



Wetlands and Resident Canada Goose

Management Plan/Environmental Impact Statement





Draft Anacostia Park Wetland and Resident Goose Management Plan / Environmental Impact Statement



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National Park Service
U.S. Department of the Interior
National Capital Parks-East
1900 Anacostia Dr. SE
Washington, D.C. 20020

EXECUTIVE SUMMARY

PURPOSE AND NEED FOR ACTION

The purpose of this plan is to guide and direct the actions of the National Park Service (NPS) in the management of wetlands and resident (non-migratory) Canada geese at Anacostia Park. To satisfy National Environmental Policy Act (NEPA) requirements, the plan will be implemented through the environmental impact statement (EIS), which will facilitate the protection of wetland functions within the park. The NEPA of 1969 process was conducted in accordance with the NPS regulations for implementing NEPA, and it examined the consequences of the proposed management alternatives and the no action alternative on the environment. This plan/EIS will be an integrated tool designed to allow for the long-term planning and management for both wetlands and resident Canada geese at the park. The alternatives evaluated in this plan/EIS rely on the use of adaptive management to guide the implementation of the preferred alternative, which will consist of a series of techniques, available for use by the park to manage wetlands and resident Canada geese within the park. To satisfy NEPA requirements, this plan/EIS presents the alternatives considered during the NEPA process, the affected environment, the impacts associated with the proposed project, and the agency consultation and coordination conducted to support this project. Where NEPA analysis is suggested or required for site-specific management or techniques carried out under the guidance of this document, future analyses will “tier to” or reference this plan/EIS. Site-specific NEPA analysis, when required, will focus on issues, alternatives, and environmental effects unique to the project area, if not already discussed in this plan/EIS and subsequent record of decision (ROD), and may be categorically excluded, or documented in either an environmental assessment (EA) or an EIS, depending on the significance of the effects.

PARK SIGNIFICANCE AND DESIRED CONDITIONS

Anacostia Park is a part of the National Capital Parks – East unit of the NPS and encompasses approximately 1,300 acres along the banks of the Anacostia River in the District of Columbia and in Maryland. This plan/EIS includes only those lands within the current NPS jurisdiction of Anacostia Park. Historically, the NPS has worked in collaboration with other stakeholders concerned about the health of the watershed to restore nearly 100 acres of tidal wetlands along the Anacostia River. Over the past decade, an increasing number of resident Canada geese have been observed in the park. As a result of the growing resident Canada goose population, the tidal wetland restoration efforts within the park have been jeopardized by these grazing resident Canada geese. Two primary desired conditions (thresholds) have been defined in this plan/EIS. These desired conditions are directly linked to the purpose, need, and objectives of the plan/EIS as well as the objectives defined by the Anacostia River Watershed Environmental Condition and Restoration Overview. The desired conditions include the following:

- Wetland systems that are maintained, in a predominantly self-sustaining condition to deliver the best quality and quantity of wetland functions that reflect park goals and strategies, and
- A population of resident Canada geese that will not adversely impact the wetland habitats available at the park.

ALTERNATIVES CONSIDERED

The alternatives included in this plan/EIS are presented as a two-tiered approach, which includes techniques for wetland management and also for goose management. Wetland management includes the following elements: hydrology, vegetation, cultural/education, wetland restoration, and park operations. Goose management includes the following elements: lethal control (killing), habitat modification, scare and harassment, reproductive control, and cultural/education. Each of these elements is composed of

various management techniques such as erosion control, managing invasive species, and construction of new trails. Through internal scoping meetings and public comments received during the scoping process, the various management techniques were then packaged into four different management alternatives (alternatives B through E) to provide a maximum number of options. The No action alternative (alternative A) is also analyzed in this plan/EIS as a requirement of NEPA.

It is important to note that this plan/EIS attempts to present the entire suite of possible techniques for wetland management and for goose management regardless of constraints such as costs and feasibility. However, the type, number, and intensity of wetland management techniques and goose management techniques differ by alternative. The no action alternative (alternative A), includes management techniques that are currently occurring in the park. Alternatives B through E offer combinations of high and low intensity techniques for wetland and goose management, which are described fully in the alternatives chapter (chapter 2). Low intensity wetland and goose management represent the least number of techniques and the fewest locations available for the park to implement. High wetland and goose management represents the maximum number of techniques available to the park to implement and would be applied at the maximum level of effort and at numerous locations. The moderate to high intensity wetland and goose management would fall between the low and high intensity, depending on the alternative. Specifically, alternative B combines high wetland management with high goose management techniques (includes lethal control); alternative C combines high wetland management with moderate goose management techniques (includes lethal control); alternative D combines low wetland management with low goose management techniques (includes lethal control); and alternative E combines high wetland management with moderate goose management techniques (no lethal control).

ENVIRONMENTAL CONSEQUENCES

The majority of adverse impacts to resources are associated with the no action alternative (alternative A) and the majority of beneficial impacts to resources are associated with both alternative B (very high wetland management and very high goose management) and alternative C (high wetland management and moderate goose management). The majority of negligible impacts to resources are associated with alternative E (high wetland management and moderate goose management with no lethal control). The impacts as a result of alternative D (low wetland management and low goose management) are generally negligible to minor and adverse. The impact statements above are true for the following resources: soils, hydrology, water quality, floodplains, aquatic resources, terrestrial vegetation, and wildlife (not including resident Canada geese). There will be *No Effect* to species of special concern as a result of all alternatives (A through E).

The impacts to wetlands are expected to range from short-term to long-term, from negligible to moderate, and from beneficial to adverse, depending upon the selected alternative. Alternative A would have long-term moderate adverse impacts to wetlands because the resident Canada goose population would continue herbivory of wetland vegetation that is not fenced and no measures other than egg oiling would be taken to limit or control the resident Canada goose population under this alternative. A reduction in the abundance and diversity of wetland vegetation has already occurred at Anacostia Park. Alternatives B and C propose more intense wetland and goose management techniques, and therefore, have overall beneficial impacts to wetlands. Alternative D has short-term beneficial impacts to wetlands following goose reduction activities, but long-term minor, adverse impacts to wetlands because of the combination of low wetland and low goose management techniques; limited wetland plantings are proposed and no wetland restoration projects are included in alternative D. For all the action alternatives, some of techniques included in wetland management elements would require additional NEPA analysis for future projects prior to construction or implementation of these projects. Finally, alternative E would result in overall long-term minor adverse impacts on wetlands because the full suite of wetland management techniques as proposed in alternative E would provide an improvement to wetland vegetation, but these benefits would

most likely be offset by the size of the resident Canada goose population, which would not be lethally reduced under alternative E.

The impacts to the resident Canada geese in the park are expected to range from short-term to long-term and from negligible to major and adverse, depending upon the selected alternative. Alternatives A and E have an overall negligible impact on the resident Canada geese in the park because no lethal reduction strategies are proposed and there would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Maryland, DC, or Atlantic Flyway resident Canada goose populations. Alternative B proposes more intense management techniques, and therefore, has a long-term moderate to major adverse impact on the resident Canada goose in the park because the population would be lethally reduced and maintained at a lower level than current numbers throughout the life of the plan/EIS. Impacts to the population of resident Canada geese within the park would be detectable, and these impacts would be perceptible at the Maryland or DC resident Canada goose population level but not at the Atlantic Flyway resident Canada goose population levels. Alternative C would have long-term minor to moderate adverse impact on the resident Canada goose in the park because the population would be lethally reduced and maintained at a lower level than current numbers throughout the life of the plan/EIS. Impacts to the population of resident Canada geese within the park would be detectable, but these impacts would not be perceptible at the Maryland, DC, or at the Atlantic Flyway resident Canada goose population levels. Alternative D would have a short-term major adverse impact on resident Canada geese in the park due to a one-time, lethal population reduction could occur but would not be maintained over the long-term. An overall, negligible impact on the resident Canada goose population would also occur because there would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Maryland, DC, or Atlantic Flyway resident Canada goose populations.

None of the current goose and wetland management practices that would be continued under the no action alternative (alternative A) would have any impact (corresponds to *no adverse effect* for Section 106) on historic structures and districts or archeological resources. Alternatives B and E would have negligible to long-term moderate adverse impacts (corresponds to *no adverse effect* to *adverse effect* for Section 106) on archeological resources (due to ground-disturbing activities) and historic districts and structures (due to proposed seawall breaks), since the Anacostia River Seawall is potentially eligible for the National Register of Historic Places. Alternative C would have a negligible to long-term minor adverse impact (corresponds to *no adverse effect* for Section 106) on archeological resources and historic districts and structures and alternative D would have a negligible impact (corresponds to *no adverse effect* for Section 106) on archeological resources and historic districts and structures. Future NEPA compliance would be necessary for alternative B, C, and E to assess possible impacts to historic districts and structures (such as seawall breaks and daylighting) and/or archeological resources (due to ground-disturbing activities and impacts to unknown/undiscovered resources) associated with these alternatives.

The no action alternative (alternative A) would have a long-term minor adverse impact to park management and operations because maintenance requirements could increase if the resident Canada goose population in the park exhibits an overall increase. For all the action alternatives (B, C, D, and E), a long-term moderate adverse impact to park management and operations would occur due to additional staff, resources, and funding required as a result of these alternatives.

For visitor use and experience, there will be different expectations for different users of the park and the impacts as a result of the no action alternative, and management alternatives will either be positive or negative, depending on the user category. The impact analysis for visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not. For the no action alternative, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial, but impacts to visitors who do not enjoy resident

Canada geese at the park would continue to be long-term minor and adverse due to continued issues with the resident Canada geese in areas such as Langston Golf Course, Anacostia River Trail, and Anacostia Park West. For all management alternatives, it is the intent of NPS to maintain a population of resident Canada geese within the park; therefore, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. For alternatives B and C, impacts to visitors who do not enjoy resident Canada geese at the park would also be beneficial since the goose population would be reduced for these management alternatives. For alternatives A, D, and E, impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse since the goose population would not be drastically reduced during the life of the plan/EIS, and some visitors may avoid the Langston Golf Course or this area because of the high numbers of resident Canada geese that utilize turf areas at the golf course.

There would be no impairment to park resources associated with the management alternatives (alternatives B through E) or the no action alternative (alternative A).

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LIST OF ACRONYMS

ANA-11	Anacostia Wetland Mitigation Project
AP	Atlantic Population
APE	Area of Potential Effects
APHIS	Animal and Plant Health Inspection Service
ARPA	Archeological Resources Protection Act
AWI	Anacostia Waterfront Initiative
AWRC	Anacostia Watershed Restoration Committee
AWS	Anacostia Watershed Society
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
CAA	Clean Air Act
CBP	Chesapeake Bay Program
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSO	Combined sewer overflows
CUE	Center for Urban Ecology
DCMR	District of Columbia Municipal Regulations
DDT	Dichlorodiphenyltrichloroethane
DFWD	District Fisheries and Wildlife Division
District (the)	District of Columbia
DNR	Department of Natural Resources
DO	Dissolved Oxygen
DOE	Department of Environment
DOH	Department of Health
DOT	Department of Transportation
District	District of Columbia
E&S	Erosion and Sediment
EA	Environmental Assessment
EHA	Environmental Health Administration
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FHA	Federal Highway Administration
GMP	General Management Plan
ICC	Intercounty Connector
IPT	Interdisciplinary Planning Team
LCS	List of Classified Structures
LID	Low Impact Development

MBTA	Migratory Bird Treaty Act
METRO	Washington Metropolitan Area Transit Authority's
mg/L	Milligram per liter
M-NCPPC	Maryland –National Capital Park and Planning Commission
MOU	Memorandum of Understanding
MWCOG	Metropolitan Washington Council of Governments
NCPC	National Capital Planning Commission
NCR-EPMT	National Capital Region – Exotic Plant Management Team
NDW	Naval District Washington
NEPA	National Environmental Policy Act
NEM	New England Method
NGVD	National Geodetic Vertical Datum
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
PAHs	Polyaromatic hydrocarbons
Park (the)	Anacostia Park
PCBs	Polychlorinated biphenyls
PEPC	Planning, Environment, and Public Comment
plan/EIS	Draft Wetlands and Resident Canada Goose Management Plan / Environmental Impact Statement
RFK	Robert F. Kennedy
ROD	Record of Decision
SAV	Submerged Aquatic Vegetation
SHA	State Highway Administration
SHPO	State Historic Preservation Officer
SOF	Statement of Findings
TCP	Traditional Cultural Property
TMDLs	Total maximum Daily Loads
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VIMS	Virginia Institute of Marine Sciences

WAP	Wetlands Action Plan
WASA	Water and Sewer Authority
WET	Wetland Evaluation Technique
WPA	Works Project Administration
WQD	Water Quality Division
WQS	Water Quality Standards

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Chapter 1: Purpose of and Need for Action



CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

This “Purpose of and Need for Action” chapter describes what this plan intends to accomplish and explains why the National Park Service (NPS) is taking action at this time. This Draft Wetlands and Resident Canada Goose Management Plan / Environmental Impact Statement (plan/EIS) presents alternatives for managing wetlands and resident Canada geese (*Branta canadensis*) at Anacostia Park (the park) and assesses the impacts that could result from continuation of the current management framework (the no action alternative) or implementation of any of the management (or action) alternatives. Upon conclusion of the plan/EIS and decision-making process, an alternative will be selected to describe the wetland management and resident Canada goose management strategies that will guide future actions at the park for a period of 15 years. Brief summaries of both purpose and need are presented in this section. Additional information to support the purpose and need is available in the “Project Background” section of this chapter.

This plan/EIS is a general plan at the programmatic level for the management of wetlands and resident Canada geese within Anacostia Park. Where National Environmental Policy Act (NEPA) analysis is suggested or required for site-specific management or techniques carried out under the guidance of this document, future analyses will “tier to” or reference this plan/EIS. Site-specific NEPA analysis, when required, will focus on issues, alternatives, and environmental effects unique to the project area, if not already discussed in this plan/EIS and subsequent record of decision (ROD), and may be categorically excluded, or documented in either an environmental assessment (EA) or an environmental impact statement (EIS), depending on the significance of the effects.

PURPOSE OF THE PLAN/EIS

The purpose of this plan is to guide and direct the actions of the NPS in the management of wetlands and resident Canada geese at Anacostia Park. This plan/EIS will be an integrated tool designed to allow for the long-term planning and management for both wetlands and resident Canada geese at the park.

The purpose of this plan is to guide and direct the actions of the NPS in the management of wetlands and resident Canada geese at Anacostia Park.

NEED FOR ACTION

The Anacostia River was historically flanked with nearly 2,500 acres of tidal wetlands. In the early 20th century, the natural shoreline wetlands along the Anacostia River were severely reduced and drained to provide better flood control, to eliminate areas where malaria-spreading mosquitoes bred (known as “malarial flats”), and to improve navigation by channeling and containing the river. The NPS has been working in collaboration with other stakeholders concerned about the health of the watershed to restore nearly 100 acres of tidal wetlands along the Anacostia River. Over the past decade, an increasing number of resident (non-migratory) Canada geese have been observed in the park. As a result of the growing resident Canada goose population, the tidal wetland restoration efforts within the park have been jeopardized by these grazing resident Canada geese.



Wetland area denuded of vegetation due to grazing pressure from resident Canada geese.

Action is needed at this time to manage the restored wetlands at Anacostia Park. This plan will identify strategies to facilitate the success and functionality of current and future wetland restoration activities at the park. Currently, some restored wetlands at the park are being damaged by grazing resident Canada geese, resulting in:

- Adverse changes to the emergent vegetation and submerged aquatic vegetation structure and composition;
- Erosion and sedimentation problems in the Anacostia River that have negatively impacted the water quality of the river; and
- Potential adverse effects on wildlife and fisheries habitat and the natural distribution, abundance, and diversity of native plant species.

Besides grazing pressures from resident Canada geese, other wetland restoration issues have been observed at Anacostia Park. As a result, a need to determine the appropriate hydrologic regimes of current and future restored wetlands exists at Anacostia Park to improve the success of restoration projects. Determining the correct hydrologic regimes, anticipating the degree of settlement of placed sediments at restoration sites prior to the planting of wetland vegetation, as well as other factors (such as planting methods and species selection; insects and disease; engineered marsh soils), have been inconsistent in the past, resulting in varied levels of planting success at the park.

Finally, a need to control invasive species at current and future restored wetland sites at Anacostia Park exists. Invasive and non-native plant species are compromising the native vegetation in many of the restored and natural wetland areas.

OBJECTIVES IN TAKING ACTION

Objectives are specific statements of purpose and state what must be achieved for the plan to be successful. Objectives must be measurable, and meeting objectives is part of what makes an alternative “reasonable.” Objectives also support the purpose of this plan/EIS as stated in the “Purpose of the Plan” section above and help to resolve the need for action. Any plan the park develops will be consistent with the laws, policies, and regulations that guide the NPS. The objectives for wetland management and the correlated management of resident Canada goose populations at Anacostia Park must be grounded in the park’s enabling legislation, purpose, significance, and mission goals, and must be compatible with park guidance. The following objectives related to wetland management and resident Canada goose management were developed for this plan/EIS.

The objectives for wetland management and the correlated management of resident Canada goose populations at Anacostia Park must be grounded in the park’s enabling legislation, purpose, significance, and mission goals, and must be compatible with park guidance.

GENERAL

Ensure actions are consistent with the laws, policies, and regulations that guide the NPS.

WETLANDS

- Reduce adverse effects of resident Canada goose grazing pressure on restored wetlands to ensure plant regeneration sufficient to reach the desired condition of a functional wetland system.
- Maintain native wetlands vegetation and manage the encroachment of invasive and exotic plant species.
- Restore, protect, and maintain wetland functions.

WILDLIFE AND WILDLIFE HABITAT

- Manage the resident Canada goose population within the park such that a viable wetlands habitat can be sustained.
- Manage the resident Canada goose population, consistent with the U.S. Fish and Wildlife Service (USFWS) Resident Canada Goose Management Plan (USFWS 2005).
- Restore, protect, and maintain wetlands for native fish, plant, and wildlife populations.

VISITOR EXPERIENCE

- Enhance visitor experience by restoring, maintaining, protecting, and interpreting wetlands.
- Enhance public understanding of the value of wetland restoration and issues associated with the management of resident Canada geese.

- During implementation of any management action, minimize disruption to visitor use and experience or adverse impacts to visitor and community safety.

PARK OPERATIONS

- Consider and plan for impacts from wetland and resident Canada goose management response activities on current park operations, including budget, workload, and visitor experience.
- Consider and plan for invasive plant species management on current park operations, including budget, workload, and visitor experience.

COOPERATION AND COORDINATION

- Cooperate and coordinate with the District of Columbia (the District), the U.S. Army Corps of Engineers (USACE), and other government agencies, as well as other stakeholders currently implementing or interested in implementing a wetlands and resident Canada goose management strategy.

PROJECT SITE LOCATION

Anacostia Park occupies 1,300 acres along 5 miles of the Anacostia River shoreline within Washington D.C. and Maryland (figure 1). On the east bank of the Anacostia River, the park extends from the southernmost tip of the Baltimore-Washington Parkway in Maryland located approximately 0.5 mile northeast of the District/Maryland line and south to the mouth of the Anacostia River at Poplar Point (figure 2). On the west bank of the Anacostia River, the park extends from the District/Maryland line, southward to the CSX Railroad Bridge (figure 2). Anacostia Park also includes much of the Buzzard Point waterfront located in the southwest portion of the District. The study area for this plan/EIS includes the entire park. However, the primary focus of the plan/EIS is approximately 100 acres of restored tidal wetlands within Anacostia Park including Kenilworth Marsh, Kingman Marsh, and Fringe Marsh (figure 2). This plan/EIS includes only those lands within the current NPS jurisdiction of Anacostia Park. Therefore, land originally located within Anacostia Park that was transferred in fee or through a long-term lease to other government agencies is not included in this plan/EIS. The properties along the Anacostia River that are not currently under NPS jurisdiction include the following:

The focus of the plan/EIS includes nearly 100 acres of restored tidal wetlands within the park, including Kingman Marsh (includes marsh area, lake, and island), Heritage Marsh, Fringe Marsh, and Kenilworth Marsh.

1. The southern portion of Kingman Marsh, which encompasses 43 acres of open space south of Benning Road, which was transferred to the District in 2003;
2. The Robert F. Kennedy (RFK) Memorial Stadium and adjacent parking areas; and
3. Approximately 20 acres of the west bank strip of Anacostia Park (Boathouse Row), between the 11th Street Bridge and the CSX Railroad Bridge (transferred to the District government in 2008 per the Federal and D.C. Real Property Act of 2005).

All other land within Anacostia Park that is subject to special use permits, leases, and concession agreements by the NPS is included as part of the study area covered by this plan/EIS.



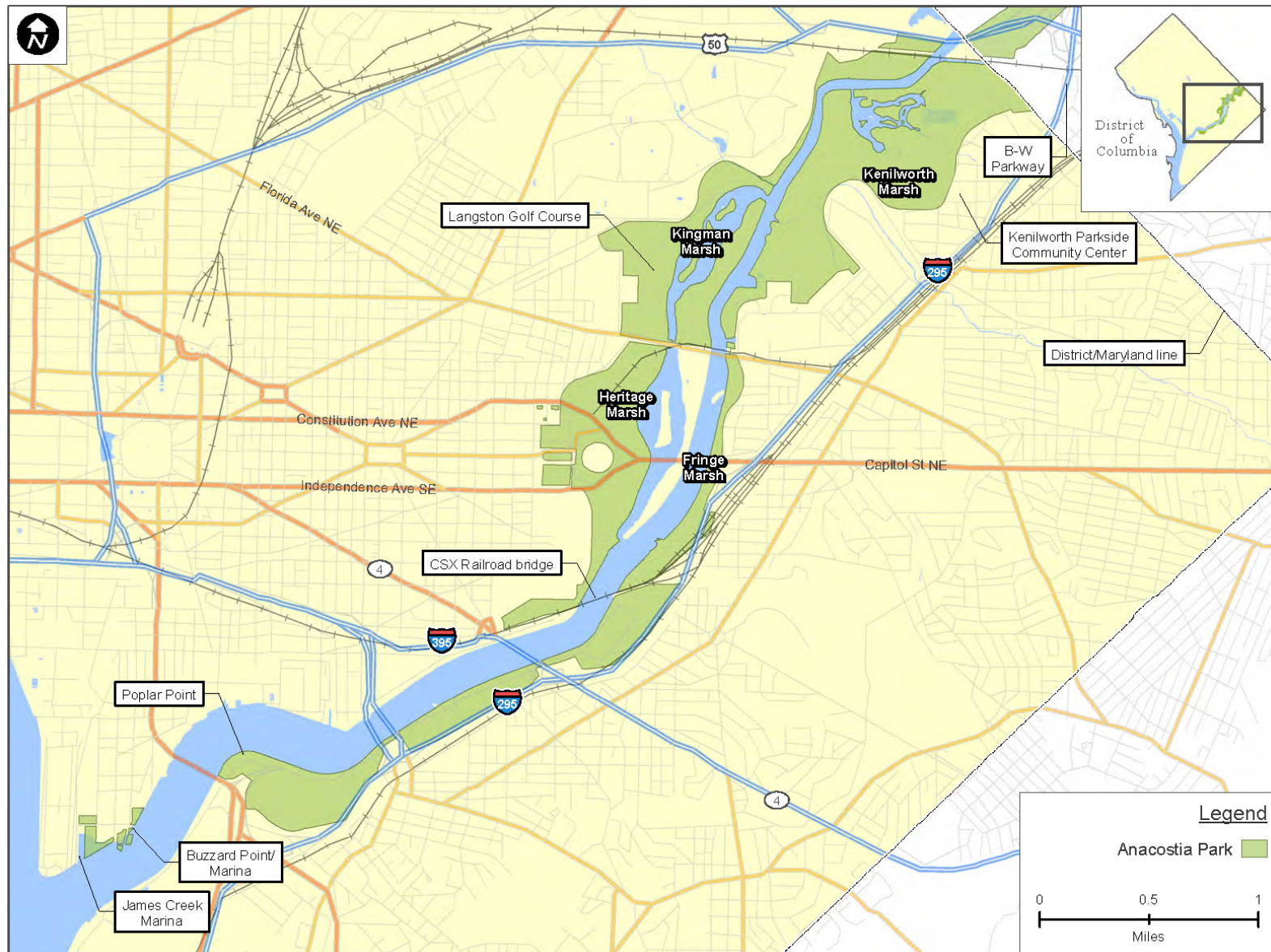


FIGURE 2: ANACOSTIA PARK

PROJECT BACKGROUND

HISTORY OF ANACOSTIA PARK

Most of the land known today as Anacostia Park was created under the authority of the Anacostia River Flats Act of 1914 (Public Law 63, 38 Stat. 549). This Act linked improvements to the navigable waterway of the Anacostia River with the creation of new land to help meet the needs of the growing population of the nation's capital. Under the auspices of the USACE, a seawall was constructed along the riverbanks, and materials dredged from the river bottom were placed behind the seawall to fill in the marshes. At that time the tidal marshes along both sides of the river were considered sources of "filth, stench, and disease." Their reclamation was intended to provide the dual function of eliminating a public health hazard while creating parkland for the enjoyment of the city's residents. In 1919 additional appropriations were made through the District of Columbia Appropriations Act for Fiscal Year 1919 (Public Law 66, 40 Stat. 950) for continuing the reclamation and development of the river and flats for the creation of parkland to become a part of Anacostia Park.

Beginning with legislation passed in 1924 that established the National Capital Park Commission (Public Law 592, 43 Stat. 463), which was later renamed the National Capital Planning Commission (NCPC) in 1926 (44 Stat. 374), Anacostia Park became a part of the park, parkway, and playground system of the National Capital. The Act stated that land within the park system in the District was to remain under control of the Chief of Engineers of the U.S. Army. It further stated that areas suitable for playground purposes could, at the discretion of NCPC, be assigned to the control of the Commissioners of the District for playground purposes.

The Capper-Cramton Act of 1930 (46 Stat. 482, as amended) appropriated additional funds for acquisition of lands requisite to the comprehensive park, parkway, and playground system of the national capital. Included was additional funding for acquisition of land necessary for extension of the Anacostia Park system up the valley of the Anacostia River.

In 1933, Executive Order (EO) 6166 transferred NCPC's responsibilities for management of the park, parkway, and playground system – including Anacostia Park – to the NPS. With the transfer, park managers were required to comply with the specific purposes identified in the park's earlier establishing legislation as well as to follow the NPS mission to conserve and protect park resources and to provide for use of the park in a manner that will leave the park unimpaired for the enjoyment of future generations.

In 1949, the NPS entered into an agreement with the District Recreation Board to permit the Board to conduct public recreation activities and programs within public properties administered by the NPS, including Anacostia Park, as recommended in NCPC's *Comprehensive Plan* (NCPC 1949). The NPS retained ownership of all land and facilities as well as responsibilities for grounds maintenance and physical improvements. Provisions of the legislation allow for the Recreation Board to transfer funds to the NPS for maintenance and improvements of facilities that are used for the Board's recreation activities and programs within the park.

Historic resource protection was added to the NPS protection responsibility for the National Capital's park, parkway, and playground system in 1952 (66 Stat. 782). A year later, legislation was passed identifying *National Capital Parks* as part of the national park system "in order to facilitate the management of miscellaneous areas administered in connection with that system, and for other purposes" (60 Stat. 885).

HISTORY OF WETLANDS MANAGEMENT IN ANACOSTIA PARK

The Anacostia River is formed by the confluence of the free-flowing (non-tidal) Northeast and Northwest Branches at Bladensburg, Maryland in Prince George's County. The tidal influence in the Anacostia River extends approximately 1,000 feet upstream of this confluence in both Branches; therefore, the entire tidal Anacostia River from Bladensburg to the Potomac River contains only freshwater. The Anacostia River was historically flanked with nearly 2,500 acres of tidal marsh. However, in the early 20th century the USACE was charged with a major reclamation effort designed to improve navigation by channeling and containing the river within a stone seawall. The Anacostia River was engineered into a channeled city river from a meandering river with extensive wetlands. Tidal flats and wetlands were drained and filled to help rid the city of mosquito-borne diseases and stench along the river. Most of the areas known today as Anacostia Park, including Kingman Marsh and Kenilworth Marsh, were created by the USACE during the reclamation work.

Public and government interests in restoring wetlands in the Anacostia River Watershed grew in the 1980s when the NPS began working with others to restore nearly 100 acres of wetlands in the park. Four tidal freshwater wetland restoration projects have been undertaken within Anacostia Park on lands managed by the National Park Service since 1993. These include Kenilworth Marsh, Kingman Marsh, Fringe Wetlands, and Heritage Islands. In 1993, 32 acres of emergent wetlands were created at Kenilworth Marsh by planting approximately 350,000 plants of 16 species to re-establish marsh vegetation (Syphax and Hammerschlag n.d.). In 2000, over 40 acres of wetlands were restored in the Kingman Marsh area to increase plant and animal diversity (USACE 1999). In 2003, 16 acres of tidal wetlands were restored along the shorelines of the Anacostia River adjacent to Kingman Marsh (Fringe Wetlands) (DCDOH n.d.). An additional 6 acres of wetlands (Heritage Marsh) were created adjacent to the RFK Memorial Stadium parking areas in Kingman Marsh (USACE 2002). The restoration of tidal marshes was completed to improve the water quality of the Anacostia River, improve native plant and animal diversity, and provide a more natural recreation experience for park visitors along the river, as well as meet the Department of the Interior's agreement to the Chesapeake Bay Recovery Program.

Over the past decade, an increasing number of resident Canada geese have been observed within Anacostia Park. Canada geese are a migratory species that have always been seasonal visitors to the area, stopping temporarily in local waters en route to summer breeding areas to the north or winter ranges to the south. However, the region now supports a growing non-migratory population of Canada geese, referred to as resident Canada geese. A subspecies of giant Canada geese (*Branta Canadensis maxima*) were captive birds that were released to restock the depleted migratory populations along the Atlantic Flyway. Geese from Minnesota and Wisconsin were introduced to Pennsylvania, Georgia, Maine, West Virginia, North Carolina, and South Carolina and local hunt clubs released geese east of the Appalachians after wildlife managers restricted the use of live decoys to attract wild flocks (Harris 2002). The geese became non-migratory in their new habitats and formed year round resident populations. The abundance of food and the lack of predators in urban areas such as the District have allowed resident Canada goose populations to grow rapidly. In July 2009, the mean population of resident Canada geese along the tidal Anacostia River was approximately 492 birds and in June 2010, the mean population of resident Canada geese along the tidal Anacostia River was approximately 564 birds (NPS 2009a; Bates 2010a). The 2010 mean of 564 resident Canada geese within Anacostia Park is the current number used in this plan/EIS for all sections that follow.

As a result of the growing resident Canada goose population, the wetland restoration efforts completed by the NPS and others have been jeopardized by grazing resident Canada geese throughout the growing season. Some wetland planting areas in Kingman Marsh that cost millions of dollars to restore have been nearly destroyed by feeding resident Canada geese (AWS 2006). Figure 3 shows the decimation of the restored wetlands from resident Canada geese at Kingman Marsh.

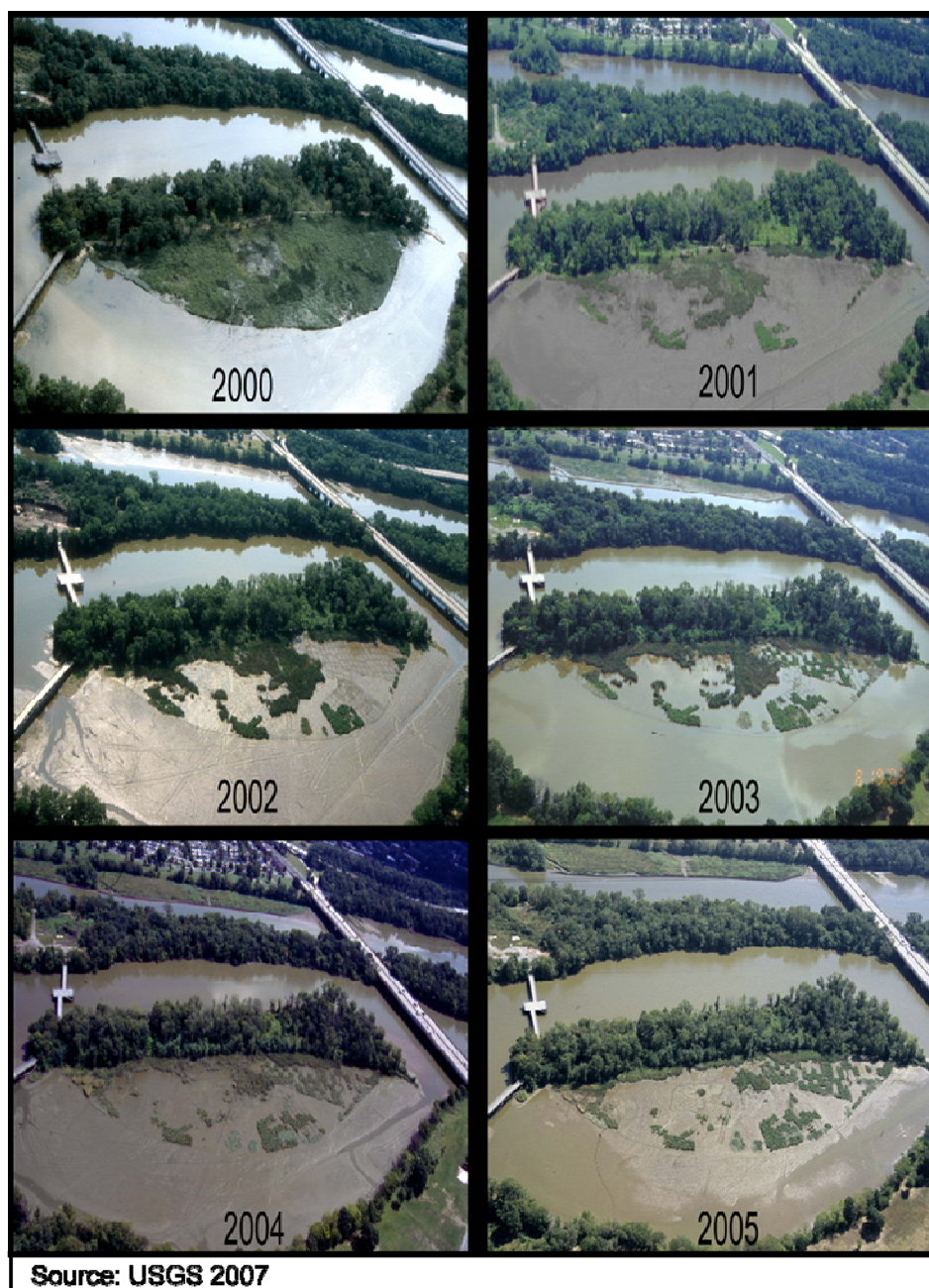


FIGURE 3: LOSS OF WETLAND VEGETATION AT KINGMAN MARSH FROM 2000 TO 2005

ANACOSTIA PARK’S PURPOSE, SIGNIFICANCE, AND MISSION GOALS

All units of the national park system were formed for a specific purpose (its reason for being) and to preserve significant resources or values for the enjoyment of future generations. The purpose and significance identify uses and values that individual NPS plans should support. The following purpose, significance, and mission goals were developed during the ongoing process to prepare a new General Management Plan (GMP) for Anacostia Park. This document is still in development and has not yet been adopted by NPS.

Purpose

The Anacostia Park Purpose Statement was developed from the establishing legislation for Anacostia Park. It states why the park was incorporated into the national park system and serves as a guide for ensuring that the recommendations of the GMP are in accordance with the original intention of creating the park. The following purpose statement represents the NPS's interpretation of the establishing legislation:

Anacostia Park was created when the banks of the Anacostia River were reclaimed for park purposes. It is part of the comprehensive, systematic, and continuous development of the park system of the national capital, and provides waterfront recreation and access for public enjoyment. Within this system, the park provides opportunities for a variety of recreational activities that are compatible with the resources of the Anacostia River. Legislation covering Anacostia Park gives specific direction to preventing pollution in the Potomac and Anacostia Rivers and to preserving forests and natural scenery in and about Washington. The park protects natural and nationally significant historic resources, promoting and regulating the use of the area in such a manner as will leave them unimpaired for the enjoyment of future generations. The park provides opportunities for the understanding of these resources and values to the American people.

Significance

Park significance statements define the resources and values that are most important to Anacostia Park. The statements provide the basis for placing greater management emphasis on those resources and values that contribute directly to the park's purpose. The following significance statements capture the essence of the park's importance to the national capital's natural and cultural heritage:

- The park is a river gateway to the national capital and an important waterfront component of the city's unique design.
- The park has a variety of recreational opportunities and provides important public waterfront access.
- The park contains naturalized shoreline that provides habitat for native plants and animals and connects with other natural and historic corridors outside city boundaries.
- The park protects one of the few remaining tidal wetlands in the nation's capital and reflects changing attitudes towards wetlands.
- The park provides a variety of educational opportunities regarding the natural and cultural heritage of the Anacostia River.
- The historic Kenilworth Aquatic Gardens is the only site in the National park system dedicated to the propagation and display of aquatic plants.

Management Goals and Current Strategies

Park mission goals articulate the broad ideals and vision that the NPS is trying to achieve at Anacostia Park. They are broad, conceptual descriptions of what Anacostia Park should look like, expressed in terms of desired resource conditions and appropriate visitor experiences. Linked directly to the NPS service-wide mission goals contained in the *National Park Service Strategic Plan* (NPS 2000), the mission goals are written as desired outcomes in keeping with the Government Performance and Results Act of 1993 for Anacostia Park are as follows:

- A variety of recreational and leisure activities are offered where appropriate.
- The resources and scenic values associated with Anacostia Park are protected.
- The park cooperates with others to protect the overall watershed and environs of the Anacostia River.
- The park has adequate and safe access and circulation for motorized and non-motorized visitors.
- Visitors understand the value of park resources and their relationship to the Anacostia River and the natural and cultural heritage of the nation's capital. The park landscape, facilities, and services complement and enhance visitor's experience.

BACKGROUND ON WETLANDS MANAGEMENT AND RESIDENT CANADA GOOSE MANAGEMENT

WETLANDS MANAGEMENT ISSUES AND RESEARCH OVERVIEW

Wetlands originally covered over 221 million acres of the lower United States. Today, 50 percent of these have been lost, and much of the remaining wetland area is degraded. However, wetlands offer many ecological and economic benefits, including water quality improvement, flood control, and recreational opportunities (Andrew et al. 1996). *Wetland Restoration, Enhancement, and Management* (NRCS 2003) is designed to provide the most recent technical information available on wetlands restoration topics, including techniques for restoration and enhancement of vegetation, hydrology, and wildlife; monitoring; and specific species management. Similarly, *Managing Your Restored Wetland* (Andrew et al. 1996) provides information on restoring and managing wetlands and specific wildlife groups, as well as a troubleshooting section for dealing with common problems of restored wetlands.

CURRENT WETLAND MANAGEMENT WITH THE ANACOSTIA WATERSHED

Agreements signed in 1987, 1991, and 1999 formed the Anacostia Watershed Restoration Committee (AWRC), which is composed of the chief administrators of the natural resources, environmental regulation and/or public works agencies from the State of Maryland, the District, Prince George's County, Montgomery County, and the Baltimore District of the USACE. The committee was formed to evaluate the Anacostia River basin to determine how the agencies could carry out their respective stewardship roles. Then, the Department of Environmental Programs and the Metropolitan Washington Council of Governments produced the *Anacostia Watershed Restoration Indicators and Targets for Period 2001-2010* report that contains a Six Point Action Plan with six specific goals focusing on: (1) reducing pollutant loads, (2) restoring ecological integrity, (3) improving fish passage, (4) increasing wetland acreage, (5) expanding forest coverage, and (6) increasing public and private participation (DEP 2001). Indicators included total phosphorus, total nitrogen, and dissolved oxygen for reducing pollutant loads; pH and macroinvertebrate community health for restoring ecological activity; and created/restored tidal and non-tidal wetland acreage (DEP 2001). The Anacostia Watershed Partnership released its *Annual*

Report, which tracks the progress of the six restoration goals. Over the years 2001, 2002, and 2003, the progress towards meeting the 2010 targets rated ‘good’ on the AWRC grading scale, which means that the restoration targets and schedule were met for those years. Overall, 2004 rated “fair” or “partially” meeting restoration target and schedule (AWP 2004). The lower rating in 2004 resulted from decreased effort in reducing pollutants, improving fish passage, increasing wetland acreage, and expanding the forest cover (AWP 2004).

The USACE conducted a study in 2005 to determine if there was federal interest in developing a comprehensive plan for the Anacostia River and to determine what improvements might be needed. The report identifies 16 major problems and gives potential opportunities related to each. These problems are: lack of a comprehensive management plan, combined sewer overflows, sewer system leakage, fish blockages, point source pollution, non-point source pollution, physical stream degradation, hydrologic stream degradation, toxic chemicals, wetland loss or degradation, loss of submerged aquatic vegetation, loss of riparian and upland forest, invasive and non-native species, nuisance animals, loss of special status species, and trash. Preliminary plans and financial analysis are included in preparation for a potential feasibility study to develop a comprehensive restoration plan and focused restoration projects (USACE 2005). This plan/EIS addresses many of the problems defined in the USACE (2005) study described above.

WETLAND RESTORATION FACTORS

Resident Canada Geese Herbivory

In the early 1900s, Canada geese were on the verge of extinction due to unrestricted hunting, egg harvesting and destruction of wetland habitat. However, a restoration program with strict harvesting restrictions, habitat protection and habitat creation allowed the geese populations to make an extremely successful recovery. Additionally, local hunt clubs deliberately released captive-bred geese along the East Coast after wildlife managers restricted the use of live decoys to attract wild flocks (Harris 2002). These geese became non-migratory birds and formed year round populations. Unfortunately, the non-migratory population has tended to make its home in urban and suburban areas, often leading to conflicts between geese and humans. Although aesthetically pleasing and usually welcome in small numbers, the geese can quickly present a nuisance or even a serious environmental and health threat if the population density is high enough. Problems that often arise include geese droppings, damage to vegetation and crops (herbivory), noise, aggressive behavior, and airplane collisions (Smith et al. 1999).

In 2004, a bird monitoring program at Kingman Marsh and Kenilworth Marsh in Anacostia Park found that site selection of the resident Canada geese might be dependent on the surrounding area. Vegetation at Kingman Marsh, located adjacent to Langston Golf Course was extremely decimated, while vegetation at Kenilworth Marsh was barely affected. The lack of herbivory at Kenilworth Marsh may have been due to the surrounding riparian forest and small meadow habitats (USGS 2004). It has been estimated that resident Canada goose damage results through their herbivory has led to Kingman Marsh being reduced to less than one third its original cover along with severe reduction in palatable plant species (USGS 2007). A study of resident Canada goose grazing selection and effects showed that geese preferentially select tender grass species with low ash content, such as Kentucky bluegrass (*Poa pratensis*), and avoid species such as tall fescue (*Schedonorus phoenix*) (Conover 1999). Resident Canada geese also pose a threat to native wild rice (*Zizania aquatica*), a signature emergent plant in Patuxent River marshes in nearby Maryland. A goose exclusion study by Haramis and Kearns in 2006 showed that fenced areas of marshland were able to support a lush, healthy population of wild rice, whereas in unfenced areas grass survival was extremely low due to grazing by resident Canada geese (Haramis and Kearns 2006).

In 2009, U.S. Geological Survey began an experiment to determine the impacts of herbivory by resident Canada geese on Kingman Marsh. The study used enclosure fencing to permit access by herbivores such as fish and turtles while excluding mature Canada geese. The first year results of the study reveal that resident Canada geese are inflicting damage to the wetland vegetation at Kingman Marsh (Kraft et al 2010). Results from the second study year will be included in the FEIS.

A wide range of goose management strategies have been developed for use in many different situations. The USFWS released a final EIS on resident Canada goose management that describes these strategies, analyzes their environmental impacts and places them under three different categories: resource management, physical exclusion and deterrents, and population management (USFWS 2005). In a series of fact sheets, Rutgers Cooperative Research summarizes and provides pros and cons for many different management techniques, including exclusion, habitat modification, human behavior modification, capture and euthanasia, nest and egg destruction, repellents, harassment, and regulated hunting. In general, hunting is the most cost-effective and efficient method, but in many urban areas this is not an option and public opposition is often high (Drake and Paulin 2003). Non-lethal methods of population control may therefore be more desirable. One such method is the use of unpalatable repellents to discourage grazing. The repellent GooseChase™ was shown to be effective at application rates as low as 0.5 gallons per acre, and treatment of the first 100 feet of turf from the water's edge reduced grazing on untreated areas further from the water. The repellent was not washed away by irrigation or rain, but re-application was required after mowing (Askham 1996). Reproductive control tactics are also less controversial than hunting, and include egg oiling and addling, where embryos are destroyed without actually damaging the egg. This is important because destruction of the eggs would lead to the nesting females laying a second clutch. Recently, oral contraceptives such as OvoControl® G have been developed that can be fed to the geese in the form of bait and prevent egg development (Innolytics 2007). Habitat modification and harassment are two more non-lethal methods of driving geese from a location. Habitat modification can involve many different tactics, including switching the vegetation on a site to unpalatable grasses, not mowing grass shorter than 10 inches, or planting shrub and tree barriers on the water's edge. Because geese like to walk from water onto land to feed and prefer open spaces where they can see approaching predators, they tend to avoid high grass and wooded areas (Doncaster and Keller 2007). Harassment can involve visual deterrents such as balloons or flags, auditory deterrents such as firecrackers or air cannons, or even specially trained dogs. It has been shown, however; that harassment is most effective when combined with an actual threat, because geese can adapt quickly to most forms of harassment (Harris 2002).



Marking Eggs for Addling and Oiling

Erosion and Sedimentation

Erosion and sedimentation in wetlands are integral functions of the ecosystem, and can affect both vegetation and water quality. The storage or export of many compounds are tightly bound to the movement of sediment in a system, and because wetlands have much lower water velocities than the streams and rivers that feed them, they tend to serve as depositional environments, preventing the downstream passage of excess nutrients or harmful chemicals. A study was performed on sedimentation rates in created freshwater marshes, comparing the effectiveness of clay, sand, glitter, and feldspar marker horizons (Harter et al. 2003). Although the study did not occur within the Anacostia wetland systems at the park, general conclusions can be made and site-specific studies can then be suggested. Sand and glitter markers were the most effective, while clay was virtually useless. Observed sedimentation rates averaged 4.9 centimeters/year. Spatial variability was high, with a tendency toward higher rates in open deep water and lower rates in shallow vegetated areas. This variability is possibly due to bioturbation (mixing of

sediment particles by benthic organisms or flora) and turbulence or high hydraulic loads distributing the sedimentation (Harter and Mitsch 2003). A second study examined two natural freshwater wetlands, one upstream and one downstream. Sediment deposition rates were highly variable, and none of the factors were considered correlated with sedimentation rates between the two sites. In examining the sites separately, however, elevation, flood depth and flood duration did correlate with deposition rates, and vegetation, land use, and proximity to the turbidity maximum all appeared to be important contributors (Drake and Paulin 2003).

Fluctuations in water level, known as river pulsing, also have an effect on sedimentation. In a study of constructed riparian wetlands, it was found that although short-term sedimentation patterns were different between pulsing and steady-flow years regardless of normalization, long-term normalized sedimentation rates between the two flow regimes were similar (Nahlik and Mitsch 2005). They also found that a pulsing flow regime helps with nutrient distribution by allowing new sediments to mix with old, re-suspended sediment, and that basin morphology and vegetation act together to affect sedimentation rates (Nahlik and Mitsch 2005). One effect that vegetation has on wetland morphology can be observed in the differences between freshwater and saline wetlands. Saline channels migrate less than freshwater channels, and this difference can be explained by the vegetation differences between the wetlands. Vegetation in saline wetlands has denser root structures that lead to peaty substrates, whereas freshwater vegetation has less extensive root systems and muddy substrates. Another result of these differences is that freshwater channels have more gently sloping banks, with less undercutting and slumping than saline channels (Garofalo 1980).

Creating wetlands or marshes requires an understanding of the hydrogeomorphic concepts involved. Excessive water levels or steeply cut banks can easily lead to failure in a restored wetland, and even though a particular design proved to be successful in an area with one hydrogeomorphic classification, it may fail in an area with different soil types and hydrologic characteristics (Whittecarr and Daniels 1999). Other important factors in constructing wetlands or marshes include available sunlight, vegetation plantings, fencing to protect young vegetation, cliff stabilization, protection from wave action, and occasional maintenance (MDE 2006).



Areas Fenced to Protect Young Vegetation

Hydrologic Regimes

Hydrologic and hydraulic conditions dictate the vegetative composition of wetlands, upland natural communities, and wildlife that use the wetlands. The three most common hydraulic regimes are stream, lake, and groundwater systems (MIDNR 2007). Urban development is a source for hydrologic changes to stream ecosystems, and the most common changes include increased frequency of high flows, redistribution of water from base to storm flow, increased daily variation in streamflow, and reduction in low flow. However, the extent of the changes and their biological responses depends largely on the stream's physiographic context and spatial and temporal patterns of urban development (Konrad and Booth 2005). The soils and plant community structure can affect the hydrologic and hydraulic functions that the wetland will perform, which can include erosion reduction, estuarine water balance, water quality improvement, alterations in precipitation and evaporation, groundwater recharge, groundwater discharge, flood storage, and stormflow modification (Carter 2007).

Although restored wetlands can provide many benefits to a system, there is a possibility that the addition of filling an existing aquatic habitat will cause unanticipated impacts on the sedimentation/deposition patterns of a stream or river, and downstream flow patterns leading to loss of property, reductions in channel capacity, and degradation of water quality and aquatic habitat. A wetland restoration site-selection framework based on water/sediment budgets and the principle of mass conservation can be used to predict and monitor the effects of a proposed restoration wetland in various hydrologic and hydraulic regimes (Rhoads and Miller 1990).

Hydrology also has a marked effect on vegetation. A study of tidal freshwater marshes along the Patuxent showed that wetter conditions reduced plant species richness by 26 percent and drier conditions increased

it by 42 percent. These findings suggest that hydrology is a dominant environmental variable in plant species survival and that flooding can reduce seedling recruitment and plant growth (Baldwin et al. 2001). The selection of plant species for initial planting in newly enhanced or restored wetlands is based on careful study of hydrologic tolerances for each particular species. The per-species hydrologic tolerance range is identified, spatially, on the site to locate planting zones. Germination of volunteer seeds is also affected by hydrologic conditions; flooding can transport seeds, however, excessive flooding or excessive drought can inhibit germination of existing seeds in the soil (Baldwin et al. 2001).

Wetland Vegetation

One method of wetland plant-community enhancement or restoration is to refrain from actively planting any species and allow natural succession (seed recruitment and natural plant colonization) to take place. Left alone, newly enhanced hydric soils will become colonized first with a wide variety of pioneer species including annual herbaceous cover. The newly enhanced or restored hydric soils will later evolve to contain small monocultures of plants that compete with each other, over time, to colonize the area. Over the long-term, (10 to 30 years) plant diversity and the number of different plant assemblages will begin to decrease and resemble older, natural wetland plant communities with large polygons of the same species. The monocultures of plants that have evolved in Kenilworth Marsh are a good example of succession of plant communities (how species evolve and out-compete each other into broad colonies) in restored wetlands. The initial pioneer plant diversity will support pioneer animal species as well. Managing the wetlands to evolve on their own, without planting, can be tolerable, depending on the quantity of non-native or invasive species that take over.

Enhanced or restored wetlands can be given a jump start up the evolutionary scale (in order to avoid the initial stages of highly diverse pioneer and invasive species colonization) by planting later seral-stage species in hydrologic conditions appropriate to their survival of life cycles. Seral stage refers to a phase in the sequential development of a climax community. A study of two created wetlands, (one planted with thirteen species and one unplanted) found that after five years, the wetland had developed different species compositions (Bouchard and Mitsch undated). The study results demonstrate the ability to effect a change in species colonization with initial plantings. Aside from hydrologic preference, the selection of plants for wetland enhancement or restoration also depends on other factors including water and salt tolerance, available plant forms, growth and spread rates, wildlife benefits, sunlight requirements, and drought tolerance (Thunhorst 1993).

The management decision to plant or not plant a newly enhanced or restored wetland will depend on the cost of the initial plantings versus the ecological benefits of jump starting the plant species composition.

Invasive and Non-Native Plant Species

In this document, plants are described as falling under categories of either native plants (those which have historically occurred in a system) and non-native plants (alien plants such as exotic, introduced, and non-indigenous) or invasive species (plants which cause economic or environmental harm or harm to human health). Invasive plants present a considerable danger to wetlands—less than 6 percent of the earth's land mass is wetlands, and yet 24 percent of the world's most invasive plants are wetland species. Wetlands are particularly vulnerable because they act as landscape "sinks," collecting any seeds as well as high concentrations of nutrients that opportunistic invasive species can use to their advantage (Zedler and Kercher 2004). Invasive plants often share certain characteristics that allow them to grow out of control, including aggressive spreading with runners or rhizomes, production of many seeds with a high survival rate, or dispersing seeds by means of wind, water or animals (Swearingen et al. 2002). Specific plant species that are located within the project area of Anacostia Park that can be considered invasive include

common reed grass (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) (USDA NRCS 2010).

DESIRED CONDITIONS

Desired conditions are what the park staff expects to achieve in managing wetlands over the long-term at Anacostia Park. The two primary desired conditions are:

- Wetland systems that are maintained, in a pre-dominantly self-sustaining condition to deliver the best quality and quantity of wetland functions that reflect park goals and strategies, and
- A population of resident Canada geese that will not adversely impact the wetland habitats available at the park.

The desired wetland conditions for Anacostia Park are directly linked to the purpose, need, and objectives of the plan/EIS and the objectives defined by the Anacostia River Watershed Environmental Condition and Restoration Overview.

A FUNCTIONAL WETLAND SYSTEM

The park staff believes that park wetlands are integral to the functioning of all wetlands within the watershed. In order to achieve desired wetland conditions in the wetland systems at Anacostia Park, this plan/EIS reflects the park's understanding of the watershed conditions that affect the wetland systems. Therefore, the wetlands should be managed in such a way as to contribute to achieving the six priority watershed goals as defined in the *Anacostia Watershed Restoration Indicators and Targets for Period 2001-2010*: (1) reducing pollutant loads, (2) restoring ecological integrity, (3) improving fish passage, (4) increasing wetland acreage, (5) expanding forest coverage, and (6) increasing public and private participation (DEP 2001).

This plan/EIS also recommends managing wetlands to reach the desired condition of self-sustaining wetland systems (containing advanced seral-stage habitat conditions). Some of the restored and enhanced wetlands in the park may require limited active management and maintenance in order to prolong their current conditions and functional value. With some maintenance management, the restored and enhanced wetlands within the park have the capability to be self-sustaining and achieve the ability to regenerate and maintain plant and animal assemblages as well as contribute benefits to the Anacostia River watershed that natural wetlands have historically provided. Over time, it is expected that the restored and enhanced wetlands within the park will evolve to equilibrate with changing hydrologic and hydraulic conditions, climate-change induced conditions, and anthropogenically-induced changes (including water quality changes).

This plan/EIS also recommends managing wetlands to reach the desired condition of self-sustaining wetland systems.

SUCCESSFUL MANAGEMENT OF RESIDENT CANADA GOOSE POPULATION

Migratory Canada geese are a natural part of the ecosystem, which play an important role in the system. Resident Canada geese stay within Anacostia Park and the surrounding area year round, which ultimately disrupts the natural ecosystem. One of the objectives of this plan is to successfully manage the resident Canada goose population within Anacostia Park, while protecting park resources, specifically restored wetlands. For this plan, a manageable resident Canada goose population is defined as one that allows restored wetlands within the park to function as wetland systems.

During the alternatives development process, a science team was initiated to provide technical information on wetland and resident Canada goose management. The science team was made up of university professors, wildlife biologists, wetland specialists, Canada goose experts, and resource management specialists. The purpose of the science team was to review and provide available research and data pertaining to wetland and goose management and to provide technical and scientific input on resident Canada goose management and monitoring. Based on information from the science team, the park determined that the resident goose population at Anacostia would be managed based on the thresholds related to vegetative monitoring as well as adaptive management (NPS 2009b).

It is desirable to have a wildlife population level that the land or habitat can support without degradation to the population health, individual bird health, or the environment over an extended period of time (Decker and Purdy 1988). A nearby regional park is using 30.5 geese per wetland square mile (200 geese exist in 4,000-acre wetland complex), according to Greg Kearns of the Jug Bay Regional Park (personal communication 18 June 2009). Wild rice stands in the Jug Bay Regional Park continue to thrive at this density. However, even at these low goose numbers there continues to be some damage, requiring goose fencing in certain areas. Converting this amount (30.5 geese per wetland square mile as discussed above) to the total wetland area Anacostia Park, which is approximately 0.92 square miles, creates an abundance threshold of 28 geese (30.5 geese/wetland square mile \times 0.92 square miles of wetland = 28 geese) (NPS 2010c). However, at Anacostia Park, resident Canada Geese utilize grassland areas for grazing in addition to wetland areas (NPS 2010a, NPS 2010c). At Anacostia Park, there are 397 acres of grasslands (mowed or maintained areas such as lawns or golf courses). The grassland component was therefore added separately to the wetland component for Anacostia Park. According to Conover and Chasko (1985), the grassland threshold is one goose per 15 acres [397 grassland acres \times (1 goose/15 acres) = 26 geese]. When the wetland and grassland goose values are added together (28+26 = 54), a resident Canada goose population goal of 54 geese is established for Anacostia Park (NPS 2010c). Based on information from the science team, the park determined it would use 54 geese in the park as the initial resident Canada goose population goal. This goal may be adjusted to meet management goals based on the results of vegetation and goose population monitoring (NPS 2009b).

It is important to note that the goose population goal discussed above was developed specifically for Anacostia Park. In general, population objectives for resident Canada geese are different by location, including state and region, as described by both the Atlantic Flyway Council (1999) and the USFWS Final EIS for Canada Geese (2005), because these documents considered much larger areas in their objectives. Resident Canada geese are not only a nuisance within Anacostia Park but in all the Mid-Atlantic states as well as regionally in the Atlantic Flyway. There are large numbers of resident Canada geese in each Flyway, and accordingly cooperative Atlantic Flyway management plans have been developed to address these populations (USFWS 2005). Each plan presents an overall goal and associated objectives/strategies; a commonality among the goals is the need to balance the positive aspects of resident Canada geese with the conflicts they can cause (USFWS 2005). Based upon resident Canada goose population estimates and population objectives by the Flyway Council, the USFWS (2005, I-20) suggests a 54 percent reduction in the Atlantic Flyway, a 73 percent reduction in the Mississippi Flyway, a 70 to 85 percent reduction in the Central Flyway, and a 25 to 42 percent reduction in the Pacific Flyway. In summary, USFWS (2005) recommends a 25 to 85 percent reduction of resident Canada geese. Additionally, in 1999, before the Final EIS for Canada Geese was even drafted, the Atlantic Flyway Council (1999) also recommended a 60 percent one-time reduction during the summer flightless period in resident geese to decrease the population, assuming a moderate recruitment (20-30 percent of the current adult population) of goslings and new adults.

SCOPING PROCESS, PUBLIC PARTICIPATION, ISSUES AND IMPACT TOPICS

NEPA regulations require an “early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.” The following public and internal meetings and agency coordination were conducted as part of the scoping and public participation process:

- An internal scoping meeting was held on February 14, 2007.
- An agency scoping meeting was held on March 28, 2007 and included representatives from both the NPS and the District.
- Two public scoping meetings were held on July 17 and 18, 2007 at the U.S. Park Police Anacostia Operations Facility, in Anacostia Park, in the District and approximately 31 people attended the two meetings.
- A Notice of Intent (NOI) was released for comment in January of 2008.
- A newsletter containing draft alternatives was released for comment in October of 2008.
- An internal alternatives meeting was held on May 21, 2008.
- An internal discussion of the plan/EIS was held on August 24, 2010.

As a result of the scoping efforts, issues were identified that would require further analysis. These issues were recorded as comments during the public scoping process. Issues are problems, opportunities, and concerns regarding the current and potential future management concepts for wetland and resident Canada goose management within Anacostia Park; impact topics are a more refined set of concerns. Impact topics were derived from the issues, and in the “Environmental Consequences” chapter, the impact topics were used to examine the actions of a particular alternative. Impact topics were also based on legislative requirements, executive orders, topics in Director’s Order #12 and Handbook (NPS 2001), *NPS Management Policies 2006* (NPS 2006a), guidance from NPS, input from other agencies, public concerns, and resource information specific to the park. A summary of the impact topics analyzed is provided below, along with the rationale for further analysis or dismissal. A detailed summary of the agency and public scoping activities is presented in “Chapter 5: Consultation and Coordination.”

IMPACT TOPICS INCLUDED IN DETAILED ANALYSIS

Soils—Wetland and goose management activities should result in a range of impacts to the soils at Anacostia Park. Grazing by resident Canada geese of shoreline areas that currently support vegetation result in the further removal and loss of turf, terrestrial vegetation, and/or wetland vegetation (which hold soil) and result in erosion during excessive rain events.

Water Resources—This topic includes hydrology and water quality. A reduction of wetland vegetation cover by resident Canada goose herbivory could affect water quality. Wetland vegetation effectively protects soils from eroding thus preventing further degradation of the wetlands, particularly during storm events. Erosion of soil into waterways can cause an increase in turbidity, a decrease in water clarity, and result in poor water quality. Specific hydrology techniques have been described in this plan/EIS that would benefit hydrology by infiltrating stormwater into soils, reducing the volume of stormwater runoff and improving stream and channel flow. Resident Canada goose fecal material adds pathogens to the water, thus reducing water quality. A reduction of resident Canada goose feces at the park could improve water quality.

Floodplains—The geographic study area for the 100-year floodplain includes areas within the park that could be impacted by wetland and resident Canada goose management activities, including adverse to beneficial impacts to floodplains through reconnection with the Anacostia River and restoration of floodplain functionality.

Wetlands—This impact topic includes the tidally influenced freshwater and non-tidal wetland systems within Anacostia Park. Some wetland habitats that have been restored within the park are being damaged in part by resident Canada geese that are overgrazing wetland plants, which are important to the health of the Anacostia River. Emergent and submerged aquatic vegetation that comprise the tidal marshes and fringe wetlands cannot sustain viable seasonal growth due to the intense grazing pressures from resident Canada geese, thus reducing the survival of the plantings. Other wetland restoration issues include hydrologic regime, planting methods including species selection and existing seed bank, insects and disease, engineered marsh soils, and sediment quality.

Aquatic Resources—This topic includes benthic invertebrates, finfish, and shellfish that could be impacted by wetland and goose management activities.

Vegetation and Wildlife—This topic includes terrestrial vegetation and habitat, wildlife species (not including resident Canada geese), rare/unusual vegetation, as well as invasive species. Factors affecting habitat and vegetation (including wetlands and uplands) in Anacostia Park include the encroachment of invasive and non-native plant species, erosion and sedimentation, sea level rise, and urbanization. In addition, as discussed under wetlands above, resident Canada goose overgrazing of wetland plants affects the quality of wetland habitat at Anacostia.

In 2001, Congress addressed the need for wildlife conservation and developed new conservation funding legislation that includes the *Wildlife Conservation and Restoration Program* and *State Wildlife Grants Program*. Each of these programs required all states, including the District, to submit a wildlife action plan to the USFWS by October 2005. The District WAP identifies species of greatest conservation need and their habitats as well as listing and giving the status and trends of the species of special concern and priority habitat types. Therefore, animal species of concern (not including federal and state listed species) have been identified at Anacostia Park through the District Wildlife Action Plan. These animal species are discussed under this section titled “Vegetation and Wildlife” in the plan/EIS.

Resident Canada Geese—Some Canada geese have become non-migratory in their new habitats due to a variety of reasons and have formed year-round resident populations within extensively urbanized areas of the District, including Anacostia Park. As a result of the growing resident Canada goose population, the tidal wetland restoration efforts within the park have been jeopardized by these grazing resident Canada geese. This plan/EIS presents a suite of possible techniques for goose management that will have a range of affects to resident Canada geese within Anacostia Park. Resident Canada goose populations at Anacostia are considered “nuisance species” and as such may be managed using a variety of methods available (NPS 2006, section 4.4.5 “Pest Management”).

Cultural Resources—This impact topic includes prehistoric/historic structures and archaeological resources. These resources could be impacted by wetland and goose management activities.

Park Management and Operations—This topic includes the current management and operations at the park as well as the long-term management of resources or productivity at the park. Park management and operations refers to the availability of park resources to protect and preserve vital park resources and provide for an effective visitor experience. Wetland and resident Canada goose management activities have the potential to impact staffing levels and the operating budget necessary to conduct park operations to provide for beneficial visitor experiences.

Visitor Use and Experience—This topic includes recreation (supply, demand, visitation, and activities), soundscapes, and aesthetic resources as well as visitor use and experience; health and safety issues are also generally discussed under this resource topic. Anacostia Park is one of the District’s largest and most important recreation areas. Visitors are attracted to Anacostia Park for various reasons. Walking, bike riding, picnicking, basketball, tennis, roller skating, golfing, soccer, Frisbee, and boating are all popular activities available to the public at the park. Resident Canada geese are impacting the public use of the park due to excessive accumulation of fecal material (specifically at Langston Golf Course) and overgrazing of mowed/maintained areas. Resident Canada geese are denuding restored wetland areas, thus detracting from the visitor experience at the park.

OTHER ISSUES CONSIDERED BUT DISMISSED FROM FURTHER CONSIDERATION DURING INITIAL SCOPING

Air Quality—Section 118 of the 1963 *Clean Air Act* (CAA) (42 United States Code [USC] 7401 et seq.) requires a park unit to meet all federal, state, and local air pollution standards. Further, the CAA provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. *NPS Management Policies 2006* directs parks to seek the best air quality possible in order to “preserve natural resources and systems; preserve cultural resources; and sustain visitor enjoyment, human health, and scenic vistas” (NPS 2006a).

Wetland and resident Canada goose management activities as described under the proposed alternatives include some construction activities that may generate particulates in the short-term, but no long-term impacts on air quality are anticipated. Criteria pollutant emissions including carbon monoxide and particulate matter are normally generated during construction phases of projects. Construction activities that may cause emissions that will be implemented as a result of this plan/EIS such as creating tidal guts, removal of the sheet piling, or installing boardwalks/trails will require additional NEPA documentation in the form of a categorical exclusion or an EA. These NEPA documents will tier off this plan/EIS and will analyze and evaluate in detail any criteria pollutant emissions generated during the construction phases of future projects. Other activities that are analyzed under this plan/EIS that will not require additional NEPA documentation such as trucks used to round up geese and construction vehicles proposed for the vegetation buffer plantings resulting in short-term negligible to minor, adverse impacts to air quality during implementation. Because no long-term, adverse impacts to air quality are anticipated from any of the alternatives (including the no action alternative), this topic was dismissed from further analysis.

Geology and Topography—Anacostia Park is located within the Atlantic Coastal Plain physiographic province. The Coastal Plain is characterized by gently rolling hills and valleys. It is underlain by a southeastwardly thickening sequence of sediments that consists of sand and gravel aquifers interlayered with silt and clay confining units (DCFWD 2001). Elevations in the Coastal Plain range from 0 to 200 feet National Geodetic Vertical Datum (NGVD). Streams in the Coastal Plain, including the Anacostia River, are characterized as sluggish and meander slowly, although most have been channelized to reduce flooding and erosion (USACE 1994). Wetland and resident Canada goose management activities described under the proposed alternatives would not result in an impact to the geology or topography of the area.

Geohazards—No effects related to wetland and resident Canada goose management would occur from geohazards because no such hazards exist in the park.

Prime and Unique Farmlands—According to the *Farmland Protection Policy Act*, farmland (either prime or unique) does not include farmland already “in or committed to urban development.” The *Farmland Protection Policy Act* does not apply to this project because the dominant soil type in the

Anacostia area is not farmed and is mapped as Urban land and various types of Udorthents soil, which are not considered prime or unique farmland (USDA NRCS 2006).

Groundwater—The aquifers that underlie the Coastal Plain near Anacostia Park include the Patapsco aquifer and the Patuxent aquifer. Due to the high amount of impervious surfaces in the District, the total amount of rainfall that infiltrates into the ground is reduced, creating lower groundwater levels and diminished base flows in perennial streams. The management alternatives may have reductions in impervious surfaces; however, no detectable changes to groundwater are anticipated.

Marine or Estuarine Resources—There are no marine or estuarine resources exist in Anacostia Park.

Essential Fish Habitat—Essential fish habitat is defined to include “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Based on review of essential fish habitat designations in Maryland and Virginia, the project are does not lie within waters designated as essential fish habitat (NOAA 2008).

Unique Ecosystem, Biosphere Reserves, World Heritage Sites—No unique ecosystems, biosphere reserves, or World Heritage Sites exist in Anacostia Park.

Designated Critical Habitat—Critical habitat is defined in the *Endangered Species Act* (ESA) as a specific geographic area that contains habitat features essential for the conservation of a threatened or endangered species. There is no designated critical habitat in the Anacostia Park or the District (USFWS 2008).

Cultural Landscapes—According to the NPS’s *Cultural Resource Management Guideline* (Director’s Order # 28), a cultural landscape is:

...a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

Cultural landscapes within Anacostia Park have not been formally evaluated by NPS; however, the park considers Kenilworth Aquatic Gardens as a designed cultural landscape and has plans to inventory that property as a cultural landscape. Since Kenilworth Gardens is already listed on the National Register of Historic Places (NRHP) and its boundary encompasses the entire gardens, possible impacts on the property will be assessed so there it is unnecessary to include cultural landscapes as an impact topic.

Ethnographic Resources—Ethnographic resources are defined by the NPS as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (Director’s Order # 28, *Cultural Resource Management Guideline*, 181). In this analysis, the NPS’ term “ethnographic resource” is equivalent to the term “Traditional Cultural Property” (TCP), which is more widely used in the cultural resource management industry, and it would include sacred sites. Guidance for the identification of ethnographic resources is found National Register Bulletin #38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1998). The key considerations in identifying TCPs are their association with cultural practices or beliefs of a living community that are rooted in the community’s history and are important in maintaining the continuing cultural identity of the community (Parker and King 1998, 1). There are no properties that meet the definition of a TCP within the study area, therefore ethnographic resources was dismissed as an impact topic.

Rapid Ethnographic Assessment Procedures for Anacostia Park in 1997 was completed for the NPS to assist in the development of management plans for the park. The study divided Anacostia Park into seven study areas: Anacostia Park, the Seafarers Boat Club, River Terrace, Kingman Park, Kenilworth Park, and Kenilworth Gardens. The report concluded that overall, the park “receives heavy, year-round use and serves visitors of different class and ethnic backgrounds from around the region” (Juarez and Associates 1997). However, certain areas of the park have strong African-American ethnographic ties such as the Seafarers Boat Club and Kingman Park, which includes Langston Golf Course.

Because the undertaking will neither alter the function nor restrict the use of the park, there will be no effect on ethnographic groups. Because there are no properties that meet the definition of a TCP within the project area, and because the use of Anacostia Park by ethnographic groups will not be affected by the proposed actions, ethnographic resources were dismissed as an impact topic.

Tribal Use Plans or Policies—Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights; and it represents a duty to carry out the mandates of federal law with respect to American Indian tribes and Alaska Native entities. There are no Indian trust resources in, near, or associated with Anacostia Park, and the lands comprising Anacostia Park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, this impact topic was dismissed from further analysis in this report.

Museum Collections—Implementation of any alternative would have no effects upon museum collections (historic artifacts, natural specimens, and archival and manuscript material); therefore, museum collections was dismissed as an impact topic.

Energy Resources—This topic includes energy, conservation potential, and sustainability. No impacts to energy resources are anticipated under this plan, because none of the proposed alternatives would affect energy resources.

There is strong evidence linking global climate change to human activities, especially greenhouse gas emissions associated with burning fossil fuels (IPCC 2007). Some of the activities associated with wetland and goose management would result in fossil fuel consumption. For example, vehicle trips by park staff and volunteers to implement wetland and goose management techniques would consume fossil fuels. However, these trips would result in a negligible increase in park wide emissions. Therefore, the contribution of wetland and goose management actions to climate change through greenhouse gas emissions was dismissed from further analysis. Any anticipated changes in the physical environment from climate change are discussed in chapter 3.

Other Important Resources—This topic includes geothermal, paleontological resources, and any other important resources. No other important resources have been identified at Anacostia Park.

OTHER ISSUES CONSIDERED BUT DISMISSED FROM FURTHER CONSIDERATION FOLLOWING DETAILED ANALYSIS

The following resources were analyzed in detail while drafting this plan/EIS. This analysis determined that each of the alternatives (A through E) would have negligible impacts to these resources. Therefore, the resources described below were dismissed from further consideration in this plan/EIS.

Sediment Quality—This topic describes the characteristics of and the amount of contaminants contained within sediment. It has been recognized for many years that sediment quality (and water quality) in the Anacostia River are highly degraded due to point source, non-point source pollution, and refuse (USEPA and NOAA 2009). Overall, the morphology of the tidal river system has been dramatically altered which has affected sediment quality. This condition reflects the impacts of seawall construction, mainstem navigational dredging, and associated filling, which collectively led to the destruction of the river's once-thriving riverine fringe wetlands. These efforts were undertaken in attempting to manage the massive sediment inputs generated by upstream erosion (DCOP 2003). The bottom of the tidal portion of the Anacostia River is heavily silted in and flows are highly turbid and slow-moving (USACE 1994). Because the lower reaches of the Anacostia River are tidally influenced, the slow moving water causes contaminants to settle out of the water column into bottom sediments and prevents flushing that might otherwise remove some of the contamination (USEPA and NOAA 2009).

Currently, the Anacostia River continues to suffer from high levels of suspended solids (sediment) eroded from stream banks and washed into the river from streets, sidewalks, rooftops, and construction sites. These suspended solids are referred to as total suspended solids (TSS) and defined as solids in water that can be trapped by a filter. The Anacostia River is mostly an embayment of the Potomac River, with very low flow rates compared to the Potomac. The sluggish nature of the tidal Anacostia River causes it to act as a very effective sediment trap. It has been estimated that approximately 85 percent of the incoming sediment load is deposited in the tidal river and remains trapped there (MWCOC 2007). Sediment particles serve as binding sites for a broad range of urban pollutants and toxicants. These pollutants include petroleum hydrocarbons, trace metals such as lead, mercury, cadmium, copper and zinc, polychlorinated biphenyls (PCBs), pesticides, herbicides, nutrients, and bacteria. Sediment contaminant levels in the Anacostia River are high enough in organic pollutants such as PCBs, chlordane and polycyclic aromatic hydrocarbons (PAHs) for there to be advisories on fish consumption from the Anacostia River (USGS 2006a).

Because no new wetland restoration techniques and no population reduction strategies for the resident Canada goose are proposed as part of the no action alternative, grazing of shoreline areas by geese would continue and result in the removal and loss of turf, terrestrial vegetation, and/or wetland vegetation. When vegetation that protects waterways is removed, sediment transport can occur and affect the quality of the waterbody (USFWS 2005). However, continued negligible impacts to sediment quality are anticipated as a result of the no action alternative because it is unknown if the current sediment load entering the Anacostia River from other sources is contaminated. Impacts to sediment quality are expected to be negligible for all alternatives. For all action alternatives, sediment quality could be improved if the eroded sediment that is reduced is contaminated; however, sediment quality would not improve if the eroded sediment that is reduced is not contaminated (such as sediments originating from stream bank erosion). For all alternatives (including the no action alternative), any increase or decrease in sediment loads would be undetectable in comparison to the sediment loads currently entering the waterway from other sources.

Submerged Aquatic Vegetation (SAV)—This topic includes marine angiosperms (the so-called true seagrasses) and freshwater macrophytes. The Virginia Institute of Marine Science (VIMS) conducts annual aerial surveys to map the extent and coverage of SAV in waterbodies, including the Anacostia River. From the most recent SAV survey conducted in 2007, no SAV was reported within quadrats covering the Anacostia River within Anacostia Park. Water quality, especially water clarity (turbidity), is influential on the success of SAV, which could explain the absence of SAV within the turbid Anacostia River (USGS 2006a). The most recent report of SAV in the Anacostia River within Anacostia Park occurred during the year 2002, within the channel and located north of the I-295 Bridge. Approximately 2.70 hectares of hydrilla were mapped in this location by VIMS (Orth et al. 2008). Hydrilla is characterized by the U.S. Department of Agriculture (USDA) as a noxious weed.

Water quality influences the distribution of SAV and the absence of SAV within the Anacostia River can be explained by high turbidity (USGS 2006a). No wetland management techniques are being proposed to improve water quality as part of the no action alternative, and therefore, continued negligible impacts to SAV in the park are anticipated as a result of the no action alternative because no observable change in the distribution of SAV is expected. Although improvements to wetlands and thus water quality are expected from alternatives B and C, limited SAV currently exists in Anacostia Park and any improvement in water quality is not expected to cause a perceptible change for SAV species. Therefore, impacts to SAV from the no action alternative and all management alternatives are negligible due to the limited SAV that currently exist in the Anacostia River within the park and because no observable change in the distribution of SAV is expected.

Species of Special Concern—This topic includes all federal or state listed plant or animal species or proposed for listing and their habitat. In addition to federal and state-listed species, other animal species of concern have been identified at Anacostia Park through the District WAP (the plan does not identify plant species). These animal species have not been dismissed and are discussed under the “Wetlands” and “Vegetation and Wildlife” sections in this plan/EIS.

The Endangered Species Act of 1973 was enacted to protect plant and animal species considered to be in danger of extinction. The ESA affords legal protection to species listed as endangered and threatened, including protection of their habitats. The ESA requires federal agencies to undertake affirmative action to protect and restore populations of listed threatened and endangered species and to prevent proposed and candidate species from being listed. The USFWS of the Department of the Interior and the National Oceanic and Atmospheric Association’s (NOAA) National Marine Fisheries Service share responsibility for administration of the ESA of 1973. On October 20, 2005, NPS consulted with the USFWS and NOAA-Fisheries to identify any endangered or threatened species within the proposed project area. A response was received on November 10, 2005 stating that none of the federally endangered or threatened species under the USFWS jurisdiction is known to occur within Anacostia Park (appendix A). Therefore, no biological assessment or further section 7 consultation with the USFWS is required. A response was received from NOAA-Fisheries on November 22, 2005 stating that the endangered shortnose sturgeon (*Acipenser brevirostrum*) has been documented in the Potomac River. Transient shortnose sturgeon may occur in the Anacostia River; however, the types of activities associated with this project would not affect the shortnose sturgeon. No further section 7 consultation would be required (appendix A). A second consultation letter was sent to the USFWS on December 22, 2009 explaining that after initial consultation it was determined that an EIS was necessary for the wetland and goose management plan. The letter further described the project. A response was received on January 6, 2010 stating that except for the occasional transient individuals, no federally listed endangered or threatened species are known to exist within the project impact area and no further section 7 consultation is required (appendix A). Therefore, impacts to shortnose sturgeon as a result of the no action alternative and all action alternatives are expected to be no effect.

State listed rare, threatened, and endangered species are managed by the District Fisheries and Wildlife Division (DFWD). The mission of DFWD is to determine the status of fisheries and wildlife resources within the District area, ascertain how they interact, and actively manage the resources so that they can endure, through protection, conservation, and education (DCDE 2006). The DFWD, Wildlife Research Branch was established in 2000 and began implementing the District Natural Heritage Program (NHP) in 2005. The NHP inventories, catalogues and facilitates protection of rare and outstanding elements of the natural diversity of the United States. The plant and animal species identified by the NHP are species that merit conservation action and the NHP provides the data regarding the listing of all species occurring within the District. The Hay’s Spring amphipod (*Stygobromus hayi*) is the only species in the District that is recognized as being state-listed as endangered (Whitworth 2008). However, the Hay’s Spring amphipod is only known from one population inhabiting an underground aquifer; the amphipod has been

collected from a single spring at the south end of National Zoological Park and near Rock Creek Park within the District (Pavek 2002). Therefore, because the amphipod is not located within the project area, there are no impacts to the amphipod as a result of the no action alternative or the action alternatives.

Socioeconomics—This topic includes demographics, economy, housing, and land use (occupancy, income, values, ownership, type of use). Wetland management and goose management techniques would not create few additional jobs accessible to any populations in the areas surrounding Anacostia Park. Residents in the adjacent communities could participate in the proposed volunteer opportunities such as planting new vegetation, maintaining fencing and studying water quality in the wetlands. The increased educational opportunities, however, would not impact the population's ability to secure employment. When combining each of these factors that impact socioeconomics such as jobs, educational opportunities, and the supply of donated food in the areas surrounding the Park (due to lethal goose management actions), impacts to socioeconomics would be negligible for all alternatives, including the no action alternative.

Environmental Justice—EO 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” requires federal agencies to make achieving environmental justice part of its mission. Specifically, each agency must identify and address “disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” The intent is to prevent minority and low-income populations from being disproportionately affected by adverse human health and environmental impacts of federal actions. The minority population is defined as the non-white and multi-racial population of a given area and includes African-American, Asian, American Indian, Native Alaskan, Native Hawaiian, Pacific Islander, persons reporting some other race, and persons reporting two or more races. Minorities comprised 69 percent of the total population in the District in 2000. Anacostia Park is located in a community with a large low-income, minority population.

Although Anacostia Park is located in a community with a large low-income, minority population, none of the alternatives (including the no action alternative) would result in disproportionate impacts to these populations. The local residents of the Anacostia Park area would continue to use Langston Legacy Golf Course and other open spaces throughout the park.

Land Use—The land use within the Anacostia watershed follows the general pattern of other metropolitan areas, with the densest development occurring near the urban center. Over 80 percent of the watershed surrounding the lower Anacostia River is heavily developed with large impervious surfaces (NOAA 2007a). The average impervious surface of the entire watershed ranges from 22 to 48 percent (AWRP 2007). Residential use is the largest single land use within the area, comprising more than 43 percent of the watershed (AWRP 2007). Typically, the surrounding neighborhoods have medium- to high-density row houses and multifamily homes that were built between 1900 and 1950. In addition to the residential communities, commercial and industrial activities occur in close proximity to the river. Some of the larger commercial and industrialized areas located adjacent to the Anacostia Park and shoreline include the RFK Memorial Stadium and associated parking areas, Washington Navy Yard, Congressional Cemetery, the District General Hospital, PEPCO Electrical Service, and Anacostia Senior High School. Most industrialized areas are located along the tidal portion of the river.

Approximately 30 percent of the Anacostia watershed is forest and parks, including the 1,200 acres of land and 11 miles of the Anacostia River shoreline that is managed by the NPS. Anacostia Park includes forested, wetland, landscaped, and turf areas. The southern portion of the park (below the railroad bridge and boat ramp) contains the most developed recreation facilities. The northern part of the park is one of the best places in the region to view wildlife. Additional parks within the Anacostia watershed located adjacent to the park include the National Arboretum and Kenilworth Parkside. Other land use within the

park includes the National Capital Parks - East Headquarters and the U.S. Park Police training center and helipad.

Land use at Anacostia Park is mainly dedicated to the pursuit of natural areas within an urban city and the enjoyment of recreational opportunities. The current land use as a result of this plan/EIS would not change, so impacts to land use would be negligible as a result of the no action alternative and the action alternatives.

Visitor and Employee Health and Safety—This topic includes the health and safety of the public, volunteers, and Park employees of Anacostia Park. Although fecal droppings from resident Canada geese have been mentioned as a public safety issue (MDNR 2009), this has not been demonstrated as a safety concern at Anacostia Park, but rather a public nuisance issue (NPS 2010a) and is discussed under the “Visitor Use and Experience” section in this plan/EIS. In the USFWS’s *Final EIS for Canada Goose Management* (2005), the state of Maryland noted concern about the potential wildlife disease threat posed by concentrations of resident Canada geese. Local concentrations of resident Canada geese may congregate and waterbodies (stagnant pools) can be contaminated by fecal material and are a potential source of avian diseases, especially when temperatures are high. Although the Anacostia River does have backwater and is stagnant, the tidal nature of the waterbody would probably not allow avian diseases carried by resident Canada geese to concentrate enough to pose a health hazard to visitors and employees. Some studies have confirmed the presence of disease pathogens in goose feces, so presence of feces in water or on the ground where humans may contact them is a legitimate health concern (USFWS 2005). However, disease transmission between resident Canada geese and visitors or employees at Anacostia Park has not been documented, and therefore, these impacts cannot be quantified and are considered negligible for all alternatives. Besides avian diseases, there is also the threat of attacks on children and adults by nesting geese, although such attacks have not been quantified or recorded for Anacostia Park. There is the potential for park employees to be attacked while conducting goose management reproductive control techniques such as egg oiling and during the scare/harassment program, although such attacks have not been quantified or recorded for Anacostia Park. Impacts to visitor and employees as a result of goose attacks are considered negligible for all alternatives.

For the management alternatives, reducing the goose population could result in less goose waste, thereby reducing the potential risk of visitors and employees being infected from goose-related pathogens, but this reduction is considered imperceptible. The no action alternative and alternative F would not remove resident Canada geese from the park. Therefore, impacts to visitor and employee health and safety would be negligible. Management alternatives B through E would also result in negligible impacts to visitor and employee health and safety. For these alternatives, the NPS would take all possible measures to comply with safety regulations and avoid any incidents associated with these activities.

There are a number of contaminated sites documented along the Anacostia River in the District, which release hazardous substances into the river and its tributaries. It is unlikely that impacts to visitor and employee health and safety would occur from these contaminated sites as a result of the any of the alternatives in this plan/EIS. However, additional NEPA analysis may be required for some future management projects prior to construction or implementation of these projects; these NEPA documents would adequately address any site-specific contamination issues.

Although not a problem at Anacostia Park, high populations of flightless geese can pose a threat to automobile traffic when they are drawn across public roads; high populations can also pose a serious safety hazard when goose populations congregate near airports and also when in flight near airports. The recent bird (Canada goose) ingestion incident for U.S. Airways Flight 1549 in New York City on January 15, 2009 demonstrated the potential for catastrophic hazards posed by such large birds in close proximity to an airport, and the potential for loss of life due to wildlife strikes with aircraft. The U.S. Airways plane

took off from New York's LaGuardia Airport, collided with a flock of migratory Canada geese approximately 2,900 feet above the ground, and extensively damaged both engines 5 miles from the airport. Ronald Reagan Washington National Airport (Airport) is located approximately 1.8 miles from the South Capitol Street Bridge and Anacostia Park. In a letter dated March 26, 2009, the Airport expressed strong concerns to the NPS regarding the local bird population residing on the adjacent NPS George Washington Memorial Parkway property, including the potential for serious aircraft bird-strike related damage. Representatives from the Airport, the NPS of George Washington Memorial Parkway, and the USDA Wildlife Service have met to discuss implementation of bird control measures to be considered along the parkway to reduce the potential risk of aircraft damage that has been occurring as a result of bird strikes by Canada geese and other birds in the immediate vicinity of the Airport. Therefore, the action alternatives that include lethal control proposed in this plan would address concerns by the Airport for serious aircraft bird-strike related damage, specifically damage from Canada geese and should result in beneficial impacts to health and human safety.

RELATED LAWS, POLICIES, PLANS, AND CONSTRAINTS

NPS RELATED LAWS, POLICIES, PLANS, AND CONSTRAINTS

This section describes applicable federal policies, Eos, and regulations and how they relate to each resource that is being considered. In addition, NPS *Management Policies 2006* (NPS 2006a) was used for guidance for numerous impact topics. Other regulations specific to NPS include the Director's Orders and the NPS Organic Act of 1916 as described in more detail below.

NPS Organic Act—By enacting the NPS *Organic Act of 1916*, Congress directed the U.S. Department of the Interior and the NPS to manage units of the NPS “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 USC 1). The *Redwood National Park Expansion Act of 1978* reiterates this mandate by stating that the NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a-1). Despite these mandates, the *Organic Act* and its amendments afford the NPS latitude when making resource decisions.

NPS Management Policies 2006—Several sections from NPS *Management Policies 2006* (NPS 2006a) are relevant to wetland restoration and resident Canada goose management in Anacostia Park, as described below.

The NPS Management Policies 2006 instruct park units to maintain as parts of the natural ecosystems of parks all native plants and animals native to park ecosystems.

The NPS *Management Policies 2006* instruct park units to maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The NPS will achieve this maintenance by “preserving and restoring the natural abundance, diversities, dynamics, distribution, habitats, and behaviors of native plants and animal populations and the communities and ecosystems in which they occur” (NPS 2006a, sec. 4.4.1). The NPS *Management Policies 2006* (NPS 2006a) also recognize that resource conservation takes precedence over visitor recreation. The policy dictates, “when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant” (NPS 2006a, sec. 1.4.3). Because conservation remains predominant, NPS seeks to avoid or to minimize adverse impacts on park resources and values; however, the agency has discretion to allow negative impacts when necessary (NPS 2006a, sec. 1.4.3).

Section 4.4 of the NPS *Management Policies 2006* (“Biological Resources”) includes many statements specifically applicable to this plan/EIS that are described in more detail in the sections below. Section 4.4.2 of the NPS *Management Policies 2006* (“Management of Native Plants and Animals”) provides that NPS may intervene to manage individuals or populations of native species when an ecosystem supports them. This section also states that management is necessary when a population occurs in unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences (NPS 2006a, sec. 4.4.2).

Also, Section 4.4.2.1 of the NPS *Management Policies 2006* (“NPS Actions That Remove Native Plants and Animals”) states, that where visitor use or other human activities cannot be modified or curtailed, the NPS may directly reduce the animal population by using several animal population management techniques, either separately or together. These techniques include relocation, public hunting on lands outside a park or where legislatively authorized within a park, habitat management, predator restoration, reproductive intervention, and destruction of animals by NPS personnel or their authorized agents. Where animal populations are reduced, destroyed animals may be left in natural areas of the park to decompose unless there are human safety concerns (NPS 2006a, sec. 4.4.2.1). Whenever NPS identifies a possible need for reducing the size of a park plant or animal population, the NPS will use scientifically valid resource information obtained through consultation with technical experts, literature review, inventory, monitoring, or research to evaluate the identified need for population management; the NPS will document it in the appropriate park management plan (NPS 2006a, sec. 4.4.2.1).

Section 4.4.4 of the NPS *Management Policies 2006* (“Management of Exotic Species”) states that exotic species will not be allowed to displace native species. All exotic plant and animal species that do not meet an identified park purpose will be managed.

Section 4.6 of the NPS *Management Policies 2006* (“Water Resource Management”) states how the service will perpetuate surface waters and groundwater as integral components of park aquatic and terrestrial ecosystems. Under the NPS *Management Policies 2006* Section 4.6.5, NPS will manage wetlands in compliance with NPS mandates and the requirements of EO 11990, “Protection of Wetlands,” the *Clean Water Act*, the *Rivers and Harbors Appropriation Act* of 1899, and the procedures described in Director’s Order 77-1: *Wetland Protection*. The NPS will:

1. Provide leadership and take action to prevent destruction, loss, or degradation of wetlands;
2. Preserve and enhance the natural and beneficial values of wetlands; and
3. Avoid direct and indirect support of new construction in wetlands, unless there are no practicable alternatives.

Specifically, Section 4.6.5 of the NPS *Management Policies 2006* (“Wetlands”) states that NPS will implement a “no net loss of wetlands” policy. In addition, the NPS will strive to achieve a longer-term goal of net gain of wetlands across the national park system through restoration of previously degraded or destroyed wetlands and that when natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human actions, the Service will, to the extent practicable, restore them to pre-disturbance conditions.

Section 4.9 of the NPS *Management Policies 2006* (“Soundscape Management”) states that the NPS will preserve, to the greatest extent possible, the natural soundscapes of parks.

Director’s Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-Making and Handbook—NPS Director’s Order #12: *Conservation Planning, Environmental Impact*

Analysis, and Decision-Making and its accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with NEPA. Director's Order #12 and the handbook set forth a planning process for incorporating scientific and technical information and for establishing an administrative record for NPS projects.

Director's Order #12 requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision makers to understand the implications of those impacts in the short- and long-term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

Director's Order #77-1: Wetland Protection—NPS Director's Order #77-1: *Wetland Protection* established the policies, requirements, and standards through which the NPS will meet its responsibilities to protect and preserve wetlands. The Order states “Where natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human activities, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbance conditions.” And “Where appropriate and practicable, the NPS will not simply protect, but will seek to enhance natural wetland values by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions.”

*NPS Director's Order #77-1,
Wetland Protection
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Natural Resource Reference Manual 77—The *Natural Resource Reference Manual #77*, offers comprehensive guidance for NPS employees responsible for managing, conserving, and protecting the natural resources found in National park system units. This manual replaces NPS-77 *The Natural Resource Management Guideline*, issued in 1991 under previous guideline series. To date, 16 of the 42 sections of NPS-77 have been revised.

OTHER LEGISLATION, COMPLIANCE, AND POLICY

In addition to policy and guidance specific to the NPS, the NPS is governed by other laws and regulations. Based on the scope of this plan, these include the following:

The National Historic Preservation Act of 1966, as Amended and Code of Federal Regulations, Title 36—This plan/EIS has been prepared in accordance with Section 106 of the National Historic Preservation Act of 1966 as amended, and implementing regulations, 36 CFR Part 800. The intent of this document is to comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA) of 1969, as amended (36 Code of Federal Regulations (CFR) Part 800.8).

Executive Order 11990, “Protection of Wetlands”—EO 11990, “Protection of Wetlands” directs federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Migratory Bird Treaty of 1918—The *Migratory Bird Treaty Act of 1918* implements various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the activities prohibited, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this

Convention...for the protection of migratory birds...or any part, nest, or egg of any such bird (16 USC 703).

Canada geese are federally protected by the *Migratory Bird Treaty Act* (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the Act, promulgated in Title 50 CFR parts 13 and 21, and issued by the USFWS. As promulgated in 1999, subpart C of part 21, Specific Permit Provisions, section 21.26 is the Special Canada Goose Permit, issued only to State wildlife agencies, authorizing certain resident Canada goose management and control activities. Section 21.27 pertains to special-purpose permits, which allow for the taking of migratory birds with compelling justification. In subpart D of part 21, section 21.41 pertains to general depredation permits and section 21.42 authorizes the Director of the USFWS to issue depredation orders to permit the killing of migratory game birds. The USFWS adopted special federal regulations (called “depredation orders” and “control orders”) in 2006 authorizing take of Canada geese without a federal permit in certain situations and is described in detail in Title 50, CFR, Part 21, Subpart D (50 CFR 21D: Control of Depredating Birds).

Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds”—This EO was signed in 2001 to define the responsibilities of federal agencies to protect migratory birds. This EO directs executive departments and agencies to take certain actions to implement further the act. Each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within two years, a memorandum of understanding with the USFWS that shall promote the conservation of migratory bird populations.

OTHER RELATED DOCUMENTS AND POLICIES

Plans and policies defined by other agencies or organizations that could also affect actions proposed under this plan include the following:

District of Columbia Environmental Policy Act—The District has an *Environmental Policy Act*; enacted in 1989, that parallels NEPA. This act was established to ensure the residents of the District safe, healthful, productive, and aesthetically pleasing surroundings; and to develop a policy to ensure that economic, technical, and population growth occurs in an environmentally sound manner. While NEPA applies to federal actions, the District’s *Environmental Policy Act* applies to local agencies’ actions that may have a significant effect on the quality of the environment. Undertakings that require federal, state, or local actions are subject to both the National and District’s *Environmental Policy Act* (D.C. 1989).

District of Columbia Wetland Conservation Plan—The District of Columbia *Wetland Conservation Plan* represents a strategy outlining the commitment of the District to the protection, restoration, and enhancement of its tidal and non-tidal wetlands. Highlighted in this strategy is the dual policy of “no net loss” of wetlands with a goal of an overall net gain of wetlands in the District. The strategy presents the current state of the District’s wetlands, examining potential and ongoing impacts to these resources while outlining a comprehensive plan to eliminate, minimize and/or mitigate these impacts. Finally, the strategy puts forth a framework for implementing a regulatory approach to protect, restore, and enhance wetlands within the District (D.C. 1997).

Anacostia Waterfront Initiative—In 2002, the District’s mayor brought together federal and district agencies that owned or controlled land along the Anacostia River to sign the *Anacostia Waterfront Initiative (AWI) Memorandum of Understanding (MOU)*. The AWI MOU created an unprecedented partnership between federal and District governments to transform the Anacostia River. The AWI environmental agenda included; eliminate pollution, control runoff, restore streams and wetland, and promote recreational water activities (DCOP 2000).

Anacostia Watershed Restoration Agreement—In 1984, Maryland and the District officially recognized the need for restoration within the Anacostia Watershed, leading to the 1987 *Anacostia Watershed Restoration Agreement*. The partnership established a six-point/goal action plan designed to restore the Anacostia River and its tributaries. The goals within the action plan include: 1) reduce pollutant loads; 2) protect and restore the ecological integrity of the Anacostia River and its tributaries; 3) restore the natural range of resident and anadromous fish; 4) increase the natural filtering capacity and habitat diversity by increasing acreage of quality wetlands; 5) protect and expand forest cover within the watershed; and 6) increase citizen and private business awareness in clean-up and economic revitalization of watershed (AWRC 1999). The *Anacostia River Watershed Restoration Plan and Report* was completed in February 2010.

USFWS Final Environmental Impact Statement on Resident Canada Goose Management—In 2005, the USFWS released a final EIS that evaluated alternative strategies to reduce, manage, and control resident Canada goose populations in the continental United States and to reduce goose-related damages. The objective of the EIS was to provide a regulatory mechanism that would allow state and local agencies, other federal agencies, and groups and individuals to respond to damage complaints or damages by resident Canada geese. The EIS was written as a comprehensive programmatic plan intended to guide and direct resident Canada goose population growth and management activities in the conterminous United States.

USFWS Wetlands Action Plan (WAP)—The WAP was published as *Wetlands: Meeting the President's Challenge (1990)* and was issued as National Policy Issuance #91-01 in 1990. The WAP was developed in response to the presidential goal of no net loss of wetlands and objectives included to consolidate, better coordinate, and improve USFWS wetlands conservation programs to contribute to the goal of no net loss of wetlands. Achieving the no net loss of wetlands was identified through a three-pronged approach, including wetlands protection; wetlands restoration, enhancement, and management; and wetlands research, information, and education. The WAP proposed solutions to many of the problems related to current federal wetlands programs contributing to wetland losses.

U.S. Department of Agriculture Documents—The USDA recognizes the damage that is created by resident Canada geese. Damages caused by the resident Canada goose include human health, crop depredation, wetland habitats, and flight hazards at airports. The USDA provides federal documents and fact sheets on the management of resident Canada geese.

District of Columbia Wildlife Action Plan—In 2006, the District of Columbia's Fisheries and Wildlife Division developed the *2006 Wildlife Action Plan*. The plan outlines the major threats to the District's species of greatest conservation needs and their habitat. In addition, the *Wildlife Action Plan* details actions for conserving its wildlife species of greatest conservation need. Some strategies for conservation of wildlife species include prevention of habitat loss, reducing and controlling invasive and alien species, reduction of over-browsed populations, and the reduction and control of predation.

Chesapeake 2000—*Chesapeake 2000* is an agreement by Virginia, Maryland, Pennsylvania, the District, U.S. Environmental Protection Agency (USEPA), and the Chesapeake Bay Commission to sustain a Chesapeake Bay Watershed Partnership. This partnership is committed to identify the essential elements of habitats and environmental quality necessary to support the living resources of the Chesapeake Bay. This document provides goals to restore, preserve, and protect living resources, habitats and natural areas, water quality, land use practices, and education and community engagement (CBP 2000).

Resolution to Enhance Federal Cooperative Conservation in the Chesapeake Bay Program—On October 7, 2005 federal agencies signed an agreement to rededicate themselves to cooperative conservation in support of the Chesapeake Bay Program. The agreement provides a list of actions that the

federal agencies will undertake to enhance cooperation in conservation for the Chesapeake Bay Program (CBP 2005).

IMPAIRMENT OF NATIONAL PARK RESOURCES

In addition to determining the environmental consequences of implementing the preferred and other alternatives, *NPS Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether proposed actions would impair a park's resources and values. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park. That discretion is limited by the statutory requirement that the NPS must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (*NPS Management Policies 2006*). Whether an impact meets this definition depends on the particular resources that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts. An impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. Impairment may result from visitor activities, NPS administrative activities, or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. Impairment findings are not necessary for visitor experience, public health and safety, environmental justice, and park operations, etc. because impairment findings relate back to park resources and values. The determination of non-impairment for the preferred alternative is found in appendix B.

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