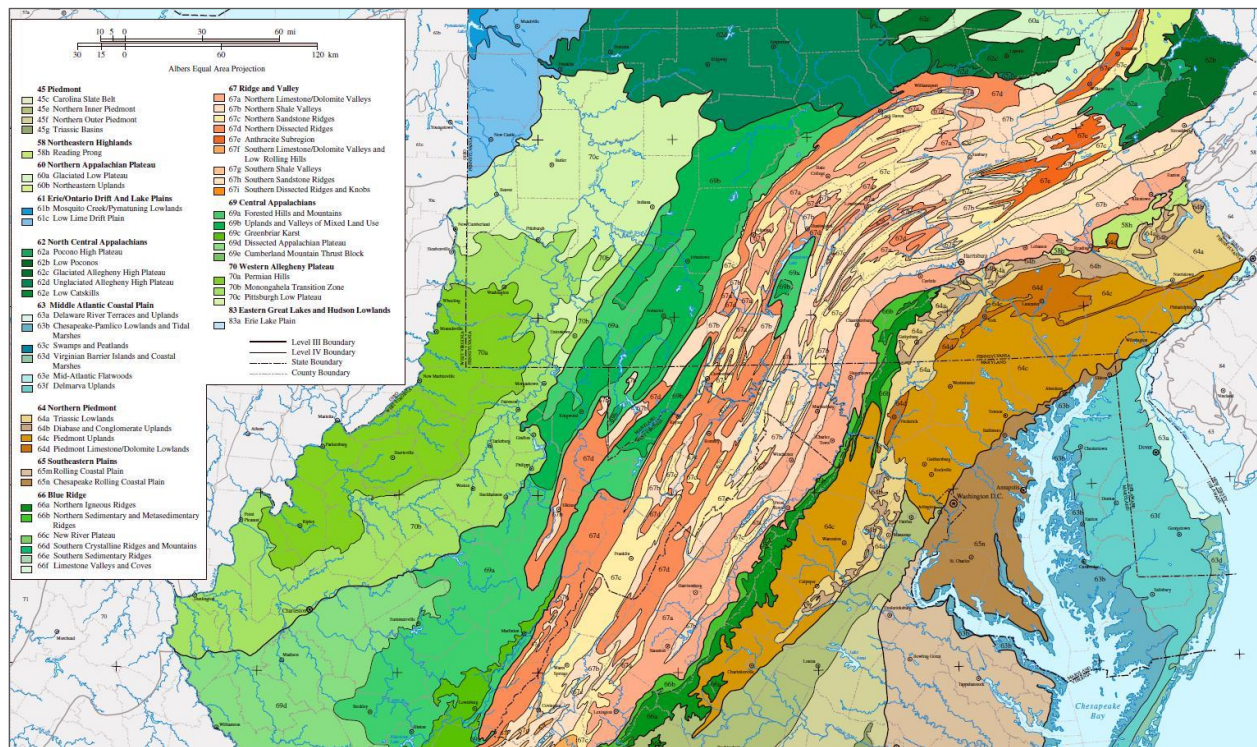


Figure 1 @ Y j Y ` ` = = = ` U b X ` = J ` 9 Wc f Y [ ] c b g ` Z f c a ` h \ Y ` 9 b j ] f c b a hierarchical classification system. (EPA Western Ecology Division, 2015)



### 3.1.2 Northeast Regional Context

The District is part of the northeastern U.S. region that extends from Maine to Virginia. From the NE Regional SynthesisThe Northeast is over 60% forested, with an average forest age of 60 years, and contains more than 200,000 miles of rivers and streams, 34,000 water bodies, and more than 6 million acres of wetlands. Eleven globally unique habitats, from sandy barrens to limestone glade, support 2,700 restricted rare species. Habitat fragmentation is one of the greatest challenges to regional biodiversity, as the region is crisscrossed by over 732,000 miles of roads. The region also has the highest density of dams and other obstacles to fish passage in the country with an average of seven dams and 106 road-stream crossings per 100 miles of river (Martin and Ap 2011). Conversion to human use has also impacted much of the Northeast landscape, with one-third of forested land and one-quarter of wetlands already converted to other uses through human activity. Total wetland area has expanded slightly in the Northeast over the past twenty years, although 87% of wetlands are close to roads and thus have likely experienced some form of disruption, alteration, or species loss.

Many of the threats described above are directly applicable at the finest scale to wildlife habitat in the District. Habitat conditions in the District can serve a proxy for future conditions across the northeast region as human-dominated land uses continue to encroach upon undeveloped wildlife habitat.

## 3.2 Process for Defining and Describing Habitats

Vegetative habitats were classified using the Northeast Lexicon and the Northeastern Terrestrial Wildlife Habitat Classification System (Gawler 2008). Aquatic habitats are based loosely on the Northeastern Aquatic Habitat Classification System (Olivero and Anderson 2008).

The Northeast Terrestrial Habitat Classification System (NETHCS) was developed in 2008 to provide a coarse but cohesive system to describe the physical and biological characteristics relevant to wildlife conservation (Gawler 2008). The Habitat System corresponds to the ecological system units developed by NatureServe (Comer et al 2003) which occur in the Northeast, with additional systems for altered habitats and land use types. The hierarchical system uses the terms Formation, Macrogroup and Habitat System (Table 4) as increasingly fine grained categories of habitat types. The system includes 7 Formation Classes at the top level, 15 Formations in the second tier, 35 Macrogroups in the third tier and 143 Habitat Systems (Crisfield and NEFWDC 2013). In this plan the terrestrial habitat types are classified to the Habitat System level, although some finer scale plant associations are called out in the descriptions of unique habitats.

The Northeastern Aquatic Habitat Classification System was developed to create a standard classification system that describes freshwater aquatic systems, particularly rivers and streams, across the northeastern United States. The goal of the classification system is to consistently represent the natural flowing-water aquatic habitat types across this region in a manner deemed appropriate and useful for conservation planning by the participating states. The system is meant to unify state classifications and promote an understanding of the hierarchical system uses Drainage Area, Gradient, Buffering Capacity, and Temperature to classify streams. Drainage Area is a measure of river or stream size, which is a critical factor determining the aquatic animal community. Gradient affects the morphology and substrate of the stream bed, and the velocity of the water. Buffering Capacity is a measure of the stream's ability to resist changes in pH due to underlying soils and bedrock, which influences the pH of the stream. Acidic water can be detrimental to the health of fish and other organisms (Allan 1995). Aquatic organisms are also limited by stream temperature for successful reproduction and overall survival. Non-vegetated intertidal aquatic habitats are from the NETHCS. Other aquatic habitats include freshwater ponds, reservoirs, riverine ponds, vernal pools, and springs and seeps.

Table 4 Formations and Macrogroups Comprising the Northeast Terrestrial Wildlife Habitat Classification System from *The Northeast Lexicon* (Crisfield and NEFWDT 2013)

Formation Class	Formation Name	Macrogroup	
Forest and Woodland	Southeastern Upland Forest	Longleaf Pine	
	Northeastern Upland Forest		Southern Oak-Pine
			Central Oak -Pine
			Northern Hardwood & Conifer
			Plantation and Ruderal Forest
			Exotic Upland Forest
	Northeastern Wetland Forest		Southern Bottomland Forest
			Coastal Plain Swamp
			Central Hardwood Swamp
			Northeastern Floodplain Forest
	Boreal Upland Forest		Northern Swamp
			Boreal Wetland Forest
			Boreal Forested Peatland
	Shrubland and Grassland	Grassland and Shrubland	
			Outcrop & Summit Scrub
			Lake & River Shore
			Ruderal Shrubland & Grassland
Coastal Scrub-Herb			Coastal Grassland & Shrubland
Peatland			Northern Peatland
			Coastal Plain Peatland
			Central Appalachian Peatland
Freshwater Marsh			Coastal Plain Pond
			Emergent Marsh
			Wet Meadow / Shrub Marsh
			Modified / Managed Marsh
Salt Marsh			Salt Marsh
Polar and High Montane	Alpine	Alpine	
Aquatic (in part)	Intertidal	Intertidal Shore	
Sparsely Vegetated Rock	Cliff and Rock		Cliff and Talus
			Flatrock
			Rocky Coast
Agricultural	Agricultural	Agricultural	
Developed	<i>No name provided</i>		Maintained Grasses and Mixed Cover
			Urban/Suburban Built
			Extractive

### 3.3 Habitat Descriptions

The District of Columbia is 68 square miles in total area. It is 78% developed land; 10% open water; and 12% undeveloped forest, shrubland, or grassland (Table 5). The District is located at the geographic fall line between the Appalachian piedmont and Atlantic coastal plain. Two tidal rivers, the Anacostia and Potomac, converge in the District. Developed land makes up the largest proportion of the District. This includes industrial and commercial areas, roads and other paved areas, residential areas, and mowed grasslands such as athletic fields and roadside right-of-way. The forests in the District are in the Northeastern Upland Forest and Northeastern Wetland Forest Formations. Most forested areas are found in National Park land in Rock Creek Park, National Capital Parks-East and Chesapeake and Ohio National Historical Park. Shrublands, emergent wetlands, and meadows are typically found in these parks as well. The natural areas in the District include a broad range of habitat types, including a globally rare plant community (Gravel Terrace Fall-Line Magnolia Bog) and the diverse ice-scour forest communities of the Potomac Gorge ecosystem. The Anacostia and Potomac Rivers make up a large portion of the open water of the District and several medium and small-sized creeks are tributaries of both larger water bodies. Rock Creek is a tributary of the Potomac River, while Oxon Run, Watts Branch and many other creeks are tributaries of the Anacostia River.

#### Soils

Most soils have been altered by development or dredge/fill operations, but much of the soils in parks remain undisturbed. Soils types are influenced by the geologic history of the Piedmont and Coastal Plain. Soils of the Piedmont are underlain by bedrock. Erosion and weathering of the bedrock contribute to the soil type. Soils of the Coastal plain are the result of the geologic erosion and weathering of the softer stone of the Appalachian Mountains, and by the most extreme southerly glaciation of past ice ages. Silty loams dominate the piedmont soils, while sandy, gravelly soils dominate the higher elevations of the Coastal Plain. Low elevations of the coastal plain are typically clayey soils. Low elevations of the Potomac Gorge area are dominated by boulder-underlain Fluvaquent soils. Low elevations along the Anacostia River are nearly 100% altered. Udothent soils, dominated by coarse textured soil materials, silt and loam, often severely compacted (Smith 1976).

#### Climate

The District has a humid subtropical climate, with hot humid summers and cold winters. Average precipitation is 39.7 inches per year, and the mean annual temperature is 58.2 degrees Fahrenheit. The warmest month is July and

the coldest month is January Average monthly precipitation is 3.2 inches, and the wettest month is May and the driest month is January (NOAA 2014) Severe weather can include hurricanes, winter blizzards and ice storms, riverine flooding, and high wind events.

Table 5 Area and Percent of Developed Land and Habitat Areas in the District Categorized by Formation Class from the Northeast Terrestrial Wildlife Habitat Classification System

Formation Class	Acres	Hectares	Percent
Water	4,573.4	1,850.8	10.4
Developed Land	34,162.0	13,823.3	77.8
Forest and Woodland	4,728.7	1,913.6	10.8
Shrubland and Grassland	440.6	178.3	1.0
Total	43,904.6	17,766.0	100.0

Figure 2 District of Columbia habitat formation map.

### 3.3.1 Critical Habitat and Vegetation Systems

In the Land Use/Habitat Formation map (see Figure 2), the natural vegetation types are Northeastern Upland Forest, Northeastern Wetland Forest, and Shrubland and Grassland. These areas represent locations where the best wildlife habitats can be found in the District. The variety of vegetation types within these formations is detailed below. Describing these habitats wildlife in







































































































































































































































































































































































