National Park Service
U.S. Department of the Interior

Anacostia Park

ANACOSTIA PARK

Wetlands and Resident Canada Goose

Management Plan/Environmental Impact Statement

Final

October 2014

UNITED STATES DEPARTMENT OF THE INTERIOR – NATIONAL PARK SERVICE
FINAL ANACOSTIA PARK WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

Anacostia Park

Lead Agency: National Park Service, U.S. Department of the Interior

This *Final Anacostia Park Wetlands and Resident Canada Goose Management Plan and Environmental Impact Statement (plan/EIS)* was prepared for the Anacostia Park in the District of Columbia. This plan/EIS describes a general plan at the programmatic level for the management of existing, restored wetlands and resident Canada (non-migratory) geese within Anacostia Park. This plan/EIS describes five alternatives, including the preferred alternative (chosen from alternatives A-E), for the management of wetlands and resident Canada geese, and details the resources that would be affected by the alternatives and the environmental consequences of implementing these alternatives.

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 would be an integrated tool for the long-term planning and management of restored wetlands and resident Canada geese at the park. While the creation of new wetlands is outside the scope of this plan/EIS and would require additional NEPA compliance, the concepts presented in this plan/EIS would apply to previously restored wetlands and any wetlands restored in the future at Anacostia Park.

Under Alternative A (no action), there would be no additional measures implemented for the management of wetlands or resident Canada geese at Anacostia Park, and current management practices would continue. Alternatives B through E offer combinations of high and low intensity techniques for wetland and resident Canada goose management, which are described fully in the alternatives chapter (chapter 2). Low intensity wetland and resident Canada goose management represent the least number of techniques and the fewest locations available for the park to implement those techniques. High wetland and resident Canada 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 resident Canada goose management would fall between the low and high intensity, depending on the alternative. Specifically, alternative B, which is the preferred alternative, combines high wetland management with high resident Canada goose management techniques (includes lethal control); alternative C combines high wetland management with moderate resident Canada goose management techniques (includes lethal control); alternative D combines low wetland management with low resident Canada goose management techniques (includes lethal control); and alternative E combines high wetland management with moderate resident Canada goose management techniques (no lethal control). Alternative B is the NPS preferred alternative, and the environmentally preferred alternative. The plan/EIS analyzes the impacts of the alternatives on physical resources (soils); water resources (including hydrology, water quality and floodplains); wetlands; natural resources (including aquatic resources, vegetation and wildlife, resident Canada geese); cultural resources (including historic structures, districts, and objects, and archeological resources); park operations and management; and the visitor use and experience (including soundscapes and aesthetics and urban quality).

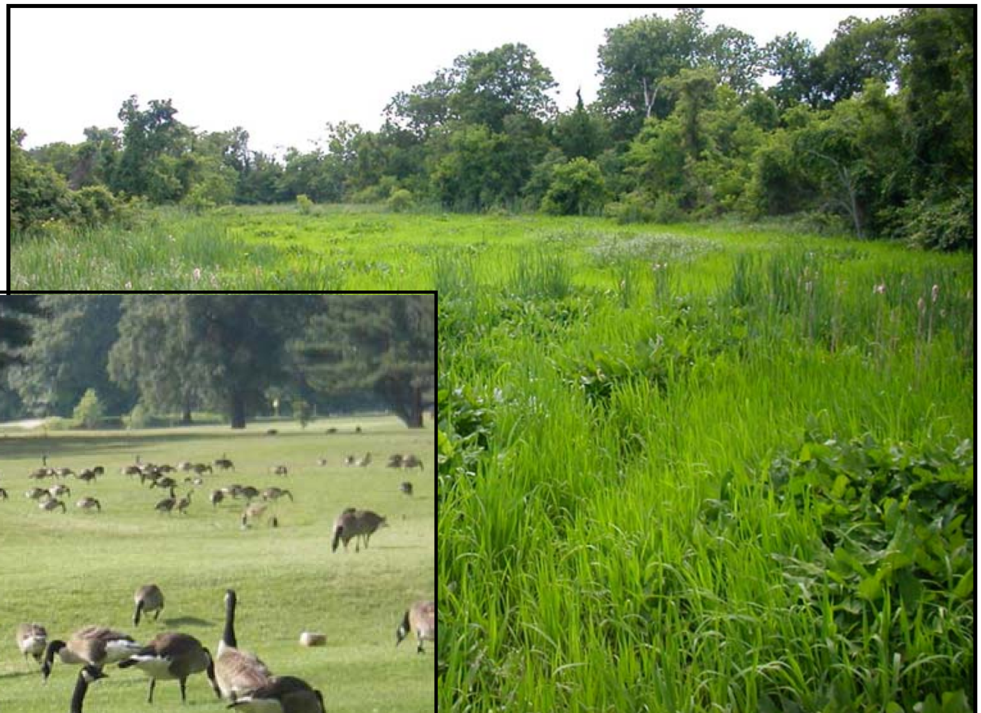
The draft version of the plan/EIS was released in July 21, 2011, and was available for public and agency review and comment beginning with publication of the notice of availability in the Federal Register. Comments were accepted until September 26, 2011. After this public review, NPS revised this document in response to public comments. A 30-day no-action period will follow the notice of availability in the Federal Register for the release of the final version of this document. After this period, the alternative or actions constituting the approved plan will be documented in a record of decision that will be signed by the Regional Director of the National Capital Region of the NPS. For further information regarding this document, please visit www.parkplanning.nps.gov/anac.

Gopaul Noojibail, Acting Superintendent
National Capital Parks-East
1900 Anacostia Dr. SE
Washington, D.C. 20020
202-690-5197

National Park Service
U.S. Department of the Interior

Anacostia Park
Washington, D.C.

Final Anacostia Park Wetlands and Resident Canada 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 would be implemented through the environmental impact statement (EIS), which would 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 would be an integrated tool for the long-term planning and management of restored wetlands and resident Canada geese at the park. While the creation of any new wetlands is outside the scope of this plan/EIS and would require additional NEPA compliance, the concepts presented in this plan/EIS would apply to previously restored wetlands and any wetlands restored in the future at Anacostia Park. The alternatives evaluated in this plan/EIS rely on the use of adaptive management to guide the implementation of the preferred alternative, which would 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 would "tier to" or reference this plan/EIS. Site-specific NEPA analysis, when required, would 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 under the management of NPS and within 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 (MWCOG 2007). 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 would 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 resident Canada goose management. Wetland management includes the following elements: hydrology, vegetation, cultural/education, wetland restoration, and park operations. Resident Canada 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 plant 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 resident Canada goose management regardless of constraints such as costs and feasibility. However, the type, number, and intensity of wetland management techniques and resident Canada 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 resident Canada goose management, which are described fully in the alternatives chapter (chapter 2). Low intensity wetland and resident Canada goose management represent the least number of techniques and the fewest locations available for the park to implement those techniques. High wetland and resident Canada 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 resident Canada goose management would fall between the low and high intensity, depending on the alternative. Specifically, alternative B, which is the preferred alternative, combines high wetland management with high resident Canada goose management techniques (includes lethal control); alternative C combines high wetland management with moderate resident Canada goose management techniques (includes lethal control); alternative D combines low wetland management with low resident Canada goose management techniques (includes lethal control); and alternative E combines high wetland management with moderate resident Canada 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 (the preferred alternative - very high wetland management and very high resident Canada goose management) and alternative C (high wetland management and moderate resident Canada goose management). The majority of negligible impacts to resources are associated with alternative E (high wetland management and moderate resident Canada goose management with no lethal control). The impacts as a result of alternative D (low wetland management and low resident Canada 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 would 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 unfenced wetland vegetation 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 (preferred alternative) and C propose more intense wetland and resident Canada goose management techniques, and therefore, have overall beneficial impacts to wetlands. Alternative D has short-term beneficial impacts to wetlands following resident Canada goose reduction activities, but long-term minor, adverse impacts to wetlands because of the combination of low wetland and low resident Canada 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 such as creating tidal guts and removing sheet piling 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 local (Maryland, or DC) or regional (Atlantic Flyway) resident Canada goose populations. Alternative B (preferred alternative) proposes more intense management techniques, and therefore, has a long-term moderate to major adverse impact on the resident Canada geese 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 local (Maryland or DC) resident Canada goose population level but not at the coastal route of the Atlantic Flyway resident Canada goose population level. Even though a percentage of the resident Canada goose population would be removed from the park as a result of alternative B (preferred alternative), alternative C, and alternative D, some resident Canada geese would remain in the park, including both resident and migratory geese. 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 local or regional (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; however, an overall, negligible impact on the resident Canada goose population would also occur under alternative D because there would be no observable or measurable impacts to the population of resident Canada geese within the park or to the local (Maryland, DC) or regional (Atlantic Flyway) resident Canada goose populations. Alternative E would have a negligible impact on the resident Canada goose population within the park because no lethal population reduction strategies would occur.

None of the current resident Canada 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 would be different expectations for different users of the park and the impacts as a result of the no action alternative, and management alternatives would 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. For all management alternatives, it is the intent of NPS to manage a population of resident Canada geese within the park and not to eradicate Canada geese. Even though a percentage of the resident Canada goose population would be removed as a result of implementing this plan/EIS, some Canada geese would remain in the park, including both resident and migratory geese. 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 resident Canada goose population would only 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 resident Canada goose population would not be drastically reduced during the life of the plan/EIS, and some visitors may avoid the Langston Golf Course because of the high numbers of resident Canada geese that utilize turf areas at the golf course.

Pursuant to the NPS Guidance for Non-Impairment Determinations and the NPS NEPA Process, a non-impairment determination for the selected alternative will be appended to the ROD.

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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
PEPCO	Potomac Electric Power Company
plan/EIS	Final 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 *Final Anacostia Park 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 would "tier to" or reference this plan/EIS. Site-specific NEPA analysis, when required, would 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 would be an integrated tool for the long-term planning and management of restored wetlands and resident Canada geese at the park. While the creation of new wetlands is outside the scope of this plan/EIS and would require additional NEPA compliance, the concepts presented in this plan/EIS would apply to previously restored wetlands and any wetlands restored in the future at Anacostia 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. Park staff believed the growing resident Canada goose population was jeopardizing the tidal wetland restoration efforts within the park. Data collected on the effects of goose herbivory at Kingman Marsh from 2009-2011 support these observations. The study involved monitoring fenced (exclosed) plots and unfenced control plots to document the effects of Canada goose herbivory on vegetation in Kingman Marsh. The exclosed plots used elevated fencing to permit access by herbivores such as fish and turtles but exclude mature Canada geese, whereas Canada geese had full access to the unfenced control plots. An analysis of the data collected from 2009-2011 documents that vegetation in the exclosed plots had significantly greater vegetative cover and species richness when compared to the vegetation in the unfenced control plots that were exposed to full Canada goose herbivory for three years (Krafft et. al 2012). Although the full U.S. Geological Survey study report must still undergo peer review, once completed, the NPS will make the final report available to the public.

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

The study described above (Krafft et. al 2010 and 2012) has demonstrated that grazing by resident Canada geese is damaging some restored wetlands at the park 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.

As a result, action is needed at this time to identify resident Canada goose management strategies to facilitate the success and functionality of current and future wetland restoration activities at the park.

Besides grazing pressures from resident Canada geese, other wetland restoration issues have been observed at Anacostia Park. 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), can result in varied levels of planting success at the 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.

Finally, a need to control invasive plant 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 would be consistent with the laws, policies, and regulations (e.g. NPS *Management Policies*, NPS Director’s Orders) 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. 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 current and future 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 and processes.

WILDLIFE AND WILDLIFE HABITAT

- Manage the resident Canada goose population within the park such that viable wetlands habitats 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

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

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 the Anacostia River Fringe Wetlands (figure 2). Heritage Island Wetlands were included within the discussion of Kingman Marsh for the analysis presented in this plan/EIS. This plan/EIS includes only those lands that are managed by NPS within 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 the management of NPS include the following:

1. The southern portion of Kingman Island and Heritage Island which were transferred to the District in 2003;
2. The Robert F. Kennedy (RFK) Memorial Stadium and adjacent parking areas (which are managed by the district); and
3. Approximately 20 acres of the west bank strip of Anacostia Park (Boathouse Row), between the 11^{th} Street Bridge and the CSX Railroad Bridge (transferred to the District government in 2008 per the Federal and D.C. Real Property Act of 2006).

As the NPS acquires new lands or assumes management of new areas along the Anacostia River, management actions described for alternative B (preferred alternative) in this plan/EIS would be applied. All other lands within Anacostia Park that are subject to special use permits, leases, and concession agreements by the NPS are included as part of the study area covered by this plan/EIS. Although RFK Memorial Stadium is not included in this plan/EIS as stated above, the narrow strip of NPS property adjacent to RFK (along the western shoreline of Kingman Lake) is included in this plan/EIS. Two additional sites are included in this plan/EIS and were incorporated after the public comment period. They include the following sites:

POPLAR POINT

Poplar Point is a 110-acre site that will be transferred to the District from NPS per the Federal and District of Columbia Real Property Act of 2006 for major redevelopment. The site is bounded by South Capitol Street, I-295 and the 11th Street Bridges. Poplar Point contains NPS and U.S. Park Police facilities, wetlands, woodlands and meadows, as well as various recreational facilities.

BARNEY CIRCLE

The area considered as "Barney Circle" varies, depending upon the context and the user. Generally, the Barney Circle Landfill Site is a 10-acre lot adjacent to the Anacostia River in a primarily residential area of the District. A portion of this site is owned by NPS. From 1898 to 1935, the U.S. War Department (now Department of Defense) owned the site and during that time, municipal waste, along with sediment from USACE dredging operations in the Anacostia River were deposited in the onsite landfill. In 1935, the property was transferred to the NPS. Later, Barney Circle was considered part of the right-of-way for a proposed extension to I-395, which was never built. When this highway project was canceled, NPS considered (but never implemented), wetland restoration at the site for environmental remediation. Instead of removing the contaminated soil, other remedies such as onsite stabilization, erosion controls, and construction of barriers were constructed in July 1997. These actions were undertaken for human health and environmental mitigation. The current use of the site continues to be restricted and the sediment and adjacent surface waters of the Anacostia are monitored for contamination (NOAA 2012). Portions of the site are owned and managed by NPS.

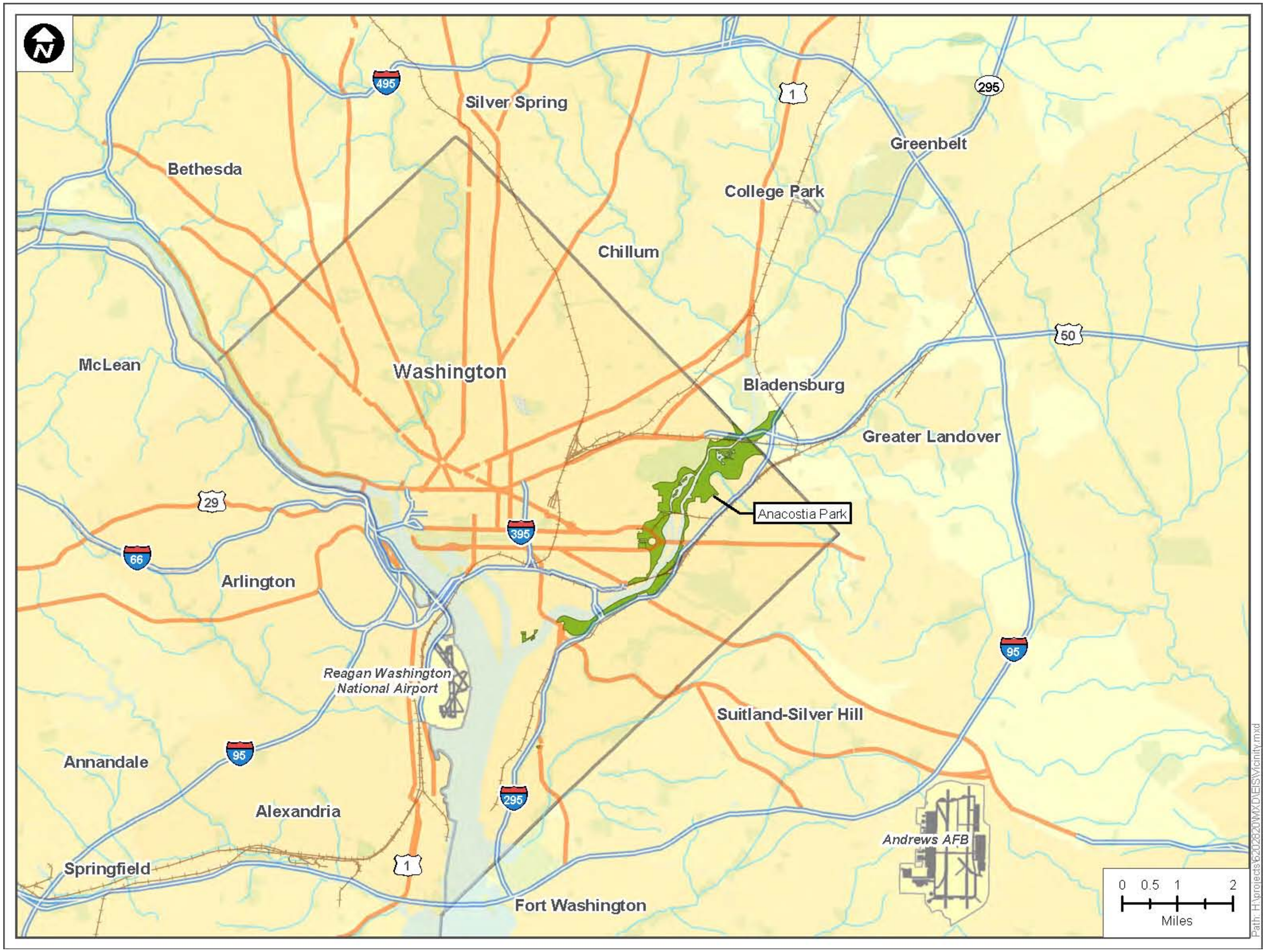


FIGURE 1: LOCATION OF ANACOSTIA PARK

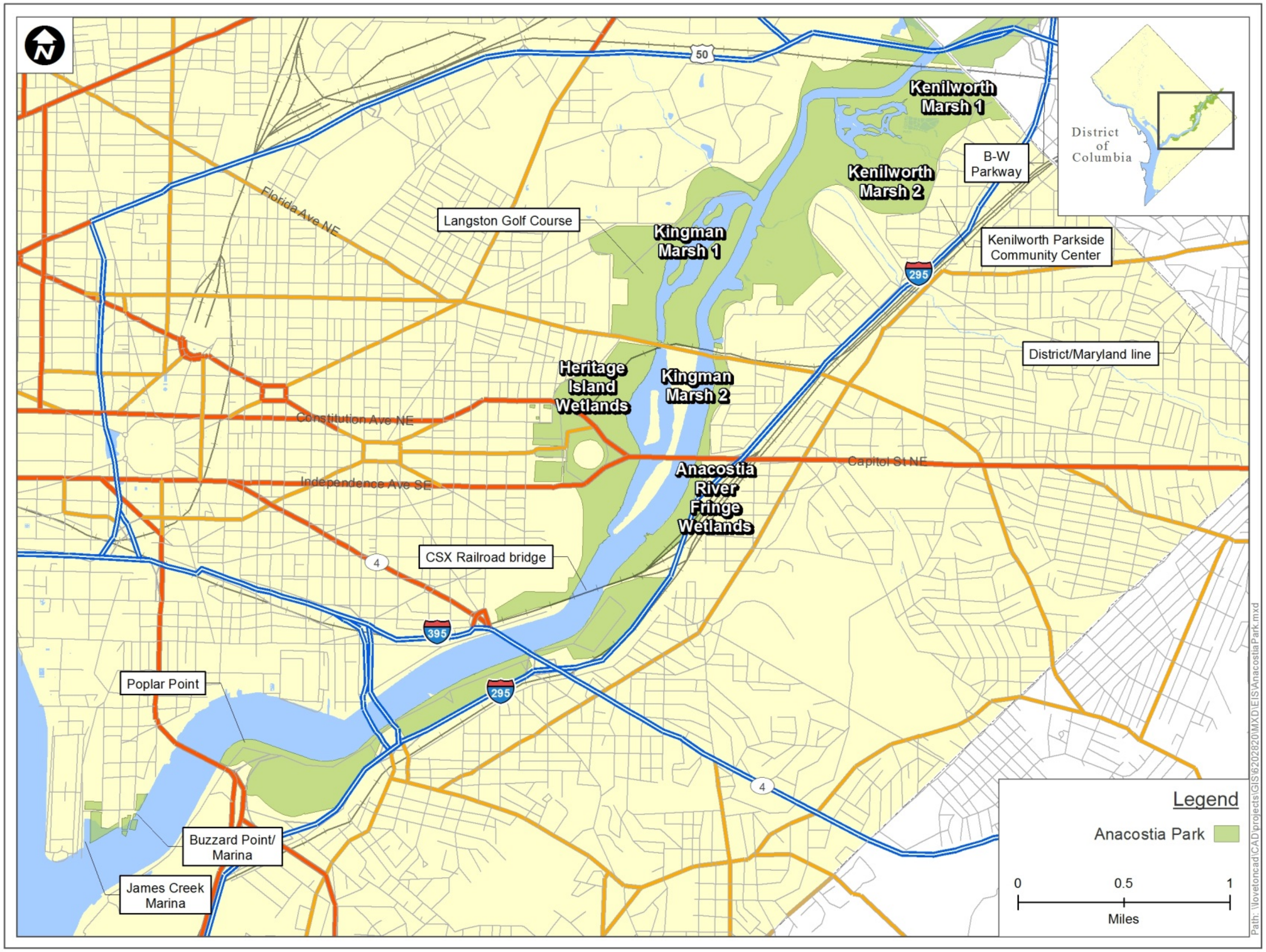


FIGURE 2: ANACOSTIA PARK

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).

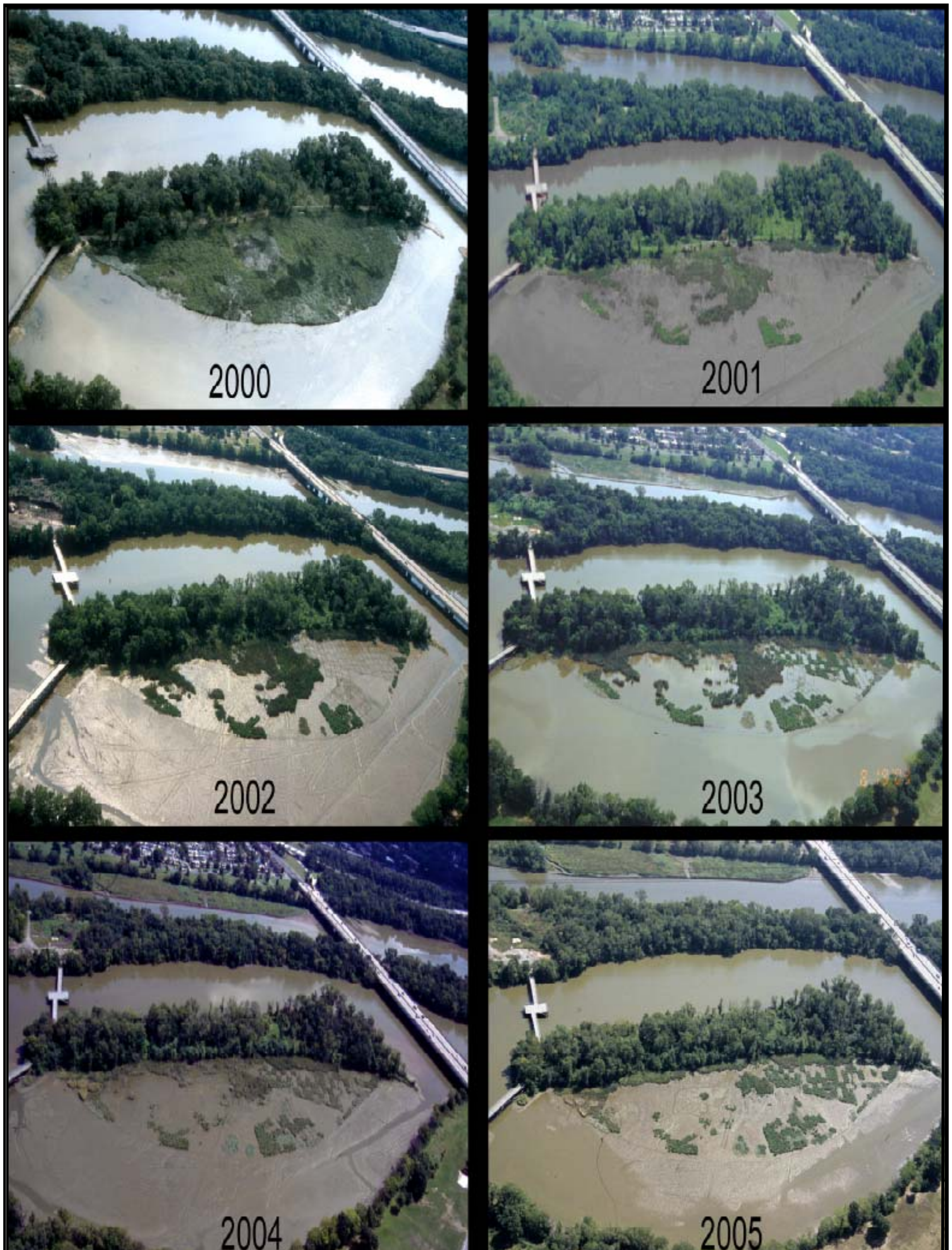
HISTORY OF WETLANDS MANAGEMENT IN ANACOSTIA PARK

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, Anacostia River Fringe Wetlands, and Heritage Island Wetlands. 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 Island Wetlands) 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. Historically, 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 Maine, Pennsylvania, West Virginia, North Carolina, South Carolina and Georgia, 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 lower Kingman Marsh.



Source: USGS 2007

FIGURE 3: LOSS OF WETLAND VEGETATION AT LOWER 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 process of preparing a General Management Plan (GMP) for Anacostia Park.

Purpose

The Anacostia Park Purpose Statement was developed from the enabling 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* (USDA NRCS 2003) is designed to provide 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 WITHIN 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 plant 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 welcome by some in small numbers, the resident Canada geese can quickly present a nuisance or possibly an 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 1991). 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).

Canada geese are highly selective herbivores (Conover 1991) and discriminate readily among different foods (Buchsbaum et al. 1984). The value of food to geese may depend on its content of protein, energy, or deterrents (Buchsbaum et al. 1984; Buchsbaum and Valiela 1987). Geese also avoid plants with high levels of secondary metabolites that are poisonous or interfere with digestion (Buchsbaum et al. 1984).

In the last 50 years, flocks of resident Canada geese have become established in many urban and suburban areas of North America and graze on lawns as their primary food source (Conover and Chasko 1985; Chasko and Conover 1988, as cited in Conover 1991). Usually these flocks are non-migratory (moving only as far as the closest open water during the winter) and rarely leave urban-suburban areas (Conover 1991). Grazing by free-ranging Canada geese may even affect the composition of grass species (Conover 1991).

In 2009, U.S. Geological Survey began an experiment to determine the impacts of herbivory by resident Canada geese on Kingman Marsh. The study involved monitoring fenced (exclosed) plots and unfenced control plots to document the effects of Canada goose herbivory on vegetation in Kingman Marsh. The exclosed plots used elevated fencing to permit access by herbivores such as fish and turtles but exclude mature Canada geese, whereas Canada geese had full access to the unfenced control plots. An analysis of the data collected from 2009-2011 documents that vegetation in the exclosed plots had significantly greater vegetative cover and species richness when compared to the vegetation in the unfenced control plots that were exposed to full Canada goose herbivory for three years (Krafft et. al 2012). Although the full U.S. Geological Survey study report must still undergo peer review, once completed, the NPS will make the final report available to the public.

Marking Eggs for Oiling

A wide range of resident Canada 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). Nest destruction and nest removal would require registering with the USFWS but not a Federal permit. Resident Canada geese typically nest within 150 feet of the water (Smith et al. 1999). When nests are destroyed, Canada geese may re-nest in or near the first or original nest, or the nest destruction may cause a “molt migration” (Luukkonen et al. 2008; Dieter and Anderson 2009). Molt migration is a phenomenon that can occur when the nest of a subadult or adult fails (Luukkonen et al. 2008). Re-nesting is more common when nest failure occurs early in the egg-laying period. If nest destruction occurs after more than one week of egg incubation, re-nesting is rare (Smith et al. 1999).

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 and Mitsch 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 (Whittecar 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 performs, 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 may 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 would become colonized first with a wide variety of pioneer species including annual herbaceous cover. The newly enhanced or restored hydric soils would 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 would 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 would 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 plant 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 would 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 expect 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 does 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.

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 would evolve to equilibrate with changing hydrologic and hydraulic conditions, climate-change induced conditions, and anthropogenically-induced changes (including water quality changes).

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 resident Canada 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 Canada goose population at Anacostia would be managed based on the thresholds related to vegetative monitoring using 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 a population density of 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 exclusion fencing in certain areas to have seedling germination. 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 x 0.92 square miles of wetland = 28 geese) (NPS 2010a). However, at Anacostia Park, resident Canada Geese utilize turf areas for grazing in addition to wetland areas (NPS 2010b, NPS 2010a). At Anacostia Park, there are 397 acres of turf (mowed or maintained areas such as lawns or golf courses). The turf component was therefore added separately to the wetland component for Anacostia Park. According to Conover and Chasko (1985), the turf threshold is one goose per 15 acres [397 turf acres x (1 goose/15 acres) = 26 geese]. When the wetland and turf goose values are added together (28+26 = 54), a resident Canada goose population goal of 54 resident Canada geese is established for Anacostia Park (NPS 2010a). 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 future results of vegetation and resident Canada goose population monitoring (NPS 2009b).

It is important to note that the resident Canada 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 total 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 overall. 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.

AUTHORITY TO MANAGE RESIDENT CANADA GEESE

NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. As stated generally in 16 USC 1 (NPS "shall promote and regulate the use of Federal areas known as national parks…by such mean and measures as conform with the fundamental purpose of the parks…to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations") and 16 USC 3 [The Secretary of the Interior] may… provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any of [the parks, monuments, and reservations under the jurisdiction of the National Park Service].

NPS *Management Policies 2006* instruct park units to maintain as parts of the natural ecosystems of parks all native plants and animals. NPS would achieve this maintenance by "preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur" (NPS 2006a, sec. 4.4.1). 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). Section 4.4.2.1 of the NPS *Management Policies 2006* ("NPS Actions That Remove Native Plants and Animals") also 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.

Section 4.4.2 of the NPS *Management Policies 2006* requires that parks "assess the results of managing plant and animal populations by conducting follow-up monitoring or other studies to determine the impacts of the management methods on nontargeted and targeted components of the ecosystem." This strategy is described in this plan/EIS, including specific thresholds for taking action, goals of management actions, as well as adaptive management and associated monitoring. Whenever NPS identifies a possible need for reducing the size of a park plant or animal population, the decision would be based on scientifically valid resource information that has been obtained through consultation with technical experts, literature review, inventory, monitoring, or research (NPS 2006a, sec. 4.4.2.1). The science team, as previously discussed, was assembled to complete this task.

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.
- An internal alternatives meeting was held on May 21, 2008.
- A newsletter containing draft alternatives was released for comment in October of 2008
- An internal discussion of the plan/EIS was held on August 24, 2010.
- The Draft plan/EIS was released for public comment on July 21, 2011.
- A public meeting was held on September 7, 2011.

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, Director's Order # 12: *Conservation Planning, Environmental Impact Analysis, and Decision-Making* (NPS 2011) and its accompanying 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 resident Canada 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. The effects of climate change on hydrology are also considered and discussed under this resource. 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. The effects of climate change on wetlands are also considered and discussed under this resource.

Aquatic Resources—This topic includes benthic invertebrates, finfish, and shellfish that could be impacted by wetland and resident Canada 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 plant 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 resident Canada goose management that would have a range of affects to resident Canada geese within Anacostia Park. Resident Canada geese populations at Anacostia are considered "nuisance species" and as such may be managed using a variety of methods available (NPS 2006a, section 4.4.5 "Pest Management"). The effects of climate change on resident Canada geese are also considered and discussed under this resource.

Cultural Resources—This impact topic includes prehistoric/historic structures and archeological resources. These resources could be impacted by wetland and resident Canada 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 feces (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 would be implemented as a result of this plan/EIS such as creating tidal guts, removal of the sheet piling, or installing boardwalks/trails would require additional NEPA documentation in the form of a categorical exclusion or an EA. These NEPA documents would tier off this plan/EIS and would 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 would not require additional NEPA documentation such as trucks used to round up resident Canada 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 would 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). 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 would neither alter the function nor restrict the use of the park, there would 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 would 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 and Climate Change—This topic includes energy, conservation potential, sustainability, and climate change. Global climate change is a change in the average weather of the earth that can be measured by wind patterns, storms, precipitation, and temperature (NPS 2009c). There is strong evidence linking global climate change to human activities, especially greenhouse gas emissions associated with burning fossil fuels (IPCC 2007). There are two aspects of climate change that must be considered in an environmental impact analysis:

- Human impact on climate change (i.e., through actions, the potential to increase or decrease emissions of greenhouse gases that contribute to climate change), and
- The impact of climate change on humans (i.e., how the resources that are managed are likely to change in response to changing climate conditions, and how that changes or otherwise affects management actions and the impacts of those actions on the resource).

This project does not involve major transportation planning or road construction, energy development, major facilities construction, or major visitor services planning that would emit greenhouse gases into the atmosphere and contribute to the changing climate. However, some of the activities associated with wetland and resident Canada goose management would result in fossil fuel consumption. For example, vehicle trips by park staff and volunteers to implement wetland and resident Canada 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 resident Canada management actions to climate change through greenhouse gas emissions was dismissed from further analysis. In addition, the effects of climate change on park resources over the 15-year period of this plan/EIS are likely to be negligible. Issues associated with climate change’s impact on the some physical/natural resources (hydrology, wetlands, resident Canada geese) are addressed in applicable sections of chapters 3 and 4.

The contribution of the actions contemplated in this plan/EIS on climate change is negligible and is dismissed from further analysis.

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 (MWCOG 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 poly-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 around Kingman Marsh. Any improvement in water quality is not expected to cause a perceptible change for SAV species, even if there was a reduction in the resident Canada goose population. 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. This plan/EIS is designed to protect existing SAV resources; the establishment of new areas of SAV is outside of the scope of this plan/EIS.

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, as amended (16 U.S.C. 1531 et seq) 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. In 2005, NPS consulted with the USFWS and NOAA-Fisheries to identify any endangered or threatened species within the proposed project area. In response, USFWS sent a letter 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. NOAA-Fisheries also sent a letter 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 NPS determined that the types of activities associated with this project would not adversely affect the shortnose sturgeon.

The NPS also sent a consultation letter to the USFWS on December 22, 2009 explaining that subsequent to the initial consultation with USFWS, NPS determined that an EIS was necessary for the wetland and resident Canada 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).

On 26 October 2011, the USFWS determined Kenk's amphipod (*Stygobromus kenki*) was a candidate for listing under the ESA. NPS policy is to treat candidates as listed species, especially when a species will become listed during the life of a plan. National Capital Parks —East, administrative unit for Anacostia Park, received a letter from USFWS on January 6, 2010 stating that the activities associated with the project would not affect any federally endangered species. This remains correct because Kenk's amphipod occurs north of and not within the Anacostia Park project action area.

Additionally, on 6 February 2012, the Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus) Chesapeake Bay distinct population segment was federally listed as endangered. As a result, on October 24, 2012, NPS requested technical assistance from the National Marine Fisheries Service (NMFS) Protected Resources to help determine potential for this and other federally listed species to occur in the project area (appendix A). The National Marine Fisheries Service responded on October 31, 2012 (appendix A) stating no federally listed or proposed threatened or endangered species and/or designated critical habitat for listed species under the jurisdiction of NMFS are known to exist in the vicinity of the proposed project. As such, no further coordination with NMFS Protected Resources Division is needed (see appendix A).

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). All Hay's Spring amphipod populations are not within the Anacostia River watershed and are not adversely affected by the activities of this project. Therefore, because the amphipods are not located within the project area, there are no impacts to the amphipods as a result of the no action alternative or the action alternatives.

As a result of the above analysis and consultation, NPS has dismissed the topic of Species of Special Concern from detailed analysis in the EIS.

Socioeconomics—This topic includes demographics, economy, housing, and land use (occupancy, income, values, ownership, type of use). Wetland management and resident Canada 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 resident Canada 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 2010b) 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. Although some literature has demonstrated that disease transmission from Canada geese is possible under certain conditions, this correlation has not been measured at Anacostia Park. Studies in other areas, including Converse et al. (1999) found that even if harmful pathogens were present in goose fecal matter, these droppings posed a minimal risk. Specific effects to health and safety as a result of resident Canada geese have not been demonstrated or studied at Anacostia Park.

Besides avian diseases, there is also the threat of attacks on children and adults by nesting resident Canada 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 resident Canada 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 resident Canada 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 the U.S. Park Police Aviation Unit is located within the park, resident Canada geese are not a concern for helicopter flight operations at the park. The downwash of the blades, overall noise, and hovering ability causes resident Canada geese to retreat from the immediate area occupied by a helicopter at the park. 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. Ronald Regan 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 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 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 would 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 would 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* (NPS 2011) 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 activates, 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 established the policies, requirements, and standards through which the NPS will meet its responsibilities to protect and preserve wetlands.

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* (DC 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 (DC 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 (DCDE 2006). Programs would be implemented to control the resident Canada goose population, since this document has stated that "locally, one of the top five threats to emergent tidal wetlands is overbrowsing by resident Canada Goose populations; the geese eat the wild rice and other native vegetation, which diminishes the habitat for other animal species and increases opportunities for non-native invasive plant species."

DC Comprehensive Plan (2006)—The Comprehensive Plan of the National Capital is comprised of two parts, the District Elements and the Federal Elements. The District's Comprehensive Plan constitutes the District Elements. The National Capital Planning Commission develops the Federal Elements. The District Elements provide goals, objectives and policies for land use issues that impact the city, including the relevant "Environmental Elements" section. This section specifically mentions the need to control Canada geese under Action E-1.5.A: Implementation of the Wildlife Conservation Plan (2005), which states that the District of Columbia implement programs to control the white-tailed deer and resident Canada goose population and to improve water quality and habitat in the Anacostia River (DCOP 2006).

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. Pursuant to the NPS Guidance for Non-Impairment Determinations and the NPS NEPA Process, a non-impairment determination for the selected alternative will be appended to the ROD.

Chapter 2: Alternatives

CHAPTER 2: ALTERNATIVES

The alternatives under consideration must include a no action alternative as prescribed by 40 CFR 1502.14.

This "Alternatives" chapter describes the various actions that could be implemented for current and future management of wetlands and resident Canada geese within Anacostia Park. NEPA requires that federal agencies explore a range of reasonable alternatives and provide an analysis of what impacts the alternatives would have on the natural and human environment. The "Environmental Consequences" chapter of this plan/EIS presents the results of the impacts analyses. The alternatives under consideration must include a no action alternative as prescribed by 40 CFR 1502.14. The no action alternative in this plan/EIS is the continuation of the current combination of management actions and practices for wetlands and resident Canada geese within Anacostia Park and assumes that the NPS would not make major changes to the current management efforts.

STUDY AREA DEFINITION

As stated previously in chapter 1, Anacostia Park occupies 1,300 acres along 5 miles of the Anacostia River shoreline. The study area for this plan/EIS includes the entire park, but only those lands within the current NPS jurisdiction of Anacostia Park. The primary focus of the plan/EIS is approximately 100 acres of restored tidal wetlands within Anacostia Park including Kenilworth Marsh, Kingman Marsh, and the Anacostia River Fringe Wetlands (figure 4). Descriptions of the wetland areas within Anacostia Park can be found in chapter 3, "Wetlands." 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.

ALTERNATIVES DEVELOPMENT PROCESS

This plan/EIS has been written as 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 were developed to achieve the desired conditions related to wetland vegetation damage from resident Canada goose herbivory (consumption of plants) and achieve the desired condition of a resident Canada goose population goal in the park. This approach includes a collection of techniques for both wetland management and resident Canada goose management. Wetland management includes techniques for the following elements: hydrology, vegetation, wetland restoration, cultural/education, and park operations/management. Resident Canada goose management includes techniques for the following elements: lethal control (killing), habitat modification, scare and harassment, reproductive control, and cultural/education. Specific management techniques included in the plan/EIS are techniques such as erosion control, managing invasive plant species, and construction of new trails. Details on the wetland and resident Canada goose management techniques are described below under each alternative description and can be found in tables 1 and 2. Through internal scoping meetings and public comments received during the scoping process, the various management techniques within were packaged into five different management alternatives (alternatives B through E) to provide a maximum amount of variability. Alternatives A through E were then analyzed for potential impacts in detail. Alternatives were reviewed and modified during a roundtable meeting March 8, 2010. Meeting attendees included the project team (Anacostia staff, NPS Regional Director, and representatives from the Center for Urban Ecology [CUE]).

FIGURE 4: LOCATIONS OF RESTORED TIDAL WETLANDS WITHIN ANACOSTIA PARK

TABLE 1: SUMMARY OF WETLAND MANAGEMENT TECHNIQUES FOR EACH ALTERNATIVE

Element	Alternative A – No Action	Alternative B –High Wetland, High Resident Canada Goose Management	Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management	Alternative D – Low Wetland, Low Resident Canada Goose Management	Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control
Hydrology	• No current actions	• Use erosion control techniques including coir fiber logs, flow deflectors, bog mats, and shoreline steepness reduction* • Remove or modify structures that result in erosion and clogging of marsh • Create tidal guts* • Address upland runoff • Investigate possible impact of extreme water level change • Consider altering water elevations* • **Inform DC Harbormaster of importance of enforcing no wake zones**	• Use erosion control techniques including coir fiber logs, flow deflectors, bog mats, and shoreline steepness reduction* • Limited removal of structures that result in erosion and clogging of marsh • Address upland runoff • Limited investigation of possible impact of extreme water level change • **Inform DC Harbormaster of importance of enforcing no wake zones**	• Remove or modify structures that result in erosion and clogging of marsh • Address upland runoff	• Same as alternative B
Vegetation	• Continue current management of invasive species • Remove sheet piling along Anacostia River Fringe Wetlands*	• **Manage invasive species** • Mechanical seedbank regeneration* • **High density planting effort with persistent, native species with high root mats and variable height** • **Remove sheet piling along Anacostia River Fringe Wetlands***	• Same as alternative B except a **low density planting effort with persistent native species**	• **Minor level of invasive species management** • Passive seedbank regeneration • **Remove sheet piling along Anacostia River Fringe Wetlands***	• Same as alternative B
Wetland Restoration	• No new restoration efforts	• Consider daylighting* • Stream/stormwater outfall energy dissipation modifications* • Consider seawall breaks*	• Least invasive stream/stormwater outfall energy dissipation modifications	• Same as alternative A (none)	• Same as alternative B
Cultural/Education	• Continue some education through park programs • Maintain existing trails at the park	• **Increased education and interpretation** • Construct new boardwalks and trails*	• **Increased education and interpretation**	• Same as alternative A	• Same as alternative B
Park Operations and Management	• Continue limited trash removal	• **Trash management** • **Reduce impervious areas*** • **New rain garden areas***	• Same as alternative B	• **New rain garden areas***	• Same as alternative B

Bold items are techniques that the park would commit to being implemented, other techniques would be implemented on an as needed basis to achieve wetland and resident Canada goose desired conditions.

*Would require additional NEPA compliance

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TABLE 2: SUMMARY OF RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES FOR EACH ALTERNATIVE

Element	Alternative A – No Action	Alternative B –High Wetland, High Resident Canada Goose Management	Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management	Alternative D – Low Wetland, Low Resident Canada Goose Management	Alternative E –High Wetland, Moderate Resident Canada Goose Management with No Lethal Control
Lethal Control	• No lethal control	• **Lethal control to remove 40 to 60 percent of the resident Canada goose population in the park** • **Lethal control <u>throughout life of this plan/EIS</u> until resident Canada goose population goal is reached** • **Lethal control = round-up, capture, euthanasia, and shooting (only mature resident Canada geese and self-sufficient young-of-the-year resident Canada geese)** • **Lethal control can increase to remove a <u>maximum of 90 percent</u> of the resident Canada goose population in the park if goals are not met in specified timeframe** • **Population monitoring for the life of the plan**	• **Lethal control to remove 40 to 60 percent of the resident Canada goose population in the park** • **Lethal control <u>up to five times</u> during life of this plan/EIS** • **Lethal control = round-up, capture, euthanasia, and no shooting would occur (only mature resident Canada geese and self-sufficient young-of-the-year resident Canada geese)** • **Population monitoring for the life of the plan**	• **Lethal control to remove 40 to 60 percent of the resident goose population in the park** • **Lethal control <u>up to one time</u> during the life of this plan/EIS** • **Lethal control = round-up, capture, and euthanasia; <u>no shooting would occur</u> (only mature resident Canada geese and self-sufficient young-of-the-year resident Canada geese)** • **Population monitoring for the life of the plan**	• No lethal control • **Population monitoring for the life of the plan**
Habitat Modification	• Continue to maintain current goose exclusion fencing	• **Plant new 25-50 foot buffers along shorelines throughout the park** • Install and maintain goose exclusion fencing • Install soft armoring around perimeter of restored wetlands • **Increase width of existing vegetated buffers (25-50 feet)** • New plantings less desirable to geese	• Same as alternative B **except new 25-50 foot buffers only along shorelines at Kingman Marsh and Anacostia River Fringe Wetlands** • Apply goose repellents to turf feeding areas yearly	• **Plant new 25-50 foot buffers along shorelines at Kingman Marsh and Anacostia River Fringe Wetlands excluding Langston Golf Course** • Install and maintain goose exclusion fencing • **Increase width of existing vegetated buffers (25-50 feet)** • New plantings less desirable to geese	• Same as alternative B except no increasing width of existing vegetated buffers
Scare and Harassment	• No scare and harassment techniques are currently used	• Intensive scare/harassment program (visual deterrents + dogs at four locations)	• Less intensive scare/ harassment program with minimized rotation (visual deterrents + dogs at two locations and less often than alternative B)	• No scare/harassment program	• Same as alternative B
Reproductive Control	• Continue yearly egg oiling program	• **Increase egg oiling program if population increases after initial reduction** • **Also complete egg addling and egg replacement, if population increases after initial reduction** • Apply goose hatch material if population increases >20 percent in one year • Implement scare tactics prior to nesting season	• **Increase egg oiling program after initial reduction** • Apply goose hatch materials annually	• **Continue current egg oiling program**	• Same as alternative B
Cultural/Education	• Continue park ranger education when possible	• Install no feeding signage • Park to enforce wildlife CFR • Park prepare and distribute brochure on resident Canada goose management	• Same as alternative B	• Same as alternative B	• Same as alternative B

Bold items are techniques that the park would commit to being implemented, other techniques would be implemented on an as needed basis to achieve wetland and resident Canada goose desired conditions.

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Project-specific NEPA analysis, when required, would focus on issues, alternatives, and environmental effects unique to the project area, if not already discussed in this plan/EIS and subsequent ROD, and may be categorically excluded or documented in either an EA or an EIS, depending on the significance of the effects. Table 1 documents the management techniques which if implemented would require further NEPA documentation.

Heritage Island Wetlands

Once an alternative is chosen, the NPS would not necessarily be required to implement each of the techniques presented; techniques would be implemented on an "as needed" basis.

The type, number, and intensity of wetland management techniques and resident Canada goose management techniques within each of the elements differ by alternative. Alternative A, the no action alternative, includes management techniques that are currently occurring as part of current management. Alternatives B through E offer combinations of high and low intensity techniques for wetland and resident Canada goose management. These alternatives are discussed in more detail in the paragraphs that follow. A summary of alternatives for wetland management can be found in table 1 and a summary of alternatives for resident Canada goose management can be found in table 2. It is important to note that this plan/EIS attempts to present the entire suite of possible techniques for wetland management and for resident Canada goose management regardless of constraints such as costs and feasibility. Many of these techniques are not mutually exclusive, some of these techniques overlap, and many should be considered in conjunction with other measures to be most successful. During development, the intent was to choose general techniques that would include the different environments along the Anacostia River but could be applied within any location of the park. This plan/EIS provides the detailed techniques for wetland management and resident Canada goose management that can be applied, in most cases, in combination with other techniques to meet the goals and objectives of this plan/EIS for the park. Once an alternative is chosen, the NPS would not necessarily be required to implement each of the techniques presented; techniques listed under each alternative would be implemented on an "as needed" basis. This document is a general plan for the management of wetlands and resident Canada geese within the park and evaluates the potential impacts at the programmatic level. Therefore, additional NEPA analysis may be required for some future management projects prior to construction or implementation of these projects. Future NEPA documents would be required for projects that involve management techniques such as day lighting, seawall breaks, and creating tidal guts. Additional NEPA compliance would also be necessary to remove the sheet piling along the Anacostia River Fringe Wetlands. These projects would therefore "tier off of" or reference this plan/EIS.

RANGE/OVERVIEW OF ALTERNATIVES

Alternative A is the no action alternative. The no action alternative is defined in the NEPA guidelines as "no change" from current management and current conditions. In the impact analysis of no action, the EIS assumes current management would continue as it is now over the lifetime of the plan. The no action alternative is also referred to in an EIS as the baseline, and the impacts of each action alternative are analyzed against those of the baseline for comparative purposes.

Alternative B provides the highest level of wetlands and resident Canada goose management. This alternative combines the most aggressive wetlands management techniques with intensive resident Canada goose management (lethal control combined with other non-lethal techniques). Alternative B also considers new wetland restoration options.

Alternative C includes moderate wetlands management with moderate resident Canada goose management. This alternative combines the second most aggressive wetlands management options with a moderate level of lethal and non-lethal resident Canada goose management techniques. This alternative assumes that more intensive wetland management would be needed to counteract the resident Canada goose population that would remain in the area.

Alternative D includes a plan for low wetlands management and low resident Canada goose management. Alternative D combines less aggressive wetlands management options with lethal resident Canada goose management one time during the plan/EIS and only as a last resort. This alternative offers the lowest cost and management effort for both wetlands and resident Canada geese of all the management alternatives.

Alternative E combines the most aggressive wetlands management techniques with intensive non-lethal resident Canada goose management techniques (no lethal controls). This alternative considers new wetland restoration options as well.

The following sections describe in detail how these alternatives were developed.

REVIEW OF EXISTING DATA AND APPLICATION OF RESEARCH

An interdisciplinary planning team of NPS staff was organized to develop a set of alternatives to meet the purpose and need of this plan/EIS. The interdisciplinary planning team was composed of NPS management personnel from a wide range of disciplines with expertise in natural resources and park management. The team also included contractors experienced in NEPA and wetlands management. The team collected information necessary to assist in the development of the alternatives and to complete the environmental analysis for the plan/EIS. The information included a literature review, which focused on wetlands management and restoration, resident Canada geese herbivory, erosion and sedimentation, hydrologic regimes, and invasive and non-native plant species. The team also collected baseline information on wetland elevations, performed an analysis on the hydrologic conditions in the park as well as a wetland functional analysis. The development of alternatives was initiated upon completion of the data research and analysis. The interdisciplinary planning team identified a group of individuals to form a science team as described in chapter 1 "Desired Conditions." Two science team meetings were held during the alternatives development process in September and October of 2008. Results of the discussions with the science team on wetlands and resident Canada goose management were incorporated into the alternatives.

After considering the data that were collected, the park held an alternatives development meeting in May 2008 to document the range of actions the park could potentially take to manage wetlands and resident Canada geese in the park. Following the 2008 meeting, the park released to the public a summary of the draft alternatives in a brochure to solicit comments from the public on the draft alternatives. After considering all comments received on the draft alternatives, the park revised and finalized the alternatives. In summary, a literature review, hydrologic and wetland functional analysis, public comments, and results from a science team contributed to the development of the range of alternatives for this wetlands management plan and resident Canada goose management strategies at Anacostia Park.

ADAPTIVE MANAGEMENT

Adaptive management is an important and effective way to insert variability and flexibility in wetland management and resident Canada goose management. The alternatives evaluated in this EIS rely on the use of adaptive management to guide the implementation of the preferred alternative. The preferred alternative consists of a series of techniques, available for use by the park to manage wetlands and resident Canada geese within the park.

The alternatives evaluated in this EIS rely on the use of adaptive management to guide the implementation of the preferred alternative.

Adaptive management is briefly defined as a type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves monitoring, evaluating the effectiveness of applied strategies and incorporating new knowledge and learning into management approaches that are based on scientific findings and the needs of society. This iterative approach uses results to modify management strategies, techniques, and elements (if necessary) due to the uncertainty of ecological responses to management actions. The purpose of adaptive management is not only to facilitate meeting the desired conditions described in this plan/EIS, but also to balance the greater environmental and socioeconomic goals of the Anacostia River.

For this plan, vegetation monitoring would be conducted annually to evaluate the effectiveness of applied strategies. NPS would collect data in accordance with a vegetation monitoring plan developed by U.S. Geological Survey (USGS) for Anacostia (appendix B). The monitoring would document the status of and changes to wetlands vegetation at Anacostia.

Thresholds are used to determine when a resource condition warrants taking action. For this plan, thresholds have been established in a separate report, *Threshold for Taking Action* (NPS 2009b). This document provides detailed information on the science behind thresholds established for vegetation and geese. For this plan/EIS, the vegetation threshold for taking action is when there is a (statistically) significant difference in the amount of plant cover between the open and exclosed plots (NPS 2009b). The threshold for geese population numbers refers to an appropriate number of resident, non-migratory Canada geese that would allow for natural wetland restoration called the goose population goal. This number would be used as a goal under any of the action alternatives. As stated previously in chapter 1, the resident Canada goose population goal of 54 has been established for Anacostia Park. The interdisciplinary team determined, after analyzing information from the Science Team, that the park would use 54 geese as the initial resident Canada goose population goal and that this goal may be adjusted to meet management goals based on the results of vegetation and goose population monitoring (NPS 2009b).

Should the evaluation of monitoring data compared with the thresholds indicate the need for action, NPS would select a management option from those available within the preferred alternative that best responds to the conditions documented by monitoring. For example, if monitoring indicates excessive predation by geese, NPS may elect to implement a resident Canada goose management strategy. Actions taken as part of adaptive management would be limited to those strategies evaluated as part of the preferred alternative.

The efforts of other regional organizations which are currently conducting or have conducted wetland management and resident Canada goose management activities in the vicinity of the park would be considered in evaluating the effectiveness of NPS efforts. Numerous efforts by various federal, local, and community organizations have been completed and are either currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. NPS would continue to work with these agencies and organizations regarding wetland management in the Anacostia River Watershed and through adaptive management. Additionally, NPS would continue to coordinate with other agencies and organizations regarding resident Canada goose management in and around the District as part of adaptive management. For example, the USDA APHIS Wildlife Services conducts resident Canada goose round-ups for the USACE at reservoirs located within the District, including at McMillan Reservoir (supplies the majority of the District's municipal water), Dalecarlia Reservoir (primary storage basin for drinking water in the District), and Georgetown Reservoir (a reservoir that is part of the water supply and treatment infrastructure for the District). The Maryland-National Capital Park and Planning Commission, responsible for the regional park system and land use planning in Montgomery and Prince George's Counties, conducts goose roundups at several of their sites, including Lake Needwood and Lake Frank (Rockville, MD) and at Bladensburg, MD. There is also a regular waterfowl (including Canada geese) hunting program at the M-NCPPC-owned Jug Bay Natural Area on the Patuxent River in Upper Marlboro, MD.

Global climate change (GCC) is another topic that would be considered under adaptive management. GCC is defined as a change in the average weather of the earth that can be measured by wind patterns, storms, precipitation, and temperature (NPS 2009c). Climate change is currently and would continue to affect coastal habitats well into the future and is therefore considered under adaptive management. Specific results of climate change have been predicted for the Mid-Atlantic Region, which includes the District and the Anacostia River (NPS 2010c). These changes were adapted from regional projections from the Intergovernmental Panel on Climate Change (IPCC 2007) as well as the Bias-corrected and Spatially-Downscaled (BCSD) Climate Projections derived from a model developed by the World Climate Research Programme (WCRP). The summary below represents a conservative estimate for future climatic change in the Mid-Atlantic Region (NPS 2010c):

- Mean Temperature will increase
- Mean Precipitation will have a small increase
- Mean Sea Level will increase
- Coastal flooding will increase
- Short-term (monthly to seasonal) droughts will increase
- Evaporation will increase
- Snowfall will decrease
- Streamflow - no large annual change expected, due to offsetting seasonal changes
- Length of growing season will increase
- Extreme heat events will increase;
- Extreme cold events will decrease

- Extreme events: intense precipitation will increase
- Extreme events: tropical cyclones will likely increase in intensity and likely decrease in frequency, although uncertainties are large.

The element of climate change that has the most direct effect on tidal wetlands is mean sea level rise (NOAA 2012). Because one of the primary desired conditions of this plan/EIS includes a functional wetland system in a tidally-influenced area, all action alternatives included in this plan/EIS include elements that adapt to predicted and future impacts of climate change if and when such impacts are observed. Water levels can be affected by sea level rise and from other impacts of climate change, such as increased precipitation, and more intense storms. These factors will require consideration when maintaining existing wetlands as well as designing sites for wetland restoration activities, including predicting the amount of sea level rise, determining a target range of elevations for the wetland and desired plant communities, and predicting future tidal ranges and water elevations. For example, an elevation that may support high marsh plants under current conditions may become dominated by low marsh species in 50 years as a result of rising water levels. Another predicted result of climate change is increased opportunities for invasive plant species such as common reed (*Phragmites australis*) to spread because of this species' adaptability to disturbance and efficiency to colonize (Erwin 2009). Also, future tidal ranges and water elevations need to be considered to determine placement and sizing of creek channels, culverts or bridges, and potential flow control measures. As a result, the Park would use adaptive management to address projected climate changes, specifically sea level rise along the Anacostia River, which could directly affect wetlands at the Park. The NOAA Restoration Center has written guidance for project design and implementation to address the current and future impacts of relative sea level rise on tidal wetland restoration projects (NOAA 2011). This NOAA guidance may be taken into account because it provides steps for assessing the sensitivity of a project to relative sea level rise and elaborates on how to avoid, minimize, adapt to, or mitigate these impacts through the use of Best Management Practices (BMPs) or recommended alternatives.

ALTERNATIVE A: (NO ACTION) EXISTING MANAGEMENT

NEPA regulations (40 CFR 1502.14) define the no action alternative as "no change from current management direction or level of management intensity." Therefore, under the no action alternative, there would be no change in the way wetlands and the resident Canada goose populations are managed at the park. Current wetland and resident Canada goose management at the park includes the following:

Under the No Action Alternative, there would be no change in the way wetlands and the resident Canada goose populations are managed at the park.

- Invasive plant species management
- Trash management
- Public education
- Goose egg oiling
- Goose population monitoring
- Goose exclusion fencing
- Wetland vegetation planting.

Invasive Plant Species Management—The National Capital Region Exotic Plant Management Team (NCR-EPMT) is responsible for managing exotic pest plants in 14 parks covering nearly 72,000 acres of diverse habitats within the National Capital Region parks (NPS 2006b). The NCR-EPMT inventories and maps exotic vegetation and develops strategies for controlling these plants in D.C., Maryland, Virginia, and West Virginia. Since 2002, the NCR-EPMT began controlling exotic plant species within the wetland areas in Anacostia Park. Common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) are two target exotic species present in both tidal and non-tidal wetlands in the park. In the five years following the first Anacostia tidal wetland project in 1992 and 1993 (Kenilworth Marsh), the park tried various approaches to dealing with the invasion of exotic plants. Primarily dealing with purple loosestrife, park resource management staff performed manual removal of the plants. Park staff tested “spot spraying” of invasives as well, using glyphosate. Park resource management staff also worked with USGS biologists with performing stump treatments of purple loosestrife, also using glyphosate. These efforts were all within the initial five-year monitoring at Kenilworth Marsh. Shortly after the initial purple loosestrife removal, the NCR-EPMT became involved in the program and started removing common reed at Kenilworth Marsh. The NCR-EPMT spends several days a year treating the wetland areas for invasive species, primarily around the Kenilworth Aquatic Gardens. The NCR-EPMT typically treats common reed, purple loosestrife, and bamboo species (*Phyllostachys aurea*) with the herbicide rodeo. There was an attempt to use biocontrol, which included introducing a beetle that preys on purple loosestrife; however, it was found to be ineffective. The group has prevented the introduction of new species through partnerships with other organizations in the District. Over the years, park staff has also performed invasive plant management using mechanical means as well as herbicide applications (NPS 2006b).

Trash Management and Public Education—Other efforts to help maintain the wetlands at Anacostia Park include trash management and educating the public. Floating trash is a problem throughout the highly urbanized watershed and along the Anacostia River and tributaries. Currently, the USACE skims the river and removes large items that are boating hazards. The District Water and Sewer Authority (DCWASA) operates a trash skimmer on the river, which removes all floating objects. Park staff organizes volunteer programs that remove trash throughout the park. Additionally, to help prevent trash from entering the wetland areas and the river, trash traps have been installed at the ends of some stormwater outfall pipes. In the winter of 2009, the park issued a permit to the District Department of the Environment (DOE) to demonstrate two systems of trash traps on two Anacostia Park tributaries (Watts Branch and Nash Run). The District DOE issued grants to the Earth Conservation Corps and Anacostia Watershed Society (AWS), respectively, for operating the systems, which includes maintaining, collecting, and characterizing the trash collected. The park staff educates the public on the importance of wetlands through park programs including ranger led walks, the Urban Tree House Program, and the Bridging the Watershed Program.

Goose Egg Oiling—In June 2010, the mean resident Canada goose population at Anacostia Park was estimated to be 564 birds (Bates 2010a). Since 2004, the park has used egg oiling and fencing as the primary goose management strategies. Egg oiling is a form of egg destruction that stops the development of the egg by coating the egg’s outer surface with corn oil, which effectively discontinues the growth process occurring in the inner egg. Egg oiling has been performed according to a protocol specified by the Humane Society and under permit by the USFWS (HSUS 2004a). There have been a number of partners involved in this management activity, including the District, USGS Patuxent Wildlife Research Center, the Prince George’s Maryland –National Capital Park and Planning Commission (M-NCPPC), and the AWS. All the groups, including the NPS, were trained by Wildlife Services branch of the USDA, and all groups are included under the USFWS permit. The Wildlife Services program of the USDA responds to requests by the public and agencies in need of help in dealing with wildlife damage. Egg oiling occurs during the April nesting season along the tidal Anacostia River corridor from Bladensburg to Poplar Point (figure 2). The resident Canada geese nests are located and marked with a numbered flag. The number of eggs in the nest is recorded and the eggs are marked and coated entirely with corn oil by rubbing oil into the egg (AWS 2006). Experience has shown that this must be completed every time the nest is visited, ideally once a week (personal communication Milton 2009). Any new, unmarked eggs are oiled at the next nest visit so no eggs reach maturity. If staff and volunteers are available, the park visits each nest on a weekly basis.

Goose Population Monitoring—The AWS and NPS organize resident Canada goose counts in Anacostia Park and recruits volunteers to help in the effort. Goose count methodologies were developed in consultation with the regional wildlife biologist at USGS Patuxent Wildlife Research Center. The Anacostia River between Bladensburg and Poplar Point is divided into sectors and subsectors. Volunteers are assigned one or more subsectors, with the goal of counting all birds in this stretch of the river. Volunteers coordinate their watches and count the geese in their assigned sectors at a designated time for a period of five minutes. Counts have been conducted quarterly each year since 2004. The mean goose count for July (resident goose population) from 2004 to 2008 is 676 geese (NPS 2009a). Counts ranged from 521 geese to 783 geese (NPS 2009a). To improve the accuracy of the population estimate, the goose counting is done over more days to reduce the coefficient of variation in the population. In July 2009, the goose counts were conducted for nine days spanning three weeks during the flightless period instead of one day per quarter. The mean for 2009 was 492 geese within these nine days with a coefficient of variation of 60 percent (NPS 2009a). The mean for 2010 was 564 geese with a coefficient of variation of 17 percent (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.

Goose Fencing—In order to keep the goose population from entering the restored wetland areas, the AWS has placed circular goose exclusion fencing in various locations throughout the park including:

- Kenilworth Marsh
- Kingman Marsh adjacent to Langston Golf Course
- Kingman Marsh adjacent to the RFK shoreline
- Anacostia River off of River Terrace.

Photo showing goose exclusion fencing.

In addition to the circular exclusion fences, the wetlands within Kingman Marsh adjacent to RFK Stadium are protected by a goose exclusion perimeter fence as well as stringing between the posts of the fencing to create internal and overhead barriers to keep the resident Canada geese from entering the wetland and grazing on the plant material. Currently, monitoring, maintenance, and repair of the goose exclusion fence throughout the park are contingent on the availability of AWS, park staff, volunteers, funding, and need. Currently, AWS partners with the park when they share common goals in the watershed; however, they are not doing any long-term management.

Wetland Vegetation Planting—The NPS has removed the most palatable plants to geese from their planting palette in restoration areas subject to aggressive goose herbivory (appendix C). Project partners have transplanted vegetation within selected areas of the restored wetlands destroyed by the resident Canada geese. Volunteers, officials from the partner agencies, and NPS staff have spent hundreds of hours working on resident Canada goose management related activities as described above. Under current management, vegetation is planted when time and staffing are available.

Under all alternatives (including the no action alternative), the NPS would remove the sheet piling along the Anacostia River Fringe Wetlands. This action would require additional NEPA compliance and is discussed in more detail in the section below titled "Management Techniques Common to All Alternatives."

IMPLEMENTATION COSTS

Actions associated with alternative A would primarily include invasive plant species management, egg oiling, resident Canada goose population monitoring, and fence monitoring/maintenance/repair. The majority of these actions is currently undertaken by volunteers or is covered in existing labor costs as shown in the table below.

Alternative A Cost Estimate

Action	Assumptions	Annual Cost	Cost for the 15-year Planning Period
Invasive Plant Species Management	NCR-EPMT would continue to treat areas as applicable at no cost to the park.	$0	$0
Egg oiling	Park would continue oiling goose eggs with assistance from the DDOE. The continuation of this effort is contingent upon volunteers and staff constraints.	$30,000	$450,000*
Population Monitoring	NPS organizes a yearly resident Canada goose count along the entire NPS-managed Anacostia. This is dependent on staff constraints and the continued willingness of many volunteers.		
Fence monitoring, maintenance, and repair	Contingent on NPS staff constraints, funding, partner and volunteer availability.		
TOTAL COST TO ANACOSTIA PARK:			**$450,000***

*This cost is contingent upon the availability of volunteers, funding, and materials similar to current conditions.

ELEMENTS INCLUDED WITHIN THE MANAGEMENT ALTERNATIVES

The management alternatives include elements for both wetland management and resident Canada goose management. Five separate elements are considered for the five wetland management alternatives, which include hydrology, vegetation, wetland restoration, cultural/educational, and park operation and management. Hydrology refers to those actions that could restore the natural hydrology of the ecosystem in order to enhance the wetland areas throughout the park. Vegetation refers to the management of the wetland vegetation by removing the existing sheet piling along the Anacostia River Fringe Wetlands (which would require additional NEPA compliance), managing invasive plant species, seedbank regeneration, installing shoreline buffers, and planting native species. Restoration refers to re-establishing the habitats and functions of a former wetland. Cultural/educational includes education and interpretation related to wetland management efforts. Park operations and management refers to efforts associated with park staff, particularly the maintenance staff, which could improve wetland function at the park.

Resident Canada goose management considers five separate elements for the five management alternatives. The five elements for resident Canada goose management are lethal control, habitat modification, scare and harassment, reproductive control, and cultural/educational. Lethal control (killing of individual animals) includes the lethal reduction methods used to bring the resident Canada goose population to a target goal. Habitat modification includes management techniques that could alter goose habitat, goose surroundings, and modifications to food and water availability. Scare and harassment techniques include visual and or auditory deterrents that are designed to frighten geese away from problem areas. Reproductive control includes techniques that could affect nesting and the ability of resident Canada geese to reproduce successfully. Cultural/educational includes education and interpretation related to resident Canada goose management efforts.

Within each wetland or goose element, specific management techniques may be used at varying intensities for each alternative. Specific management techniques are discussed for each alternative below. These techniques are not mutually exclusive and should be considered in conjunction with other measures to be most successful. Each alternative presents a suite of options at varying intensities that would be available to the park for the management of wetlands and resident Canada geese. Determining which options to use would be accomplished through monitoring and adaptive management.

MANAGEMENT TECHNIQUES COMMON TO ALL ALTERNATIVES (A THROUGH E)

One of the management techniques presented in this plan/EIS would be the same across all the alternatives (alternatives A, B, C, D, and E). Under all alternatives, the NPS would remove the sheet piling (which would require additional NEPA compliance) along the Anacostia River Fringe Wetlands. In 2003, the USACE created the Anacostia River Fringe Wetlands along the east bank of the river near Kingman Marsh, between East Capitol Street and the Benning Road bridges. The area was a depositional zone adjacent to the main channel of the river (NPS 2008a). The Anacostia River Fringe Wetlands were constructed first by driving sheet piling into the bed of the river and then back-filling on the shore-ward side of the piling with dredged river alluvium than planting the area (NPS 2008a). As part of the original project, the sheet piling was to be removed once the wetland was established, but this removal never occurred. After the piling is removed, the Anacostia River Fringe Wetlands would be subjected to normal river processes (NPS 2008a). If it appears that its removal is resulting in increased feeding on the wetland vegetation by the geese, the NPS could install single or double-stacked coir fiber logs in this area. The NEPA process for this project was initiated but not completed. Therefore, additional NEPA compliance would be necessary to remove the sheet piling along the Anacostia River Fringe Wetlands.

MANAGEMENT TECHNIQUES COMMON TO ALL ACTION ALTERNATIVES (B THROUGH E)

Some of the management techniques presented in this plan/EIS would be the same across the management alternatives (alternatives B, C, D, and E). For wetland management, some techniques under the hydrology, vegetation, and park operations and management would be the same. For resident Canada goose management, some techniques under habitat modification, and cultural/education would be the same. Specific wetland and resident Canada goose management techniques that are common to all action alternatives are discussed in more detail below; elements that differ in levels of implementation (i.e., passive versus mechanical seedbank regeneration) are discussed by each individual alternative in the sections that follow.

WETLAND MANAGEMENT TECHNIQUES

Hydrology—Hydrology techniques that are common to all action alternatives include addressing upland runoff. Wetlands have an important role in controlling runoff. As runoff water from the surrounding city landscape enters the wetlands, it brings in many chemical and nutrient contaminants and sediment, often at high volumes and velocities. As runoff flows pass through the wetlands, excess nutrients and some pollutants are retained, flows are slowed down, and the sediment can be reduced. If left unchecked, these pollutants could clog waterways and affect fish and wildlife within the Anacostia River. Too much runoff can cause wetland erosion. To prevent wetland erosion from upland surface runoff, the park could fill the rills, which direct concentrated flow into the wetlands. A rill is a narrow and shallow incision in the soil resulting from erosion by overland flow. These shallow incisions could be filled and stabilized with seed and matting, which would result in the upland runoff entering the wetlands through sheet flow rather than erosive concentrated flows. During the June 2009 site visit, no rills were identified; however, they may occur in the future.

Vegetation—The vegetation technique that is common to all action alternatives includes removing the sheet piling along the Anacostia River Fringe Wetlands as previously described above in the “Common to All Alternatives” section. Under all alternatives, the NPS would remove the sheet piling along the Anacostia River Fringe Wetlands. Additional NEPA compliance would be necessary to remove the sheet piling along the Anacostia River Fringe Wetlands.

Park Operations and Management—Park operations and management techniques that are common to all action alternatives include installing new rain gardens or biocells that are created or naturally forming in low areas. Under all action alternatives, the NPS would install new rain gardens. Rain gardens are planted depressions that function as miniature wetlands. Wildflowers or other native vegetation are typically planted in these areas. The rain garden provides a place for stormwater to infiltrate, allowing approximately 30 percent more water to soak into the ground. Following a heavy rain, stormwater would pond in the rain garden and be filtered by the plants and soil rather than running off into the storm drain. Rain gardens would be constructed and designed according to local guidelines. The installation of rain gardens would also help reduce the amount of impervious area in the park. Potential areas for rain gardens or biocells include the Kenilworth-Parkside Recreation Center, Kenilworth Aquatic Gardens parking lot, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. Creating rain gardens would require additional NEPA compliance.

RESIDENT CANADA GOOSE MANAGEMENT

Population Monitoring—For all action alternatives regardless of the type and intensity of control proposed under each management alternative, the resident Canada goose population would be monitored for approximately 15 years to determine post removal success. Population monitoring of resident Canada geese would take place during May and June after migratory flocks have left the park and during the birds’ flightless period. The bird counts would include those geese within the park and geese in the vicinity of the park because they could potentially move inside park boundaries. In addition, a yet to be determined percentage of the resident Canada geese could be captured following similar techniques to those described below under lethal controls (alternative B), marked with collars or other means (e.g. bird banding, radio transmitters), released within the park, and monitored regularly to track local movements. It has been suggested that resident Canada geese generally stay within a 5 to 10 mile radius and during breeding season stay within a 0.25 to 0.5 mile radius (NPS 2010b; Seamans et al. 2009).

Habitat Modification—Habitat modification techniques that are common to all action alternatives include installing and maintain goose exclusion fencing. This technique would be implemented on an as needed basis. Fences prevent geese from walking within wetland areas and grazing on the wetland plants, and prevent or discourage some birds from flying into wetland areas. Fencing materials may include woven wire, chicken wire, plastic snow fencing, construction-site silt fencing, corn cribbing, chain link fencing, netting, mylar tape, monofilament lines, stainless-steel wire, and picket fencing. If implemented, fences could be at least 30 inches tall and long enough to discourage geese from walking around the edges. The openings in the fence materials would be no larger than 3 inches. Some fencing could be installed on top of the wetland areas to prevent the geese from flying into these areas. Fences could be elevated 10-15 centimeters from the wetland substrate to allow other marsh animals and fish passage, while still preventing geese from walking into wetland areas. The fencing could be installed in early spring when non-persistent plants are beginning to emerge. During the spring, geese feed on young and actively growing portions of plants continuously during daytime hours. Spring nesting activities are timed so that the hatching of goslings occurs concurrently with the most vigorous growth of spring vegetation (USFWS 2005). The fencing could be regularly maintained; approximately two times per year and after severe storms throughout the life of the plan.

Under all the management alternatives, any new plantings proposed would be species that are less desirable to Canada geese. Very few species are listed as being not palatable to or lightly grazed by geese and other waterfowl. Appendix C includes species that may be planted within the wetland areas at Anacostia Park. In low marsh zones, yellow pond lily (*Nuphar advena*) may be planted with relatively good success. In mid-marsh zones, arrow arum (*Peltandra virginica*) and soft-stem bulrush (*Schoenoplectus tabermontani*) have been shown to be successful; arrow arum is one of the few wetland species listed as having foliage and rootstock not palatable to geese. In the high marsh zone, soft rush (*Juncus effusus*), broad-leaved cattail (*Typha latifolia*), rice cutgrass (*Leersia oryzoides*), water purslane (*Ludwigia palustris*), and swamp milkweed (*Asclepias incarnata*), along with several obligate woody shrub species have been successful. Species to avoid during initial plantings unless intensive protection techniques, such as goose exclusion fencing, are installed and regularly maintained, due to the high preference for feeding by geese include pickerelweed (*Pontedaria cordata*), yellow nutsedge (*Cyperus esculentus*), duck potato (*Sagittaria spp.*), common three-square (*Schoenoplectus pungens*), bur-reed (*Sparganium spp.*), spike rush (*Eleocharis spp.*), and wild rice (Hammerschlag et al. 2001; Thunhorst 1993). These species may be planted in the future, or may come in naturally when goose herbivory is no longer a problem at Anacostia Park.

Cultural/Education—Under all action alternatives, cultural/education techniques that are common to all action alternatives include installing and maintaining signage to discourage park visitors from feeding geese and other wildlife, enforcing the wildlife CFR, and preparing and distributing a brochure on resident Canada goose management including lethal control, if used. These techniques would be implemented on an as needed basis. Title 36 CFR 2.2 (a)(2) states that the feeding, touching, teasing, frightening, or intentional disturbing of wildlife nesting, breeding, or other activities is prohibited within NPS properties. Feeding waterfowl is a major cause of high urban bird populations (Smith et al. 1999). Resident Canada geese are grazers and therefore do not need handouts to supplement their diets. Feeding waterfowl encourages geese to congregate in areas and can make geese more aggressive toward people. Park visitors caught feeding waterfowl on park property could be approached by park staff and educated on the impact of the feeding and could be issued warnings or citations by the U.S. Park Police. The CUE Research Learning Alliance produces information for parks related to science and may support Anacostia in the development of materials for interpretation and education. CUE may assist park staff in preparing a technical brochure for the public that describes resident Canada goose management techniques. An understanding of goose biology and behavior can help foster a greater tolerance and willingness to work through the resident Canada goose management issues.

ALTERNATIVE B: HIGH LEVEL OF WETLAND MANAGEMENT AND HIGH LEVEL OF RESIDENT CANADA GOOSE MANAGEMENT

Alternative B combines the most aggressive wetlands management techniques with intensive resident Canada goose management techniques (lethal control combined with other techniques). This alternative considers new wetland restoration options as well. Under this alternative, the park would use lethal control to manage the resident Canada goose population as described below. Additionally, the park may choose from a number of other non-lethal techniques to manage the population as described below.

WETLAND MANAGEMENT TECHNIQUES

Hydrology—The overall goal of the hydrology element is to reduce the direct water contact with the banks and slope faces that negatively impact the functionality of the wetlands. Alternative B includes management techniques such as erosion control, shoreline protection, sediment stabilization, and restoration of tidal guts.

Shoreline erosion could be controlled by using techniques that would dissipate erosive forces associated with waves, currents, ice, rainfall/runoff, obstacles in the water, water level fluctuations, and groundwater flow. The primary focus of the shoreline erosion efforts would be on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. The secondary focus would be on the higher wetland/upland interface in areas where the slopes may be failing. Techniques used for erosion control could include the installation of soft armoring, flow deflectors, and bog mats; reducing the steepness of the wetland shoreline; and increased protection in areas with the greatest wave action. Techniques to reduce erosion through managing the amount of stormwater flow into tributaries and the Anacostia River are discussed in “Park Management and Operations.”

Alternative B combines the most aggressive wetlands management techniques with intensive resident Canada goose management techniques (lethal control combined with other techniques).

Soft armoring, such as coir fiber logs, straw bales, or brush bundles, could be placed within the restored wetland areas, including the restored wetlands within Kenilworth Marsh, Kingman Marsh, the Anacostia River Fringe Wetlands, and any new wetland restoration areas. Coir fiber logs are structures made from natural coconut fiber and are covered by strong coir netting that is typically used to stabilize banks from erosion. If implemented, the coir fiber logs would be staked along the open water/wetland interface so that about half of the log is submerged. The logs would be installed within the mean low water line with small breaks so that fish could pass through, the mean high water line, and the mean tide line. Plants would be installed in an alternating, random planting pattern rather than in a straight row into the top of the log. Plant species would need to be appropriate for the elevations and hydrologic regime in which they are planted and should include species that are less palatable to geese until the population is at a sustainable level. Once the resident Canada goose population is sustainable, additional plant species may be introduced within the coir fiber logs and the wetlands behind them, including species that may be favored by geese but that have a historic presence within the Anacostia River. Coir fiber logs could be installed in multiple locations in the restored wetlands as identified on figures 5 and 6.

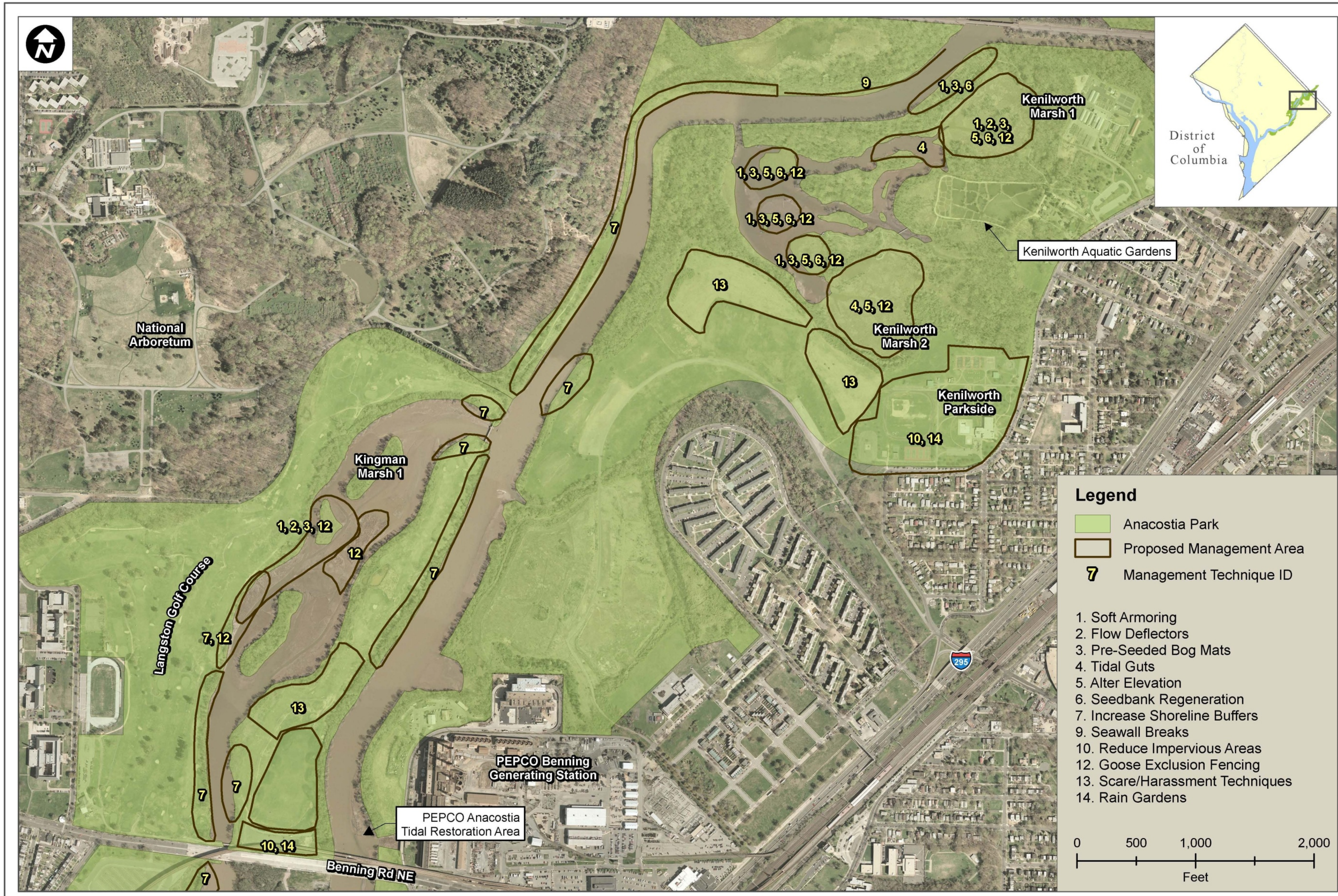

FIGURE 5: ALTERNATIVE B - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, NORTH AREA

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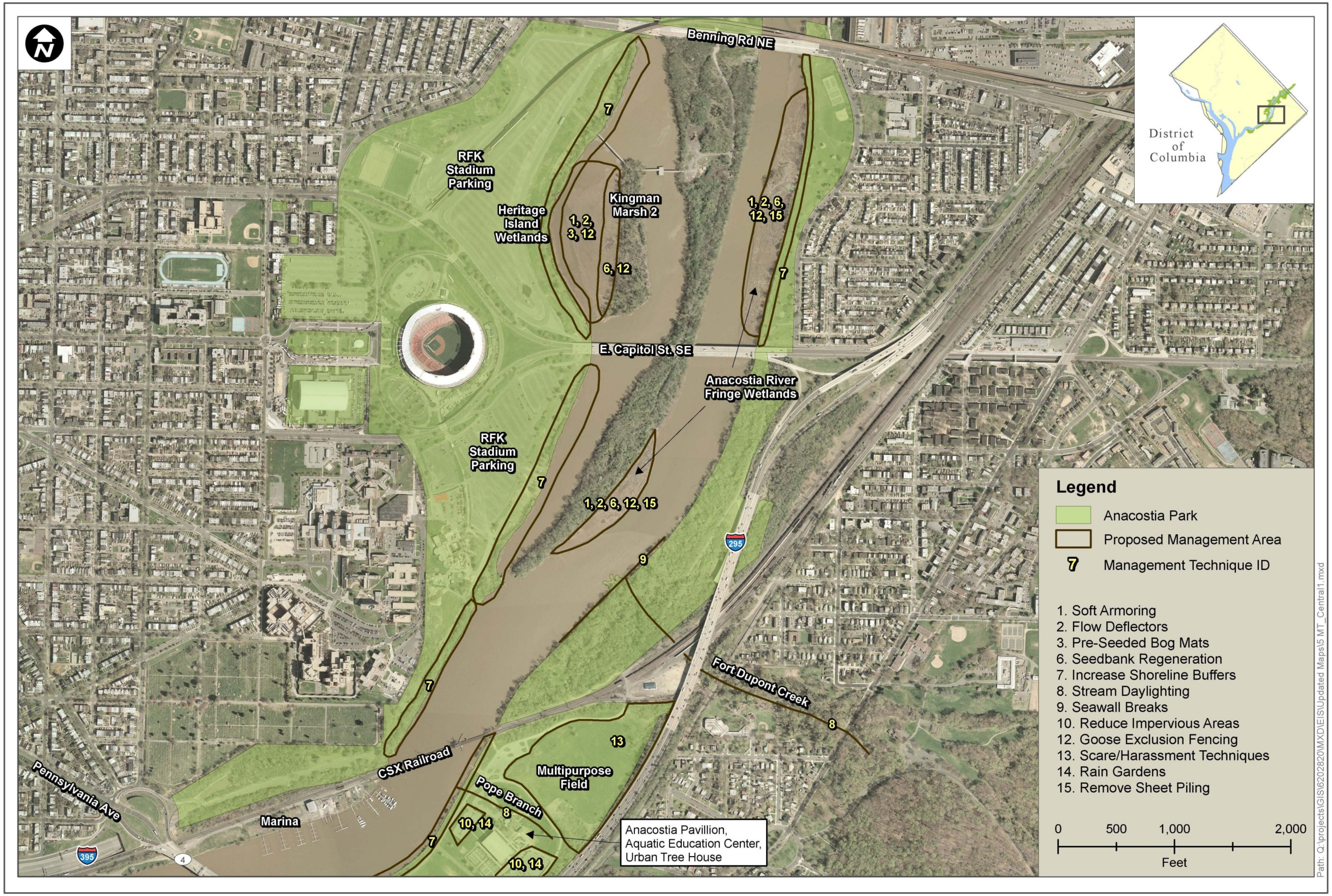

FIGURE 6: ALTERNATIVE B - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, CENTRAL AREA

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Natural or man-made flow deflectors could be installed along the upstream and possibly the downstream edges of the restored wetlands in high velocity areas to redirect the erosive velocities back to the main river channel and encourage sediment build-up in non-vegetated mud flats, such as the wetland cells constructed in Kingman Marsh. Natural flow deflectors may include log vanes, straw bales, or brush bundles; man-made flow deflectors may include boulder/large rock vanes, or rip rap. The flow deflectors should not be placed in a manner that would result in erosion of wetlands or shoreline on the opposite bank. The natural flow deflectors may eventually degrade naturally; however, the wetland soils should be fully stabilized with plant materials/root mat before degradation occurs. Potential areas for natural flow deflectors may include wetland areas in the northern section of Kenilworth Marsh and the Anacostia River Fringe Wetlands located in the central region of Anacostia River (figures 5 and 6).

Hydraulic modeling may be necessary, and permit(s) would be required to install the flow deflectors and soft armoring that encroaches into wetlands or waters of the U.S. These approaches would most likely require Nationwide Permit #27: *Aquatic Habitat Restoration, Establishment, and Enhancement Activities* through the USACE for compliance with section 404 of the *Clean Water Act*. However, some larger projects would require an individual permit through the USACE, based upon the acreage and/or linear feet of the project impacts. All projects undertaken within the District must meet the water quality standards set forth in Title 21, Chapter 11 of the *District of Columbia Municipal Regulations*. To verify that these standards are met, the District DOE Water Quality Division must review projects prior to permit issuance when the waters of the District are impacted.

Shoreline protection at the open water/wetland interface would be greatest in those areas that receive the most wave action and erosion. Pre-seeded bog mats with root-mat-forming plant species could be installed along the wetland shoreline. A bog mat is a woven blanket of coconut fibers that are pre-seeded with a variety of wetland margin plants such as arrowhead, cattails, and rushes. These mats are simply rolled across the wetland substrate and backfilled with pea gravel or staked to hold the mat in place. Typically, it takes one full growing season for the plants to establish through the mat and into the underlying sediments. Potential locations for pre-seeded bog mats may include the previously restored wetland areas in Kenilworth Marsh, the wetland area on the East Bank of the Anacostia River near Kenilworth Marsh, and wetland areas within Kingman Marsh (figures 5 and 6).

In addition to installing fiber logs, flow deflectors, and bog mats, the steepness of the landward banks of the wetlands could be reduced in order to reduce the energy and shear stress on the banks. The steep banks would be graded back or filled to create 3:1 slopes or lower and the area would be planted with species provided in appendix C to reduce the high erosion along the shoreline. Filling of these areas to lessen the slopes would likely require additional permitting if it encroached into the river, wetlands, or the wetland buffer. Also, due to the grading and filling of the land, some erosion control techniques such as shoreline steepness reduction would require additional NEPA compliance. At this time, no steep slopes have been identified; however, due to the erosive forces of the river, potential problem areas may occur in the future and would be determined on an as needed basis.

Photo of a beaver dam obstructing water flow in Kenilworth Marsh

In some areas of the park, structures or obstacles within the wetlands or river cause erosion of the shoreline or wetland. These structures may include shoreline protection features such as groins, revetments, breakwaters, or bulkheads; and natural obstacles including fallen trees, debris, beaver dams, and ice during the winter months. Although revetments, groins, breakwaters, and bulkheads typically protect an area from erosion, they may damage or increase erosion downstream by redirecting flows to other unstable areas and blocking the transport of sediments along the shoreline. In some instances, natural obstacles such as fallen trees, debris, and ice may be easily removed from the area. Beaver dams may only be removed if their presence is causing an issue. Construction equipment may be needed to remove larger structures such as revetments, bulkheads, and boat docks. Some structures may require further hydraulic evaluation to assess their actual impact on the shoreline and modifications to structures such as bridge piers and operational boat docks, and dams would need to be coordinated with the owners of these structures. In these instances, any structural modifications would require engineering designs that are protective of the shoreline or wetlands.

The park would need to identify and focus on areas that create eddy currents that impact the wetland or banks stability. In addition, modifying and removing structures and obstacles, park personnel and volunteers could remove items, such as woody debris, which clogs the openings of the marshes and negatively impacts hydrology. During a site visit in June 2009, beaver dams located in Kenilworth Marsh were identified as obstructing water flow in and out of wetland areas.

In order to help restore the Anacostia to a more natural condition, the NPS could maintain existing tidal guts and create new tidal guts where appropriate. Many of the tidally influenced wetlands within the park are not receiving regular daily tidal flushing and remain relatively dry except during spring or maximum high tides or following large storm events when large amounts of fresh water from upstream portions of the watershed flood the lower Anacostia River. Tidal guts could be created within these dryer areas of the wetlands by excavating portions of the marsh by dredging. Dredging operations may occur within the marsh in order to connect the wetland with other wetter areas of the wetlands of the Anacostia River. By creating tidal guts, these dry areas of the marshes would continually receive water that improves the hydrology and functionality of the wetlands, and may reduce some of the invasive plant species that have become established in the high parts of these marshes. Native wetland plants could be installed in these areas. If implemented, dredging would be a onetime operation as no maintenance dredging would be required in future years. The exact location of where the tidal guts should be created and the sizing of the tidal guts would need to be determined based on bathymetric and vegetative surveys and hydraulic modeling information for the created marshes. Potential locations could include two areas within Kenilworth Marsh (figure 5). Additional NEPA compliance would be required for the creation of tidal guts.

Shoreline erosion can be caused by wind driven waves and by wakes from passing boats or by flash, or surge, flows from stormwater runoff. When the banks are continuously hit by wave action, the bank and beaches become undercut, which leads to bank slumping and the removal, transport, and deposition of the bank sediments along the shoreline (MDE 2006). The District's Metropolitan Police Department has designated the Anacostia River as a no wake zone, within the city limits. The Maryland Department of Natural Resources (DNR) has designated the no wake zone in the Maryland reach of the river. To help manage the size of the wakes from boats, the NPS would encourage the District Harbormaster to enforce the no wake zone in the areas where the wetland edge may be affected. These areas would include the Anacostia River Fringe Wetlands, Kingman Marsh, RFK shoreline, Kenilworth Marsh, and areas adjacent to the Kenilworth Aquatic Gardens.

Tidal wetlands along the Anacostia River have water level changes of approximately 3 feet twice daily. On occasion the tidal wetlands may have an extreme water level change greater than 3 feet that may affect vegetation establishment. Extreme water level changes may be a result of an increase or decrease in precipitation, snowmelt, groundwater inflow, surface runoff entering the wetland, clogging or erosion of an outfall of the wetland, beaver or muskrat activity, lack of a sufficient hydrologic source during the growing season, or evaporation. Under alternative B, NPS could monitor the non-tidal wetlands within the park to determine if the establishment of wetland vegetation is being impacted by extreme water level changes and could propose remedial actions to address the particular cause(s) of the problems.

Surface elevations that help to determine the frequency and duration of inundation within a tidal wetland, based on tidal cycles, control the vegetation communities and resultant habitat within a wetland. Wetland plants installed in restored tidal wetlands are designed to be placed in planting zones based on the hydrologic regime or specific flooding tolerance levels of the particular species selected for that zone. If the marsh surface elevation is too low or too high for a particular plant species, it would likely not survive within that planting area and other non-target or undesirable/invasive plant species may begin to dominate the planting zone or the area may become unvegetated mudflat. The establishment of vegetation within the mid and high marsh vegetation zones has been shown to be more successful than in the low marsh zones during monitoring of the restored wetlands (Hammerschlag et al. 2001). This may be in part due to the ease of access that the resident Canada geese have for feeding on the vegetation in the low marsh zone. Where surface elevations are determined to be unsuitable for vegetative establishment within the restored wetlands, the NPS could consider altering wetland elevations on a case-by-case basis to achieve more mid to high marsh zones, improve vegetation establishment success, and to provide additional habitat. Potential locations for altering wetland surface elevations would include areas identified in Kenilworth Marsh on figure 5. Altering surface elevations would require additional NEPA compliance.

Vegetation—Alternative B would include managing invasive plant species and planting native species. Alternative B could include mechanical seedbank regeneration on an as needed basis. The NCR-EPMT currently treats exotic plant species within National Capital Parks - East as time and schedule allows (NPS 2006b). In the past several years, their treatment has gone towards controlling the Park's priority common reed, purple loosestrife, and bamboo at Kenilworth Aquatic Gardens. Treatment methods and strategies for these species have consisted of herbicide spraying with extended hoses from a land-based truck. As part of wetland management efforts at the park, the NPS would continue the treatment of these invasive plant species at a high level beyond the efforts of the NCR-EPMT if more money and staff are available.

There are currently existing native seedbanks located throughout wetland areas within the park, including the restored wetlands. To make seedbank growth more successful, the park could use mechanical seedbank regeneration techniques as needed. Mechanical seedbank regeneration techniques could involve churning the soil with rakes or other hand held tools and removing unwanted vegetation in areas to allow the native species seeds to regenerate naturally. Potential areas for mechanical seedbank regeneration may include most of the wetland areas in Kenilworth Marsh, the east bank wetlands along the Anacostia River near Kenilworth Marsh, wetland areas in Kingman Marsh, and the Anacostia River Fringe wetlands. These areas are shown on figures 5 and 6. Mechanical seedbank regeneration would require additional NEPA compliance because of surface and subsurface archeological resources.

The park would increase the number of plantings under this alternative throughout all the wetlands to maximize the percent basal area (a measure of tree density calculated from the diameter at breast height of all trees within a plot) cover. Plantings may include species with high root mass forming abilities, such as rhizomatous species, or species with strong root structure to increase the sediment-root matrix and overall wetland soil stability. Plant heights would be variable; the average plant height would be equal to or taller than the average high water level. The park would select persistent vegetative perennial species so that the plants would remain standing during both the growing and non-growing seasons. Plantings could be placed mostly in areas of the wetlands that receive longer hours of direct sunlight and less in areas that are shaded most of the day. Potential locations for the techniques mentioned above are shown on figures 5 through 7.

Restoration—Under alternative B, wetland restoration techniques could be performed as needed in areas throughout the park including the Kenilworth Marsh, Kingman Marsh, RFK shoreline, river trail wetlands, and Anacostia River Fringe Wetlands (figures 5 through 7). To restore these former wetland areas, the park could consider areas for daylighting streams with natural channel design techniques including floodplain access for the restored channel. Daylighting is the act of removing streams from underground pipes and culverts and restoring some of the form and function of the historic stream. Daylighting opportunities in the future would attenuate flows in the restored wetlands along the lower portions of the tributaries. Stream daylighting would require additional NEPA compliance. Potential streams proposed for daylighting may include Pope Branch and Fort Dupont Creek. The area proposed for Pope Branch could include the land north of Pennsylvania Avenue near the recreational fields (figures 6 and 7). The area proposed for Fort Dupont Creek could include the land north of the CSX Railroad Bridge crossing (figure 6). If implemented, daylighting would provide new wetland areas that would provide new wetland functions such as water quality and habitat benefits, which would re-create, to some extent, what previously existed. Daylighting would also create additional freshwater tidal marshes at the mouth of a stream.

In addition to daylighting, the park could install as needed stream/stormwater outfall energy dissipation modifications, such as installing plunge pools or a series of step-pools at the end of any outfalls identified as requiring repair to remediate for erosive velocities. An inventory of these outfalls would need to be completed by the NPS in the future. This action would also require further NEPA compliance.

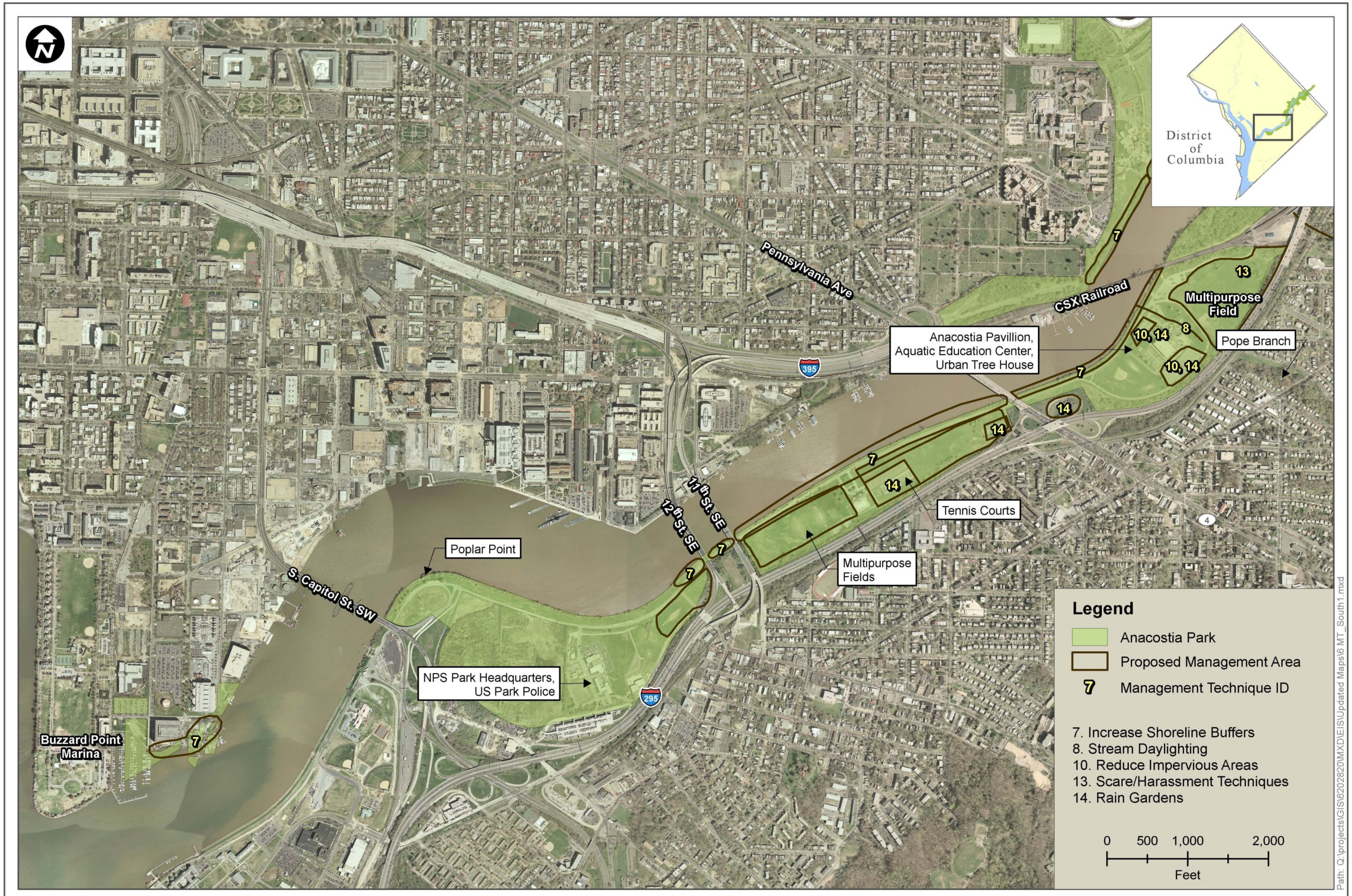

FIGURE 7: ALTERNATIVE B - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, SOUTH AREA

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Another wetland restoration action could include installing seawall breaks as needed in the existing seawall in those areas adjacent to former wetlands. Seawall breaks have the potential of giving the river more access to its floodplain and reclaiming tidal connectivity, thus encouraging more wetland functionality behind the seawall. This would re-water former wetland areas such as those along the west bank of the Anacostia River near the District property line. Potential areas for seawall breaks are identified on figures 5 and 6. These areas include the west bank of the Anacostia River near Kenilworth Marsh and the east bank of the shoreline just north of the CSX Railroad Bridge crossing. Seawall breaks would require additional NEPA compliance.

Cultural/Educational—Under alternative B, wetland management techniques would include an increase in educating the public by adding additional boardwalks, interpretive trails, waysides, and exhibits throughout the wetland areas for this alternative. This action would include developing more printed materials on wetlands for park visitors to read at the visitor centers. Park staff would educate the public on the importance of wetlands in the environment through formal programs, dissemination of printed materials, and through impromptu interpretation by roving park staff and volunteers. Park rangers could educate children by visiting schools, teaching at the Urban Tree House, and participating in the Bridging the Watershed program. The park could also encourage the public to volunteer for planting new vegetation, maintaining fencing, and studying water quality in the wetlands. This would be achieved by coordinating with the District and other partner agencies to direct interested environmental organizations and other volunteers to direct their efforts toward wetland management actions. Similarly, wetland management activities could be linked with park ranger programs at the various park sites.

The addition of boardwalks and interpretive trails is a wetland management technique that would be an as needed action to maintain the cultural values of the park by reducing the urban influences on hydrology. New boardwalks and trails may be considered for some wetland areas to reduce the foot traffic. Potential locations for new boardwalks may include areas of the River Trail in Kenilworth Marsh that intercept a wetland. Additional NEPA compliance would be required for the construction of new trails and boardwalks.

Park Management and Operations—Under alternative B, management techniques would include the reduction of impervious areas, the installation of new rain gardens, and the implementation of trash management techniques. All of these techniques would be performed under alternative B. The District DOE is responsible for managing stormwater pollution in the District. DOE has recently changed the stormwater fee to be based upon how much impervious area or hard ground is located on the property. Reducing impervious areas throughout the park would enhance the park and improve water quality of the receiving wetlands and Anacostia River. Areas of impervious surfaces, such as roadways, parking lots, and sidewalks would be reconstructed to semi-pervious or pervious areas, where feasible. Impervious areas would be replaced with materials such as gravel, cobble, pervious pavers, wood chips, or grass. Reducing the amount of impervious area throughout the park would help increase rainwater infiltration and would help minimize erosion of the shorelines from stormwater runoff and would require additional NEPA compliance. Potential areas that have been identified for reducing impervious areas include the Kenilworth Parkside, Langston Golf Course parking lots, and parking lots surrounding the Anacostia Park Pavilion (figures 5 through 7). Any new development in the park would include innovative, environmentally sensitive designs that reduce imperviousness or increase perviousness.

Large amounts of trash along the river, open areas, and in the wetlands have been a problem for the park in the past years. Large amounts of unsightly trash fosters negative perceptions of the River, can clog infrastructure and streams, and can affect wetland habitat. Under alternative B, trash management would include placing trash traps at the stormwater inlets and outlets throughout the park, increasing the use of trash booms on the river, and increasing the volunteer opportunities to help clean up the park. In addition, more trashcans would be installed in heavily used areas and more frequent trash removal would be implemented.

RESIDENT CANADA GOOSE MANAGEMENT

Lethal Control—Population objectives for resident Canada geese have been described by both the Atlantic Flyway Council (1999) and the USFWS Final EIS for Canada Geese (2005). 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. Based upon resident Canada goose population estimates and population objectives by Flyway, the USFWS (2005, I-20) suggests a 54 percent reduction in the Atlantic Flyway. Additionally, the Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment (20 to 30 percent of the current adult population) of goslings and new adults (Atlantic Flyway Council 1999). The resident Canada goose population goals suggested in this plan/EIS have been 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. The interdisciplinary team determined, after analyzing information from the science team, that the park would use 54 resident Canada geese within the park be used as the initial resident Canada goose population goal for Anacostia Park (NPS 2010a). Resource managers would use the initial goal of 54 resident Canada geese, although this number may be adjusted using adaptive management to meet management goals based on the results of vegetation and resident Canada goose population monitoring. Follow-up lethal reduction methods would be used if needed to manage the population of 54 resident Canada geese in order to minimize the impacts to wetland vegetation.

Under alternative B, the number of resident Canada geese to be removed by lethal control would be based upon the prior season’s spring goose count results the year this plan/EIS is implemented. Lethal control would be used throughout the life of this plan/EIS. The initial goose population goal of 54 resident Canada geese may be adjusted based upon results of monitoring and adaptive management strategies. The following actions are included under alternative B regarding resident Canada goose management:

1. Lethal control would begin at 40 to 60 percent removal of the resident Canada goose population in the park (based on the annual spring count) and this removal range would continue until the resident Canada goose population goal of 54 is reached or vegetation monitoring and adaptive management indicate a different resident Canada goose population goal is appropriate.
2. If after 2 years of removing 40 to 60 percent of the resident Canada goose population, the influx of resident Canada geese in the park causes the population level to remain within 50 percent of the population prior to implementing this plan/EIS, the lethal control would increase by up to 10 percent each year to a maximum of 90 percent.

Two lethal control methods would be used at the park, including goose round-up, capture, and euthanasia, and lethal removal by shooting. Lethal control techniques would be implemented during the summer months when migratory geese do not occur at the park. A vegetation monitoring plan has been established and implemented to provide background information on damage caused to wetland plants by resident Canada geese and to monitor the results of any future management actions on wetland vegetation. Vegetation indicators would point to the management thresholds. The vegetation monitoring plan is located in appendix B.

Goose round-ups would occur during the summer months when adult geese are molting and flightless (starting June 15 in Mid-Atlantic) and when young-of-the-year (juveniles less than 1 year old) are considered self-sufficient but unable to fly. Young-of-the-year resident Canada geese that remain in the park after the roundups would be expected to survive on their own. The resident Canada geese would be herded into specially designed nets by walking slowly toward the geese with hands widespread or by using remote control boats, remote control cars, or remote control airplanes. The nets would be placed in dry, flat areas away from roads or other areas that may injure the geese. The nets would be approximately 48 inches tall and supported every 15 to 20 feet with poles so that the geese do not become injured while scraping against the nets. Once the resident Canada geese are trapped inside the net, trained wildlife officials would capture the geese by hand and take them off-site to be euthanized. In accordance with the American Veterinary Medicine Association guidance (AVMA 2007), efforts would be made to ensure actions are conducted as humanely as possible to minimize goose suffering. Juvenile geese would be removed from the net before the adults to prevent trampling. In addition to the round-up nets, flightless geese located in open water or wetland areas may be captured using long-handled dip nets (Smith et al. 1999). Potential locations for goose round-ups would include open field areas in the park, such as the ball fields adjacent to the river, the grass field north of the Langston Golf Course parking lots, and the grass field north and west of the 11th Street bridge (figures 5 through 7).

If goose round-ups occur outside of the molting period, the geese capable of flight would need to be sedated prior to capture. In order to sedate the geese, alpha-chloralose, a sugar and chloral hydrate combination that immobilizes birds approximately 30 to 90 minutes after ingestion, would be placed in bait bread. Alpha-chloralose is closely controlled by USDA-Animal and Plant Health Inspection Service (APHIS) Wildlife Services and requires operator certification. Once the geese are sedated, they would be captured by trained wildlife officials and would be taken off-site to be euthanized (Smith et al. 1999). Any remaining bread would be collected and removed from the site.

The meat from the resident Canada geese captured during the round-ups would be donated to local food banks in the District area. Only the breast meat would be donated which reduce the chances of contamination. Toxicity tests would be performed on approximately 10 percent of the captured birds prior to donating the meat to the local food banks. Toxicity testing would follow APHIS standard operating procedures. If donation were not possible, the euthanized birds would be deposited in a landfill.

An additional means of lethal control that would be used includes shooting of the resident Canada geese for isolated incidences only. This activity would occur in a controlled manner, as qualified federal employees would be used for this action. Employees would be park officials that are trained, experienced, and licensed to use a firearm. Training would include safety measures to protect both visitors and NPS employees. Park officials would coordinate all details related to the removal by shooting action, including locating the geese, shooting, and disposition of the geese. In most cases, high power, small caliber rifles would be used from close range. Geese injured during the operation would be put down as quickly as possible to minimize suffering. Noise suppression devices would be used to reduce the disturbance to the public. Activities would be in compliance with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, and Firearms. Areas where lethal removal by shooting may occur would be temporarily closed to the public. The public would be notified of any park closures in advance when feasible. The NPS and U.S. Park Police would patrol public areas to ensure compliance with park closures and public safety measures. Single resident Canada geese removed from the park in this manner would be buried and not donated to local food banks.

Habitat Modification—Alternative B includes management techniques that would alter goose habitat, goose surroundings, and modifications to food and water availability. Resident Canada geese tend to choose open areas with few obstructions to give them views of potential predators (Smith et al. 1999). During the Canada goose molting period, geese become extremely vulnerable to predators because they are completely flightless. Habitat modification includes eliminating, modifying, or reducing access to areas that currently attract the geese such as the Langston Golf Course where there are no shrubs along the Anacostia River. To reduce resident Canada goose access to the wetlands and to increase the risk of fear of resident Canada goose predation by eliminating site lines of potential predators, existing vegetative buffers would be widened and new vegetative buffers would be planted to act as barriers to the geese. River shorelines and wetland shorelines would be buffered with additional vegetation. The park would plant herbaceous materials closer to the bank's edges and woody material farther away. Species with fibrous roots would be more beneficial for the shoreline stabilization rather than sparser woody roots. Plants would be dense and high enough (2.5 feet) to prevent the geese from seeing through or over them or walking through gaps in the plantings. Wide plantings (20 to 30 feet wide and 2.5 feet tall) would be more successful than narrower ones (Smith et al. 1999). A list of herbaceous and woody species that may be planted along the river and wetland shorelines is available in appendix C. Species selected would be less palatable to the resident Canada geese. Common button bush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), and crimsoneyed rosemallow (*Hibiscus moscheutos*) may be planted within the high marsh zones and southern arrowwood (*Viburnum dentatum*), dogwood species (*Cornus* sp.), and black willow (*Salix nigra*) would be planted along the wetland/upland margin. Vegetative buffers would be implemented within the first 2 years of the plan/EIS.

Principle areas of new vegetative buffers or increasing the width of existing vegetative buffers are proposed at the following areas:

- The entire west bank of the Anacostia River north of the CSX Railroad Bridge.
- All gaps in the existing buffer along Langston Golf Course.
- Areas between the east bank of the Anacostia River and Anacostia Drive Southeast, below the railroad bridge.
- Shoreline along the east bank of the Anacostia River near Kenilworth Marsh.
- Shorelines along RFK Stadium parking lots.
- Seawall along the east shore of the Anacostia River near Deane Avenue Northeast.

Typically, adult geese move their broods to areas chosen for the presence of suitable food, visibility of predators, and proximity to water (Smith et al. 1999). Management techniques that could modify food availability and water accessibility would include installing and maintaining goose exclusion fencing in wetland areas, installing soft armoring (vegetative barriers) around the perimeter of the wetland areas, placement of new plantings that are less desirable to geese, and increasing the width of vegetated buffers.

Soft armoring such as single or double stacked coir fiber logs could be installed as needed around the perimeter of all planted areas in the wetlands to reduce the ease of goose access to the vegetation for feeding. The coir fiber logs would be adequately staked into the ground to ensure that the logs are not dislodged from the shoreline. More stakes would be used in those areas that are influenced by stronger tides. The logs would be placed so that about half of the log is submerged and plants would be installed in an alternating, random planting pattern into the top of the log. Plants to be installed would include those species that are less desirable to geese and those species that are mid- to high-marsh plants (appendix C). By planting mid- to high-marsh plants, geese would have a difficult time accessing the shoreline. Locations where soft armoring and existing buffers could be widened are shown in figures 5 through 7.

Scare and Harassment—Scare and harassment techniques are designed to frighten geese away from problems areas. As long as Canada geese are not touched or handled by a person or agent of a person (trained dog), it is permissible to harass Canada geese without a federal or state permit. Scare and harassment techniques could be implemented as needed in open grassy areas of the park where geese tend to congregate and in areas adjacent to the wetlands (figures 5 through 7). Scare and harassment techniques would not be used within the wetland areas because they could potentially disturb other wildlife. If scare and harassment techniques drive the geese into the wetland areas, the use of these techniques would be discontinued.

Under alternative B, an intensive scare and harassment program could be implemented. Visual deterrents such as mylar tape, flags, balloons, and dogs can be used to scare and harass the resident Canada geese. Mylar tape is a reflective tape that is typically silver on one side and red on the opposite. The tape would be used as streamers on poles or strung between fence posts. When the wind blows, the tape rotates, creating a flash, which makes geese shy away from the area. Mylar flagging has been reported effective at reducing resident Canada goose damage to crops (USFWS 2005). Red, blue, black, and orange flagging can be hung on poles in large open areas. These flags would help discourage resident Canada geese from landing on park property. Flagging is usually two feet by three feet and stapled to wooden poles approximately four feet in height. Mylar balloons and helium-filled eye-spot balloons can be tethered approximately 10 feet above the ground in open areas. Balloons would not be placed near trees, shrubs, or other objects that may puncture them. Eye-spots on balloons have been seen to elicit a flight response from resident Canada geese (Smith et al. 1999). Scare and harassment techniques would be implemented in the spring to deter resident Canada geese from nesting at the park. Additional scare and harassment techniques may be implemented as new technologies become available.

Potential areas for the implementation of scare and harassment techniques are shown on figures 5 through 7. Scare and harassment techniques could be used in the open grassy areas where geese commonly conjugate in Langston Golf Course and along the Anacostia Drive. These techniques would be rotated or altered every few months to avoid goose adaptation or indifference. Techniques would be experimented with to determine which ones or combination of tactics would be the most effective. Additional scare and harassment techniques may be implemented as new innovative technologies become available. New techniques may require additional NEPA analysis.

Dogs could be used throughout the Langston Golf Course to chase resident Canada geese. Dogs, especially border collies have been effective in keeping golf courses and other properties free of geese (Smith et al. 1999). The National Arboretum has used dogs to scare away resident Canada geese in the past and was successful. Dogs could be used both on land and in the water in late spring and summer. More than one dog may be used the first two days of implementing this strategy. After the initial few days, only one dog would be released daily for two to three weeks to ensure that the geese keep off the golf course area. By federal law, dogs may not be used to catch or harm the geese; therefore, they would not be used during the resident Canada goose molting period, when the birds are flightless.

Reproductive Control—Under alternative B, management techniques would include egg oiling, egg addling, and egg replacement. Additional techniques could include the use of goose hatch control products and scare tactics as needed. Limiting the growth of flocks can stabilize the resident Canada goose population and influence site fidelity (HSUS 2004b). Resident Canada geese are often philopatric, meaning they return to their birth site to nest when they become sexually mature. Reducing the number of resident Canada geese born at the site would decrease the number of adults returning to the site to nest.

Oiling eggs prevents gases from diffusing through an egg’s outer membranes and pores in the shell, thereby causing the embryo to die of asphyxiation (Smith et al. 1999). Eggs would be removed from the nest, covered with an oily substance (100 percent food-grade corn oil) by brushing, dunking, or spraying, and then the eggs would be returned to the nest. The park uses guidelines for egg oiling set forth in the USFWS permit. The permit allows leaving the eggs in the nest after 14 days. Addling eggs would involve vigorously shaking the eggs until sloshing is heard, which indicates that the embryo has been destroyed. These techniques would be performed as early in the egg incubation period as possible. The nest would be marked with flagging approximately 30 feet from the nest. The treated eggs in the nest would be marked with a lead pencil. It is recommended that this must be completed every time the nest is visited, ideally once a week (personal communication Milton 2009). Any new eggs found during the subsequent visits would be oiled in the same manner. As stated above, the park would implement the vegetative buffers within the first 2 years of this plan/EIS and continue egg oiling at current levels or may also increase egg oiling to achieve the resident Canada goose population goal and to meet the desired conditions for wetlands.

Other options were considered to achieve the desired conditions for this plan/EIS. In addition to oiling/addling, some eggs could be removed from the nest and replaced with wooden, plastic, or unfertilized eggs. This would result in the resident Canada goose continuing to incubate the eggs and not re-nesting in a different area. In Toronto, Canada, 72 percent of the nests that contained artificial eggs continued to be incubated for an average of 38 days (Smith et al. 1999).

Alternative B, current egg oiling would continue as stated in alternative A, the no action alternative. If the resident Canada goose population increases greater than 20 percent in any given year of the management plan after the initial population reduction, there could be an increase in the current egg management program for the following year. The initial goose population goal of 54 resident Canada geese may be adjusted based upon results of monitoring and adaptive management strategies. If an increase in egg oiling were needed, the NPS would hire seasonal staff for the spring months to perform additional egg oiling, egg addling, and egg replacement as needed. Egg oiling would remain the major management effort.

Marking Eggs for Oiling

In addition to the egg oiling/addling, approved goose hatch control materials, such as OvoControl® G may be used. OvoControl® G is a specially formulated product to help control the hatchability of the eggs from geese. OvoControl® G is fed as palatable bait during the nesting season, and it prevents eggs from hatching. The product's active ingredient is nicarbazin and is registered by the USEPA and supported by the Humane Society and People for the Ethical Treatment of Animals (Innolytics 2007). A total of 50 grams of OvoControl® G must be consumed every day for three weeks prior to nesting. Afterwards, an unspecified amount needs to be consumed for eight to ten weeks. This product would affect all bird species if consumed; the label instructions must be followed to minimize ingestion by non-target species. To prevent consumption by other bird species, OvoControl® G has been designed with the following characteristics:

- The bread-like bait is large, suitable for geese but not to songbirds.
- The bait is fed on a restricted use basis at dawn in the vicinity of overnighting geese. Experience shows that geese are habituated to the bait; it is consumed quickly leaving little opportunity for non-target feeding.
- Geese are commensal feeders, aggressively chasing most other species out of their immediate feeding areas.
- A daily dose is required during the breeding season. If non-target species receives an occasional dose, the product would have no effect.

- Resident Canada geese breed earlier in the season when compared to other waterfowl. If other waterfowl ingest the product, it will likely be excreted by the time they reach their respective breeding season.
- Raptors will not consume bread-cased bait (Innolytics 2007).

Additional reproductive control measures may be implemented as new innovative technologies and products become available that are more effective and controlled by the USEPA. Under alternative B, these products could only be used during years following an increase in population. An approved depredation permit, identical to the one required for oiling or addling eggs, is required from USFWS prior to the use of OvoControl® G.

Alternative B could also include implementing scare tactics as needed as discussed above prior to the nesting season. This may prevent some geese from building nests within the park property.

IMPLEMENTATION COST

The total cost of implementing alternative B includes both wetland and resident Canada goose management techniques over the life of this plan/EIS. Estimates of these costs are included in the table below.

Alternative B Cost Estimate

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
1	Vegetation monitoring and invasive plant species management	Costs include initial equipment cost + salary of labor	$30, 125 (first year only)	$386,370 (labor + annual costs)	$5,825,675
2	Population Monitoring	Annual surveys	$0	$10,000	$150,000
3	Hydrology techniques	Cost does not include design and permitting; some costs encompassed in salary of labor from #1 above	$2,968,750	$0	$2,968,750
4	Vegetation techniques		$2,002,384	$26,630	$2,401,834
5	Wetland restoration	Cost does not include design and permitting	$1,348,000	$0	$1,348,000
6	Park Operations and Maintenance		$268,820	$9,970	$418,370
7	Lethal Control**	Includes year 1 one costs only	$14,872	Unknown	$14,872
8	Habitat modification		$3,193,630	$0	$3,193,630
9	Scare and harassment**	Includes year 1 one costs only	$19,712	Unknown	$19,712
10	Reproductive Control**	Includes year 1 one costs only	$11,100	Unknown	$11,100

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
11	Cultural/Educational	Some costs encompassed in salary of labor from #1 above	$5,000	N/A	$5,000
TOTAL COST FOR ALTERNATIVE B					**$16,356,943‡**

* Exact year of implementation unknown at this time; cost does not include maintenance or repair, if applicable.

** Includes cost for year 1 only; adaptive management would determine if technique would be required and to what extent in subsequent years.

† One-time cost + (annual cost*15 yrs)

‡ Total cost for 15 years assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS.

ALTERNATIVE C: MODERATE LEVEL OF WETLAND MANAGEMENT COMBINED WITH MODERATE LEVEL OF RESIDENT CANADA GOOSE MANAGEMENT

Alternative C combines aggressive wetlands management options with a moderate level of lethal and non-lethal resident Canada goose management techniques. This alternative assumes that intensive wetland management would be needed to counteract the resident Canada goose population that would remain.

Alternative C combines aggressive wetlands management options with a moderate level of lethal and non-lethal resident Canada goose management techniques.

WETLAND MANAGEMENT TECHNIQUES

Hydrology—Alternative C includes many of the same management techniques as alternative B but the techniques would be in fewer locations compared to alternative B. Under alternative C, the park may use erosion control techniques including the installation of coir fiber logs; installation of natural or manmade flow deflectors; installation of pre-seeded bog mats; and reductions to steepness of the wetland shoreline. Increased protection could be directed to those areas that receive the greatest wave action. The District Harbormaster would be encouraged to enforce the no wake zones in areas where the wetland edge may be affected. Potential locations for these techniques are shown on figures 8 through 10. Alternative C would not include creating tidal guts or altering water elevations as proposed in alternative B. The park may remove or modify structures or obstacles that result in moderate or severe erosion of the shoreline or wetland; however, removal would be located in fewer locations when compared to alternative B. Items that clog the marshes, such as beaver dams, may be removed if their presence is causing an issue. The park may investigate areas for extreme water level changes that may be affecting vegetation establishment; however, this would be done only in select and limited locations.

Vegetation—Under alternative C, techniques would be the same as alternative B, except instead of a high-density planting effort throughout the wetlands, the park would plant at a lower density when compared to alternative B.

FIGURE 8: ALTERNATIVE C - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, NORTH AREA

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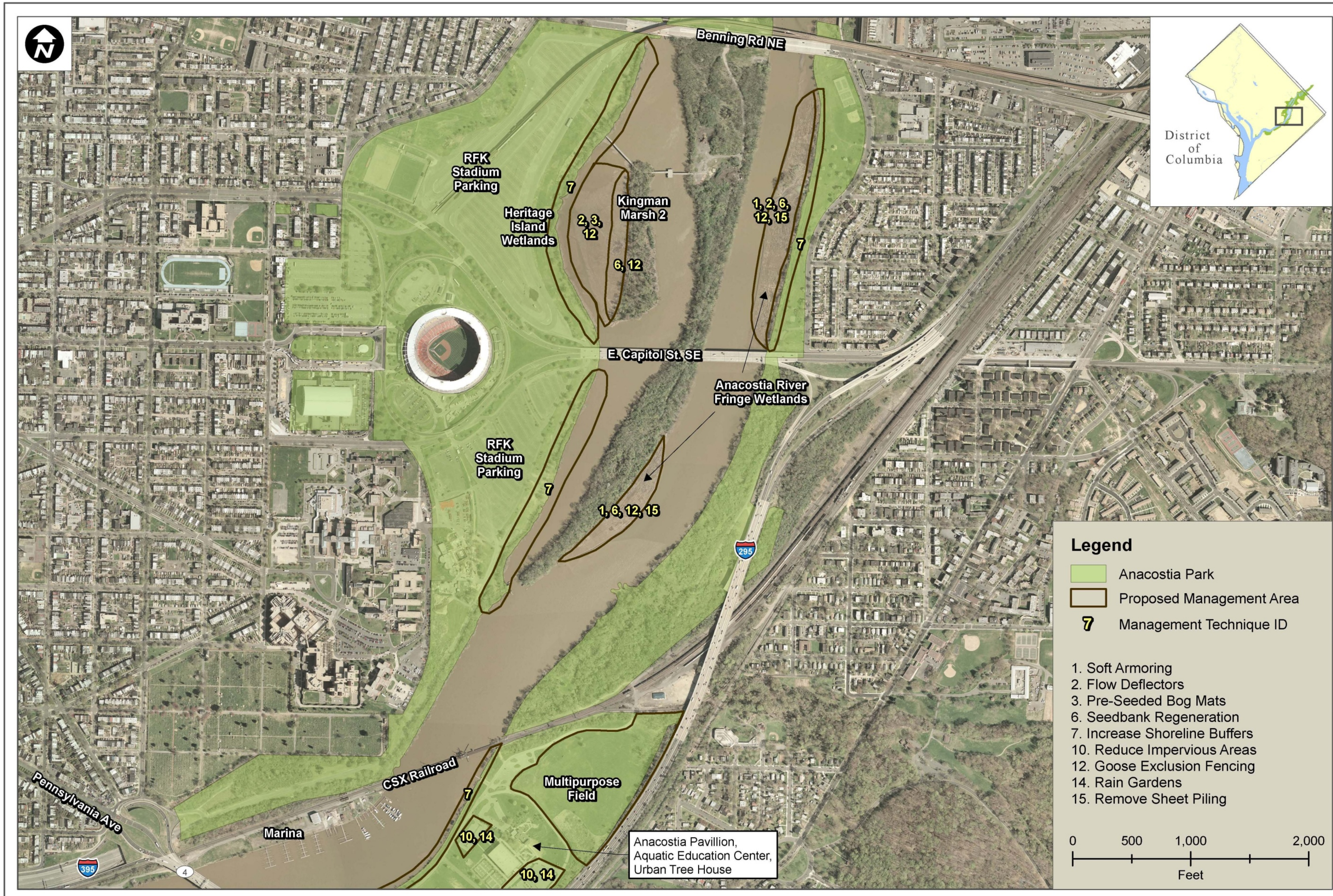

FIGURE 9: ALTERNATIVE C - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, CENTRAL AREA

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FIGURE 10: ALTERNATIVE C - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, SOUTH AREA

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Restoration—Restoration efforts under alternative C could include the installation of stream/stormwater outfall energy dissipation modifications as needed at the ends of any outfalls identified as requiring repair to remediate for erosive forces. If needed, these areas may be determined in the future. Alternative C would include techniques that disturb smaller areas of land and water compared to alternative B. For example, alternative C would not include stream daylighting or seawall breaks as described in alternative B; these techniques normally impact more natural resources and require more involved construction activities.

Cultural/Educational—Under alternative C, and similar to other management alternatives, this alternative includes an increase in educating the public through wetland programs and interpretive activities that present Anacostia River history, traditional ranger-led programs, interpretive waysides and printed material, that include the evolution of the Anacostia River watershed. These efforts would include wetland restoration work and associated issues, challenges, and current management activities. This alternative would not include constructing new boardwalks or trails as described under alternative B.

Park Management and Operations—Under alternative C, park management and operations to improve the quality of wetlands could include the same techniques as alternative B. Figures 8 through 10 show potential locations for reducing impervious areas.

RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES

Lethal Control—Under alternative C, lethal control of the resident Canada goose population at Anacostia Park would include a less intensive population reduction when compared to alternative B. Alternative C proposes population reduction for the resident Canada goose within the park, through removal of 40 to 60 percent of the resident Canada goose population within the first year of the plan/EIS as the first phase towards meeting the initial goal of 54 resident Canada geese. Although monitoring may be conducted yearly, lethal control of 40 to 60 percent of the resident Canada goose population would only be used up to five times throughout the life of this plan/EIS following the initial reduction, and only if the population exceeds the initial goal of 54 resident Canada geese within the park or if vegetation monitoring and adaptive management indicate a different resident Canada goose population goal is appropriate. Subsequent management may not require lethal control if population goals are being met using other non-lethal methods and tools. The technique used to reduce the population would include round-up, capture, and euthanasia. Lethal removal by shooting would not be used under this alternative. The population would be maintained at a sustainable resident Canada goose population goal using a similar lethal method. Locations for goose round ups are shown on figures 8 through 10. Goose round-ups would occur during the summer months when adult geese are molting and flightless (starting June 15 in Mid-Atlantic) and when young-of-the-year (juveniles less than 1 year old) are considered self-sufficient but unable to fly. Young-of-the-year resident Canada geese that remain in the park after the roundups would be expected to survive on their own.

Habitat Modification—Management techniques would be the same as alternative B except that new shoreline buffers would only be planted along Kingman Marsh and the Anacostia River Fringe Wetland areas (new buffers in fewer locations compared to alternative B). These areas are shown on figures 8 through 10. An additional technique that may be implemented under alternative C to prevent geese from grazing within the turf areas, could include applying approved goose repellents to problem areas. Goose repellents are typically products applied to vegetation so that geese find it inedible. Repellents, such as Goose Chase, could be used according to the label instructions and would not be harmful to humans. If the use of the repellent on the turf area drives the geese to the wetland areas, then the use of the repellent would be discontinued.

Scare and Harassment—A less intensive scare and harassment technique program could be implemented under alternative C as needed. The scare and harassment techniques are similar to those in alternative B; however, they would only be implemented in areas closest to the restored wetlands (only two locations) and techniques would be rotated less often compared to alternative B if implemented. Locations where scare and harassment techniques may be implemented are shown in figures 8 through 10. Scare and harassment techniques would be implemented in the spring to deter resident Canada geese from nesting at the park. Additional scare and harassment techniques may be implemented as new technologies become available.

Reproductive Control—Following the initial reduction in population size using lethal controls (killing), the current egg management program would be intensified to allow more time and effort. The NPS may hire two additional seasonal staff dedicated to work in this program each spring during the remaining years of the management plan to focus their time on egg management techniques. Application of goose hatch control materials (OvoControl® G) may be implemented annually if needed. Alternative C would not include implementing scare tactics prior to the nesting season.

IMPLEMENTATION COST

The total cost of implementing alternative C includes both wetland and resident Canada goose management techniques over the life of this plan/EIS. Estimates of these costs are included in the table below.

Alternative C Cost Estimate

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
1	Vegetation monitoring and invasive plant species management	Same as alternative B	$30, 125 (first year only)	$386,370 (labor + annual costs)	$5,825,675
2	Population Monitoring	Same as alternative B	$0	$10,000	$150,000
3	Hydrology techniques	Cost does not include design and permitting; some costs encompassed in salary of labor from #1 above	$1,244,000	$0	$1,244,000
4	Vegetation techniques		$1,474,392	$26,630	$1,873,842
5	Wetland restoration	No techniques proposed	$0	$0	$0
6	Park Operations and Maintenance		$268,820	$9,970	$418,370
7	Lethal Control**	Includes year 1 one costs only	$12,408	Unknown	$12,408
8	Habitat modification		$890,181	$0	$890,181
9	Scare and harassment**	Includes year 1 one costs only	$8,581	Unknown	$8,581
10	Reproductive Control**	Includes year 1 one costs only	$14,100	Unknown	$14,100

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
11	Cultural/Educational	Some costs encompassed in salary of labor from #1 above	$5,000 (signage)	N/A	$5,000
TOTAL COST FOR ALTERNATIVE C					$10,442,157‡

* Exact year of implementation unknown at this time; cost does not include maintenance or repair, if applicable.

** Includes cost for year 1 only; adaptive management would determine if technique would be required and to what extent in subsequent years.

† One-time cost + (annual cost*15 yrs)

‡ Total cost for 15 years assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS.

ALTERNATIVE D: LOW LEVEL OF WETLANDS MANAGEMENT WITH LOW RESIDENT CANADA GOOSE MANAGEMENT

This alternative combines less aggressive wetlands management options with a lethal resident Canada goose management option performed one time during the plan/EIS and only if necessary. This offers the lowest management effort for both wetlands and resident Canada geese.

This alternative combines less aggressive wetlands management options with lethal resident Canada goose management option performed one time during the life of the plan.

WETLAND MANAGEMENT TECHNIQUES

Hydrology—Under alternative D, management techniques that could be implemented may include the removal of structures or obstacles that are resulting in severe erosion of the shoreline or wetland areas. The park could conduct yearly clean-ups for items such as logs and debris, which clog the openings of the marshes throughout the park. Alternative D would not include using erosion control techniques, creating tidal guts, enforcing wake zones, investigating extreme water level change, or altering water elevations as described in alternative B.

Vegetation—Under alternative D, the NCR-EPMT would continue to manage invasive plant species, but at a reduced level. If more money and staff become available, the NPS may manage invasive plant species including common reed and purple loosestrife at a minor level at a minor level if needed. To allow natural seedbanks to regenerate the park could use only passive methods of regeneration. There would be no mechanical seedbank regeneration associated with this alternative. Locations for potential use of natural seedbank regeneration are shown on figures 11 through 13.

Restoration—There is no new wetland restoration efforts associated with alternative D. Conditions would continue to be similar to the no action alternative.

Cultural/Educational—There is no new cultural/educational efforts associated with alternative D.

Park Management and Operations—Alternative D would only include the installation of new rain gardens as discussed in “Techniques Common to All Action Alternatives” above. This alternative would not include trash management or reducing impervious areas as described in alternative B.

RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES

Lethal Control—Under alternative D, there would be no initial lethal resident Canada goose population reduction activities. If the other goose management techniques discussed below do not keep the resident Canada goose population at the goose population goal, a one-time population reduction using lethal controls of 40 to 60 percent of the resident Canada goose population would be performed during the life of the management plan but only if necessary. Lethal control may not be required if population goals are being met using other non-lethal methods and tools. The lethal control technique during this one time reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. If lethal control is needed, potential round-up locations are illustrated on figures 11 through 13. Goose round-ups would occur during the summer months when adult geese are molting and flightless (starting June 15 in Mid-Atlantic) and when young-of-the-year (juveniles less than 1 year old) are considered self-sufficient but unable to fly. Young-of-the-year geese that remain in the park after the roundups would be expected to survive on their own.

Habitat Modification—Alternative D would be similar to alternative B and C because existing vegetative buffers would be widened and new vegetative buffers would be planted to act as barriers to the geese; however, buffers would be planted in the following areas and are shown on figures 11 through 13:

- West bank of the Kingman Marsh along the RFK stadium parking lots.
- Shoreline buffers along the Anacostia River Fringe Wetlands (excluding Langston Golf Course)

Goose exclusion fencing would be installed and maintained and new plantings less desirable to geese would be planted. All goose habitat modification elements would be implemented within the first 5 years of this plan/EIS.

Scare and Harassment—No scare and harassment techniques would be implemented under alternative D.

Reproductive Control—The current egg oiling program described in alternative A, the no action alternative would continue under alternative D. Egg addling and oiling would occur during the April nesting season along the tidal Anacostia River corridor from Bladensburg to Poplar Point. No additional reproductive control management techniques would be used under alternative D.

IMPLEMENTATION COST

The total cost of implementing alternative D includes both wetland and resident Canada goose management techniques over the life of this plan/EIS. Estimates of these costs are included in the table below.

FIGURE 11: ALTERNATIVE D - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, NORTH AREA

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FIGURE 12: ALTERNATIVE D - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, CENTRAL AREA

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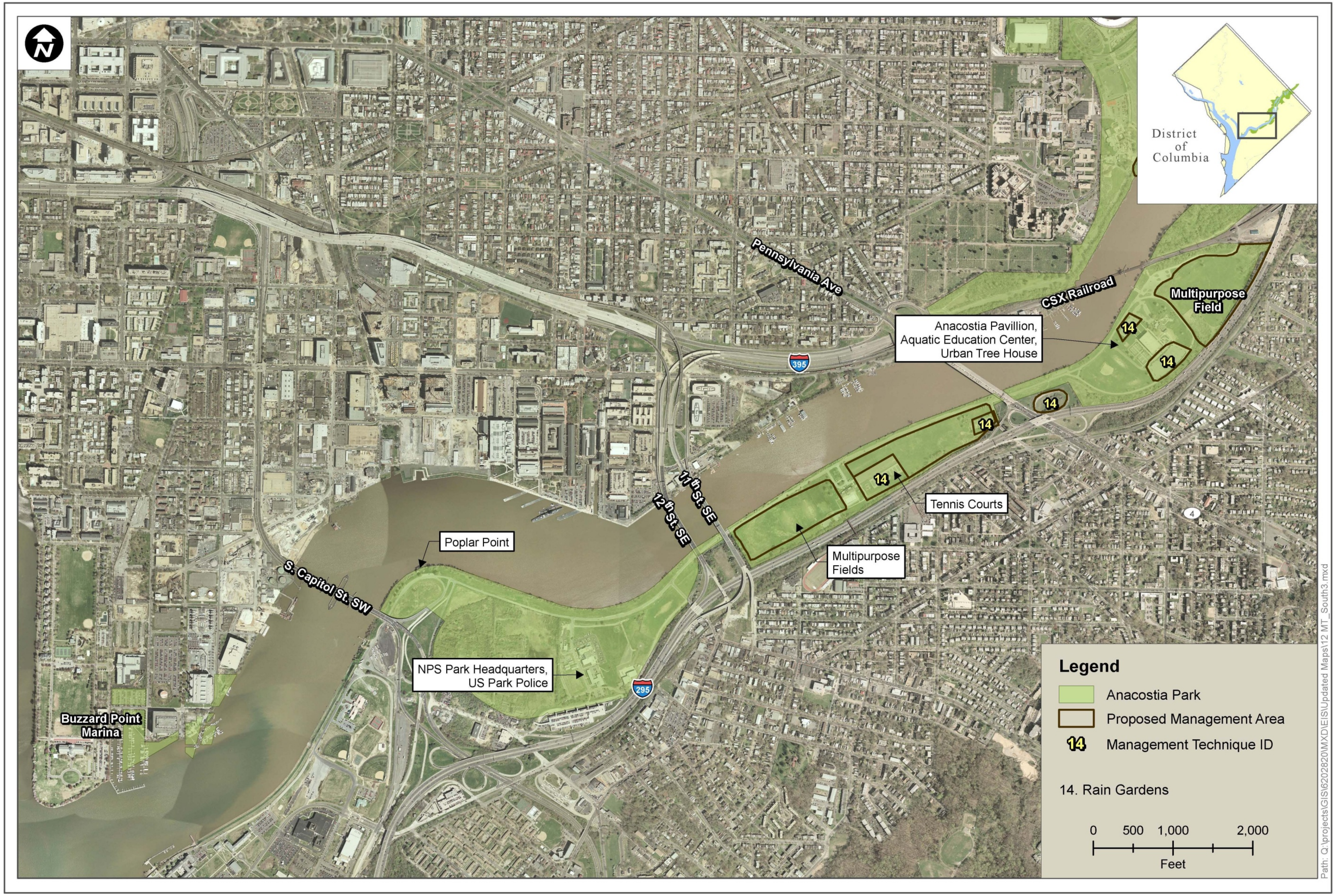

FIGURE 13: ALTERNATIVE D. LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, SOUTH AREA

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Alternative D Cost Estimate

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
1	Vegetation monitoring and invasive plant species management		$30,125 (first year only)	$243,370 (labor + annual costs)	$3,680,675
2	Population Monitoring	Same as alternative B	$0	$10,000	$150,000
3	Hydrology techniques	Cost does not include design and permitting; some costs encompassed in salary of labor from #1 above	$32,500	$0	$32,500
4	Vegetation techniques		$946,000	$7,989	$1,065,835
5	Wetland restoration	No techniques proposed	$0	$0	$0
6	Park Operations and Maintenance		$116,940	$0	$116,940
7	Lethal Control**	Includes year 1 one costs only	$12,408	$0	$12,408
8	Habitat modification		$548,813	$0	$548,813
9	Scare and harassment	No techniques proposed	$0	$0	$0
10	Reproductive Control**	Includes year 1 one costs only	$4,970	Unknown	$4,970
11	Cultural/Educational	Some costs encompassed in salary of labor from #1 above	$5,000 (signage)	N/A	$5,000
TOTAL COST FOR ALTERNATIVE D					**$5,617,141‡‡**

* Exact year of implementation unknown at this time; cost does not include maintenance or repair, if applicable.

** Includes cost for year 1 only; adaptive management would determine if technique would be required and to what extent in subsequent years.

† One-time cost + (annual cost*15 yrs)

‡ Total cost for 15 years assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS.

ALTERNATIVE E: HIGH LEVEL OF WETLAND MANAGEMENT WITH MODERATE RESIDENT CANADA GOOSE MANAGEMENT WITH NO LETHAL CONTROL

This alternative combines aggressive wetland management techniques with moderately intensive resident Canada goose management activities; however, there is no lethal control.

This alternative combines aggressive wetland management techniques with moderately intensive resident Canada goose management activities; however, there is no lethal control.

WETLAND MANAGEMENT TECHNIQUES

Hydrology—Under alternative E, management techniques for hydrology would be similar to alternative B. Potential locations for these management techniques are shown on figures 14 through 16.

Vegetation—Under alternative E, management techniques for vegetation would be similar to alternative B. Potential locations for the vegetative management techniques are shown in figures 14 through 16.

Restoration—Under alternative E, management techniques for wetland restoration would be similar to alternative B. Potential locations for these management techniques are shown in figures 14 through 16.

Cultural/Educational—Under alternative E, cultural/educational management techniques would be similar to those of alternative B.

Park Management and Operations—Park management and operations would be similar to those described under alternative B. Potential locations for reducing impervious areas are shown in figures 14 through 16.

RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES

Lethal Control—There would be no initial or follow-up lethal resident Canada goose population reduction associated with alternative E.

Habitat Modification—Management techniques affecting goose safety or habitat preference would be similar to alternative B, except that no existing vegetative buffers would be widened. Principal areas for shoreline plantings or enhancements include the following and are shown in figures 14 through 16:

- The entire west bank of the Anacostia River beginning, from the Capitol Street Railroad Bridge, up to the District/Maryland boundary.
- West bank of the Kingman Marsh along the RFK stadium parking lots.
- All gaps in the existing buffer along the Langston Golf Course.
- Seawall along the west shore of the Anacostia River near Deane Avenue Northeast.
- To reduce the ease of resident Canada goose access to the plantings for feeding, single or double-stacked coir fiber logs could be installed around the perimeter of all planted areas in the restored wetlands. There would be no repellent applications on turf feeding zones associated with this alternative.

FIGURE 14: ALTERNATIVE E - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, NORTH AREA

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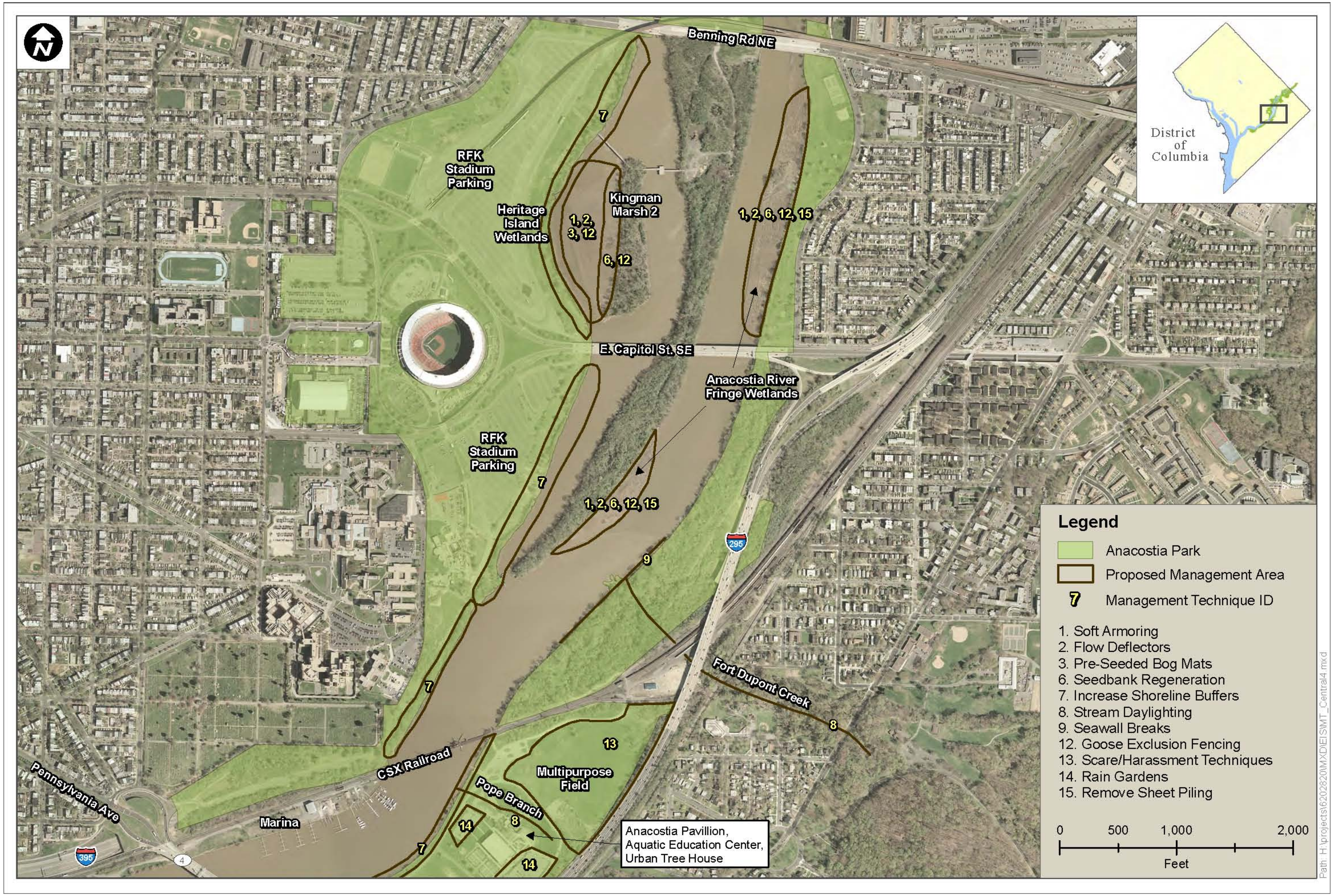

FIGURE 15: ALTERNATIVE E - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, CENTRAL AREA

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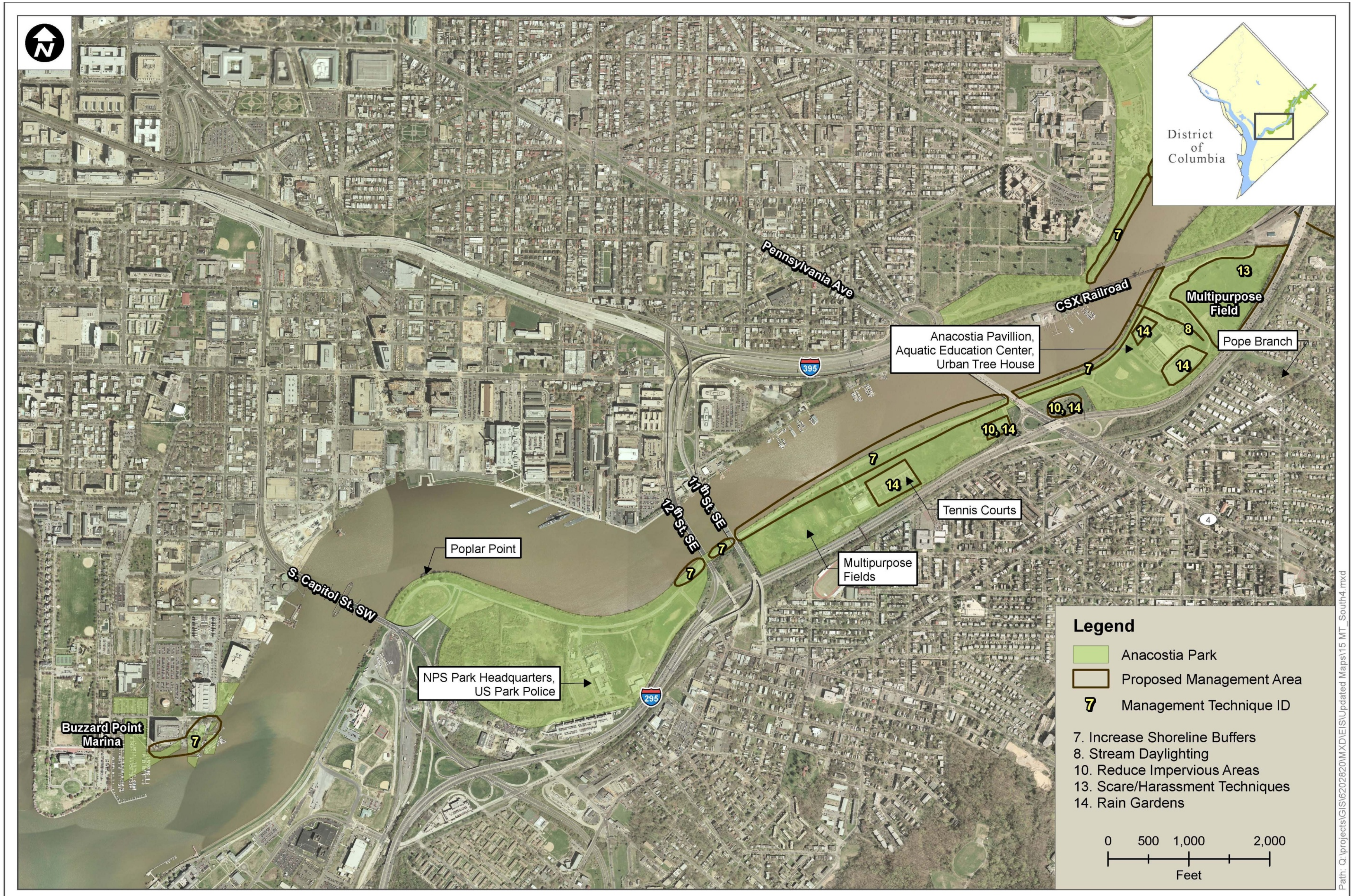

FIGURE 16: ALTERNATIVE E - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, SOUTH AREA

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Scare and Harassment—Under alternative E, an intensive program of scare and harassment techniques could be implemented and would be the same as alternative B. Scare and harassment techniques would be implemented in the spring to deter resident Canada geese from nesting at the park. Additional scare and harassment techniques may be implemented as new technologies become available.

Reproductive Control—Under alternative E, reproductive control management techniques would be the same as those of alternative B.

Cultural/Educational—Under alternative E, cultural/educational management techniques would be the same as those of alternative B.

All of the non-lethal resident Canada goose management techniques described above for alternative E would be implemented within the first 5 years of this plan/EIS with the exception of reproductive control management techniques.

IMPLEMENTATION COST

The total cost of implementing alternative E includes both wetland and resident Canada goose management techniques over the life of this plan/EIS. Estimates of these costs are included in the table below.

Alternative E Cost Estimate

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
1	Vegetation monitoring and invasive plant species management	Same as alternative B	$30,125 (first year only)	$386,370 (labor + annual costs)	$5,825,675
2	Population Monitoring	Same as alternative B	$0	$10,000	$150,000
3	Hydrology techniques	Cost does not include design and permitting; some costs encompassed in salary of labor from #1 above	$2,968,750	$0	$2,968,750
4	Vegetation techniques		$2,002,384	$26,630	$2,401,834
5	Wetland restoration	Cost does not include design and permitting	$1,348,000	$0	$1,348,000
6	Park Operations and Maintenance		$268,820	$9,970	$418,370
7	Lethal Control	No techniques proposed	$0	$0	$0
8	Habitat modification		$3,151,102	$0	$3,151,102
9	Scare and harassment**	Includes year 1 cost only	$19,712	Unknown	$19,712

#	Action	Assumptions	Implementation of Technique (one-time cost)*	Implementation of Technique (annual cost)	Cost for the 15-year Planning Period†
10	Reproductive Control**	Includes year 1 cost only	$11,100	Unknown	$11,100
11	Cultural/Educational	Some costs encompassed in salary of labor from #1 above	$5,000 (signage)	N/A	$5,000
	TOTAL COST FOR ALTERNATIVE E				**$16,299,543‡**

* Exact year of implementation unknown at this time; cost does not include maintenance or repair, if applicable.

** Includes cost for year 1 only; adaptive management would determine if technique would be required and to what extent in subsequent years.

† One-time cost + (annual cost*15 yrs)

‡ Total cost for 15 years assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS.

HOW ALTERNATIVES MEET OBJECTIVES

As stated in the “Purpose of and Need for Action” chapter, the management alternatives selected for analysis should generally meet all project objectives. The management alternatives must also address the stated purpose of taking action and resolve the need for action. Therefore, the alternatives were individually assessed by how well they would meet the objectives of this plan/EIS. Alternatives that did not meet the objectives were not analyzed further and are discussed in the “Alternatives Eliminated from Further Consideration” section that follows. These specific objectives, and how they are addressed by each proposed alternative, are summarized in table 3.

SUMMARY OF IMPACTS

A summary of wetland management techniques and resident Canada goose management techniques is presented in tables 4 and 5. The “Environmental Consequences” chapter describes the effects of each alternative on each impact topic, including the impact on recreational values and visitor experience. These impacts are summarized in table 6.

ALTERNATIVES AND TECHNIQUES ELIMINATED FROM FURTHER CONSIDERATION

NO WETLANDS OR RESIDENT CANADA GOOSE MANAGEMENT ALTERNATIVE

During the deliberative process of alternative formulation for this plan/EIS, one alternative was dismissed. This alternative was no wetlands management and no resident Canada goose management. This alternative was dismissed because it would not meet the objectives of this plan/EIS and is therefore unreasonable. In addition, the park would likely always continue to do some management activities such as oiling eggs. Therefore, this alternative was considered but dismissed.

TABLE 3: THE DEGREE TO WHICH EACH ALTERNATIVE MEETS OBJECTIVES

Objective Areas	Specific Objectives	Alternative A – No Action	Alternative B – High Wetlands & High Resident Canada Goose	Alternative C – Moderate Wetlands, Moderate Resident Canada Goose	Alternative D - Low Wetlands & Low Resident Canada Goose	Alternative E – High Wetlands & Moderate Resident Canada Goose, with No Lethal Control
Overall	• Ensure actions are consistent with the laws, policies, and regulations that guide the NPS, as defined in chapter 1.	• Fully meets objectives.	• Fully meets objectives; permits would be required to implement lethal control.	• Fully meets objectives; permits would be required to implement lethal control.	• Fully meets objectives; permits would be required to implement lethal control.	• Fully meets objectives.
Wetlands	• Reduce adverse effects of resident Canada goose grazing pressure on current and future restored wetland sites to ensure plant regeneration sufficient to reach the desired condition of a functional wetland system.	• Fails to meet objectives because resident Canada goose management techniques including egg oiling and goose exclusion fences do not meet desired conditions.	• Fully meets objectives due to numerous resident Canada goose management techniques including intensive lethal control, increasing buffers, intensive scare and harassment program, and egg oiling.	• Fully meets objectives due to numerous resident Canada goose management techniques including lethal control, increasing buffers, scare and harassment program, and egg oiling.	• Partially meets objectives because of fewer resident Canada goose management techniques available. There would be no initial lethal control used. Shoreline buffers would be limited and no scare and harassment program would be initiated. Egg oiling would remain the same intensity as it is currently.	• Partially meets objectives because of no lethal control – lethal control would be more effective in reducing adverse effects of the resident Canada geese.
	• Maintain native wetlands vegetation and manage the encroachment of invasive and exotic plant species.	• Partially meets objectives due to the reliance on volunteers and partners to continue invasive plant species management.	• Fully meets objectives because invasive plant species would continue to be managed and native species would be restored due to buffering shorelines and executing a high-density planting effort with persistent, native species.	• Fully meets objectives because invasive plant species would continue to be managed and natives would be restored by planting shoreline buffers and executing a low-density planting effort with persistent native species.	• Partially meets objectives due to reduced wetland management. There would be a minor level of invasive plant species management. There would be no shoreline buffers planted or no new native species planted.	• Fully meets objectives because invasive plant species would continue to be managed and native species would be restored due to buffering shorelines and executing a high-density planting effort with persistent, native species.
	• Restore, protect, and maintain wetland functions.	• Fails to meet objectives due to limited wetland management. There is currently no wetland restoration or hydrology management at the park.	• Fully meets objectives due to high wetland management and new wetland restoration efforts. Techniques include preventing erosion and clogging of wetlands, creating tidal guts, daylighting, seawall breaks, and stormwater outfall energy dissipation.	• Partially meets objectives because of high wetland management but no new restoration efforts are proposed. Techniques include preventing erosion and clogging of the wetlands, and stormwater outfall energy dissipation. No tidal guts, daylighting, or seawall breaks would occur to restore wetlands.	• Partially meets objectives because of high wetland management but no new restoration efforts are proposed. Techniques include removing structures that clog wetlands. No erosion control, tidal guts, daylighting, or seawall breaks would occur to restore wetlands.	• Fully meets objectives due to high wetland management and new wetland restoration efforts. Techniques include preventing erosion and clogging of wetlands, creating tidal guts, daylighting, seawall breaks, and stormwater outfall energy dissipation.
Wildlife and Wildlife Habitat	• Manage the resident Canada goose population within the park such that a viable wetlands habitat can be sustained.	• Fails to meet objectives because the resident Canada goose population has limited management resulting in wetlands that are not pre-dominantly self-sustaining.	• Fully meets objectives because resident Canada goose population would be highly managed resulting in wetlands that would become pre-dominantly self-sustaining. Resident Canada goose population would be managed by intensive lethal control, modification of goose habitat, intensive scare and harassment program, and increased egg oiling.	• Fully meets objectives because resident Canada goose population would be highly managed resulting in wetlands that would become pre-dominantly self-sustaining. Resident Canada goose population would be managed by less intensive lethal control, modification of goose habitat, less intensive scare and harassment program, and increased egg oiling.	• Partially meets objectives because the resident Canada goose population would be managed but the wetlands may not become pre-dominantly self-sustaining. There would be no initial resident Canada goose population reduction. Lethal control would be used one time if the habitat modification and current egg oiling do not meet the resident Canada goose threshold. No scare and harassment techniques would be used.	• Partially meets objectives because the resident Canada goose population would be managed but the wetlands may not become pre-dominantly self-sustaining. No lethal control would be used to manage the resident Canada goose population. Management techniques would include habitat modification, intensive scare and harassment program, and increased egg oiling.
	• Manage the resident Canada goose population, consistent with the USFWS Resident Canada Goose Management Plan (USFWS 2005).	• Fails to meets objectives because inconsistent with USFWS 2005 and the Atlantic Flyway Resident Goose Management Plan (Atlantic Flyway Council 1999).	• Fully meets objectives because consistent with USFWS (2005) and Atlantic Flyway Council (1999). Management techniques were taken from USFWS 2005.	• Fully meets objectives because consistent with USFWS (2005) and Atlantic Flyway Council (1999). Management techniques were taken from USFWS 2005.	• Fully meets objectives because consistent with USFWS (2005) and Atlantic Flyway Council (1999). Management techniques were taken from USFWS 2005.	• Fully meets objectives because consistent with USFWS (2005) and Atlantic Flyway Council (1999). Management techniques were taken from USFWS 2005.

Objective Areas	Specific Objectives	Alternative A – No Action	Alternative B – High Wetlands & High Resident Canada Goose	Alternative C – Moderate Wetlands, Moderate Resident Canada Goose	Alternative D - Low Wetlands & Low Resident Canada Goose	Alternative E – High Wetlands & Moderate Resident Canada Goose, with No Lethal Control
	• Restore, protect, and maintain wetlands for native fish and wildlife populations.	• Fails to meet objectives because does not provide wetland habitat or wetland restoration efforts.	• Fully meets objectives because provides restored wetland habitat and includes new planting efforts. Wetlands restored by preventing erosion and clogging, planting native vegetation, creating tidal guts, and daylighting.	• Fully meets objectives because provides restored wetland habitat and includes new planting efforts. Wetlands restored by preventing erosion and clogging, and planting native vegetation.	• Partially meet objectives because of low wetland restoration and planting efforts. Techniques include removing item that clog wetlands. No new native species would be planted and no wetland restoration techniques.	• Fully meets objectives because provides restored wetland habitat and includes new planting efforts. Wetlands restored by preventing erosion and clogging, planting native vegetation, creating tidal guts, and daylighting.
Visitor Experience	• Enhance visitor experience by restoring, maintaining, protecting, and interpreting wetlands.	• Partially meets objectives due to limited education efforts by park programs. Currently no wetland restoration.	• Fully meets objectives because provides new cultural and educational elements. Wetlands would be restored and enhanced by increasing buffers, managing invasive plants, and planting native vegetation.	• Fully meets objectives because provides new cultural and educational elements. Wetlands would be restored and enhanced by increasing buffers, managing invasive plants, and planting native vegetation.	• Partially meets objectives due to limited education efforts by park programs. No new cultural or educational elements would be implemented.	• Fully meets objectives because provides new cultural and educational elements. Wetlands would be restored and enhanced by increasing buffers, managing invasive plants, and planting native vegetation.
	• Enhance public understanding of the value of wetland restoration and issues associated with the management of resident Canada geese.	• Partially meets objectives because of limited wetland education efforts, but no resident Canada goose management education and no goose signage.	• Fully meets objectives because of wetland education and resident Canada goose management education efforts, including goose signage.	• Fully meets objectives because of wetland education and resident Canada goose management education efforts, including goose signage.	• Partially meets objectives because of limited new wetland and resident Canada goose management education efforts, but includes goose signage.	• Fully meets objectives because of wetland education and resident Canada goose management education efforts, including goose signage.
	• During implementation of any management action, minimize disruption to visitor use and experience or adverse impacts to visitor and community safety.	• Fully meets objectives because visitor use and experience is not disrupted and safety is not compromised.	• Fully meets objectives because visitor use and experience is not disrupted and safety is not compromised.	• Fully meets objectives because visitor use and experience is not disrupted and safety is not compromised.	• Fully meets objectives because visitor use and experience is not disrupted and safety is not compromised.	• Fully meets objectives because visitor use and experience is not disrupted and safety is not compromised.
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.	• Partially meets objectives because program relies on volunteers and partners.	• Fully meets objectives because plan/EIS identifies needed budget, impacts to workload and visitor experience.	• Fully meets objectives because plan/EIS identifies needed budget, impacts to workload and visitor experience.	• Fully meets objectives because plan/EIS identifies needed budget, impacts to workload and visitor experience.	• Fully meets objectives because plan/EIS identifies needed budget, impacts to workload and visitor experience.
Cooperation and Coordination	• Cooperate and coordinate with the District, USACE, and other government agencies, as well as other stakeholders currently implementing or interested in implementing a wetlands and resident Canada goose management strategy.	• Fails to meet objectives of the agencies and stakeholders because a strategy is not being implemented and agencies and/or volunteers may get discouraged.	• Fully meets objectives of the agencies and stakeholders due to active, aggressive programs.	• Fully meets objectives of the agencies and stakeholders due to active, aggressive programs.	• Partially meets objectives of the agencies and stakeholders due to less and minimal coordination.	• Fully meets objectives of the agencies and stakeholders due to active, aggressive programs.

TABLE 4: SUMMARY OF WETLAND MANAGEMENT ALTERNATIVES

Wetland Management Element	Management Technique	Alternative A – No Action	Alternative B –High Wetland, High Resident Canada Goose Management	Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management	Alternative D – Low Wetland, Low Resident Canada Goose Management	Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control
Hydrology	Erosion Control Techniques	--	F	F	--	F
	Remove Items that Clog Marsh	--	F	L	F	F
	Create Tidal Guts	--	F	--	--	F
	Upland Runoff	--	F	F	F	F
	No Wake Zones	--	F	F	--	F
	Water Level Change	--	F	L	--	F
	Wetland Elevations	--	F	--	--	F
Vegetation	Invasive Species	L	F	F	L	F
	Remove Sheet Piling		F	F	F	F
	Seedbank Regeneration	--	F	F	L	F
	Buffer Shoreline	--	F	F	--	F
	Planting Effort	--	F	L	--	F
Wetland Restoration	Daylighting	--	F	--	--	F
	Stream and Stormwater Outfall Dissipation	--	F	L	--	F
	Seawall Breaks	--	F	--	--	F
Cultural/ Educational	Education and Interpretation	L	F	F	L	F
	Boardwalks and Trails	--	F	--	--	F
Park Operations and Management	Rain Gardens	--	F	F	F	F
	Trash Management	L	F	F	--	F
	Impervious Areas	--	F	F	--	F

F=alternative includes a full effort

L=alternative includes a limited effort

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TABLE 5: SUMMARY OF RESIDENT CANADA GOOSE MANAGEMENT ALTERNATIVES

Wetland Management Element	Management Technique	Alternative A – No Action	Alternative B –High Wetland, High Resident Canada Goose Management	Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management	Alternative D – Low Wetland, Low Resident Canada Goose Management	Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control
Lethal Control	Round-up, Capture, Euthanasia	--	F	L	L	--
	Lethal Removal by Shooting	--	F	--	--	--
	Monitor population	--	F	F	F	F
	Maintain population	--	F	L	--	--
Habitat Modifications	Plant vegetative buffer	--	F	L	L	F
	Install/maintain new fencing	L	F	F	F	F
	Install Soft armoring	--	F	L	--	F
	Increase width of buffers	--	F	F	F	F
	New plantings unpalatable	--	F	F	F	F
	Application of repellents	--	--	F	--	--
Scare and Harassment	Scare and harassment techniques	--	F	L	--	F
Reproductive Control	Egg oiling	L	L	F	L	L
	Apply goose hatch control	--	L	F	--	L
	Implement scare techniques	--	F	--	--	F
Cultural/Educational	Signage	--	F	F	F	F
	Enforce NPS policy	--	F	F	F	F
	Technical brochure	--	F	F	F	F

F=alternative includes a full effort

L=alternative includes a limited effort

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TABLE 6: ALTERNATIVES COMPARISON TABLE AND SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Resource	Alternative A – No Action		Alternative B – High Wetland, High Resident Canada Goose Management		Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management		Alternative D – Low Wetland, Low Resident Canada Goose Management		Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control	
Soils	Long-term moderate adverse	Soil erosion and runoff would continue from lack of vegetative buffer, causing a change in soil character	Beneficial	Wetland improvement, herbivory reduction, and erosion control would stabilize soils	Beneficial	Vegetation planting and reduced herbivory would improve the soil	Long-term minor adverse	One-time resident Canada goose population reduction would lower herbivory but would not provide long lasting benefits to soils	Negligible	Vegetative buffers and wetland restoration would aid bank stabilization, but herbivory would continue to occur
Cumulative impacts	Long-term minor adverse cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Negligible cumulative impacts		Beneficial cumulative impacts	
Hydrology	Long-term minor adverse	Continued vegetation loss and wetland soil erosion would result in continued impacts on hydrology	Beneficial	Wetland restoration, revegetation, stabilization, and structure removal would all benefit hydrology, and stream flow	Beneficial	Wetland and resident Canada goose management would locally improve hydrology from better stormwater infiltration	Negligible	One-time resident Canada goose population reduction and no erosion control techniques would make no changes to hydrologic conditions	Negligible	Vegetative buffers and wetland restoration would trap pollutants, but herbivory would continue, resulting in no change to hydrologic conditions
Cumulative impacts	Beneficial cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts	
Water Quality	Long-term minor adverse	A continued loss of vegetation from herbivory, pathogen introduction, and continued erosion would cause turbidity and reduced water quality	Beneficial	Improved wetlands would reduce urban runoff and sedimentation, and reduced herbivory, fecal matter, and erosion control would improve turbidity and water quality	Beneficial	Reduction of urban runoff, a decrease in soil erosion, and a reduction in herbivory and fecal matter would improve water quality	Long-term minor adverse	One-time population reduction would cause short-term reduction in herbivory and fecal matter, but would result in no wetland restoration and long-term changes to water quality	Negligible	Wetland restoration would trap urban runoff, but goose herbivory and fecal matter addition would continue, resulting in no discernible change to water quality
Cumulative impacts	Negligible cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Negligible cumulative impacts		Beneficial cumulative impacts	
Floodplains	Long-term minor adverse	Herbivory and continued erosion would result in a further loss of the floodplain	Beneficial	Reconnection of wetland with river and wetland restoration would improve floodplain function	Negligible	Floodplain function would only be slightly improved by management techniques	Long-term minor adverse	Limited wetland management would result in localized benefits, but no overall improvement of floodplain function	Negligible to beneficial	Reconnection of wetland with river and wetland restoration would improve floodplain function
Cumulative impacts	Long-term minor adverse cumulative impacts		Beneficial cumulative impacts		Negligible cumulative impacts		Long-term minor adverse cumulative impacts		Negligible cumulative impacts	
Wetlands	Long-term moderate adverse	Herbivory, invasive plant species, erosion, and loss of wetland function would result in continued degradation of wetlands and water quality	Beneficial	Decreased herbivory would allow revegetation in wetlands, and wetland restoration and erosion control would improve functionality	Beneficial	A reduction in herbivory, and some wetland management techniques would improve wetland function	Beneficial (following resident Canada goose reduction activities)/Long -term minor adverse	A reduction in herbivory and some resident Canada goose management provide short-term benefit, but wetland functionality, abundance, and diversity would still be decreased	Long-term minor adverse	Benefits from wetland management on vegetation would be largely offset by large resident Canada goose population size, even with non-lethal resident Canada goose management measures
Cumulative impacts	Long-term minor adverse cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Negligible cumulative impacts		Negligible cumulative impacts	
Aquatic Resources	Long-term moderate adverse	Herbivory would continue to reduce wetland quality and quantity and lower water quality, resulting in further loss of aquatic habitat	Beneficial	Revegetation, stabilization, and hydrology changes would improve habitat and food sources for aquatic resources	Beneficial	Wetland improvements would have detectable improvements on food sources or aquatic habitats	Negligible	No wetland restoration techniques would result in no change or improvement of food sources or aquatic habitat	Negligible	No detectable or measureable improvements to food sources and habitat quality of macroinvertebrates
Cumulative impacts	Long-term minor adverse cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts		Beneficial cumulative impacts	

Resource	Alternative A – No Action		Alternative B – High Wetland, High Resident Canada Goose Management		Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management		Alternative D – Low Wetland, Low Resident Canada Goose Management		Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control	
Vegetation	Long-term minor adverse	Continued herbivory and increased coverage of invasive plant species would impact native vegetation	Beneficial	Wetland management, herbivory reduction, habitat modification, and new planting would improve native vegetation	Beneficial	Wetland management and reduced herbivory, and invasive plant species control would benefit native vegetation	Long-term minor adverse	Goose herbivory may increase the cover of invasive vegetation, and reduce the abundance and diversity of native vegetation	Negligible	Continued goose herbivory would offset native planting buffers, resulting in an immeasurable change in the vegetation
Cumulative impacts	Long-term minor adverse cumulative impacts		Negligible cumulative impacts		Negligible cumulative impacts		Long-term minor adverse cumulative impacts		Long-term minor adverse cumulative impacts	
Wildlife (not including resident Canada geese)	Long-term minor adverse	Vegetation loss and erosion in wetlands due to wildlife grazing (primarily resident Canada geese) negatively affects aquatic-dependent wildlife species that utilize wetlands, such as waterfowl and migrant Canada geese	Beneficial	Improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/structure of wildlife species in the park	Beneficial	Improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/ structure of wildlife species, including those listed by the District WAP	Long-term minor adverse	Food sources and habitat quality would be improved through plantings, but may be offset or reduced by the lack of lethal reduction activities; small changes to population numbers, structure, genetic variability, and other demographic factors might occur	Negligible	Food sources and habitat quality would be improved through plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change to population numbers or structure of wildlife in the park
Cumulative impacts	Long-term minor adverse cumulative impacts		Negligible cumulative impacts		Negligible cumulative impacts		Long-term minor adverse cumulative impacts		Long-term minor adverse cumulative impacts	
Resident Canada Geese	Negligible impact	Intensive population reduction strategies are not proposed and the resident Canada goose population would remain above the recommended 54 resident Canada geese within the park	Long-term major adverse impact on resident Canada geese in the park	Population would be reduced and maintained at a lower level than current numbers throughout the life of the plan/EIS	Long-term moderate adverse impact on resident Canada geese in the park	Population would be reduced at a lower level than current numbers up to five times throughout the life of this 15-year plan/EIS	Short-term, major, adverse impacts on resident Canada geese in the park	A one-time, lethal population reduction could occur, but would not be maintained over the long-term	Negligible, impact on resident Canada geese in the park	Population reduction strategies would not occur under alternative E; the resident Canada goose population would likely remain above the recommended 54 resident Canada geese within the park
			Overall long-term moderate adverse impact	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	Overall long-term minor adverse impact	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	Overall negligible impact	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	Overall negligible impact	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
Cumulative impacts	Long-term, major, adverse cumulative impacts		Long-term, major, adverse cumulative impacts		Long-term, major, adverse cumulative impacts		Long-term, major, adverse cumulative impacts		Long-term, major, adverse cumulative impacts	
Historic Districts and Structures	No Effect	Current and continued management practices would not result in any impacts to historic structures and districts.	Negligible to long-term moderate adverse*	Wetland and resident Canada goose management techniques would somewhat alter setting near Kenilworth Gardens, Langston Golf Course and Anacostia Park causing negligible impacts; future wetland management could have a long-term, moderate impact on the Anacostia River Seawall	Negligible	Wetland and resident Canada goose management techniques would somewhat alter setting in the vicinity of Kenilworth Gardens, Langston Golf Course and Anacostia Park causing negligible impacts	Negligible	Limited wetland and resident Canada goose management techniques would somewhat alter the setting in the vicinity of Kenilworth Gardens, Langston Golf Course and Anacostia Park causing negligible impacts	Negligible to long-term moderate adverse*	Wetland and resident Canada goose management techniques would somewhat alter setting near Kenilworth Gardens, Langston Golf Course and Anacostia Park causing negligible impacts; future wetland management could have a long-term, moderate impact on the Anacostia River Seawall

Resource	Alternative A – No Action		Alternative B – High Wetland, High Resident Canada Goose Management		Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management		Alternative D – Low Wetland, Low Resident Canada Goose Management		Alternative E –High Wetlands, Moderate Resident Canada Goose Management with No Lethal Control	
Cumulative impacts	Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts	
Archeological Resources	No Effect	Current and continued management practices would not result in any impacts to archeological resources.	Long-term, minor to moderate adverse *	High effort wetland and resident Canada goose management techniques would require ground-disturbing activities that could impact known and unknown/undiscovered archeological resources	Long-term minor adverse*	High effort wetland and moderate effort resident Canada goose management techniques would require ground-disturbing activities that could impact known and unknown/undiscovered archeological resources	Long-term minor adverse	Goose herbivory may increase the cover of invasive vegetation, and reduce the abundance and diversity of native vegetation	Negligible	Continued goose herbivory would offset native planting buffers, resulting in an immeasurable change in the vegetation
Cumulative impacts	Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts	
Park Management and Operations	Long-term minor adverse	Maintenance requirements could increase if the resident Canada goose population in the park exhibits an overall increase	Long-term moderate adverse	Increased staff and resources would be necessary to implement new management techniques and measures required to ensure a safe and beneficial experience for park visitors	Long-term moderate adverse	Increased staff and resources would be necessary to implement new management techniques and measures required for the alternative	Long-term minor adverse	Food sources and habitat quality would be improved through plantings, but may be offset or reduced by the lack of lethal reduction activities; small changes to population numbers, structure, genetic variability, and other demographic factors might occur	Negligible	Food sources and habitat quality would be improved through plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change to population numbers or structure of wildlife in the park
Cumulative impacts	Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts		Long-term moderate adverse cumulative impacts	
Visitor Use and Experience	Beneficial for visitors who enjoy Canada geese at the park	Visitors could continue to view goslings and adult resident Canada geese year round in large numbers	Beneficial for visitors who enjoy Canada geese at the park	Visitors would continue to view goslings and adult Canada geese year round within the park	Beneficial for visitors who enjoy Canada geese at the park	Visitors would continue to view goslings and adult Canada geese year round within the park	Short-term, major, adverse impacts on resident Canada geese in the park	A one-time, lethal population reduction could occur, but would not be maintained over the long-term	Negligible, impact on resident Canada geese in the park	Population reduction strategies would not occur under alternative E; the resident Canada goose population would likely remain above the recommended 54 resident Canada geese within the park
	Long-term minor adverse for visitors who do not enjoy Canada geese at the park	Resident Canada goose population would not be drastically reduced; Some visitors may avoid the Langston Golf Course or this area because of the high number of resident Canada geese that utilize turf areas of the golf course.	Beneficial for visitors who do not enjoy Canada geese at the park	Resident Canada goose population would be reduced; management techniques would make Langston Golf Course and other areas less attractive to resident Canada geese	Beneficial for visitors who do not enjoy Canada geese at the park	Resident Canada goose population would be reduced; management techniques would make Langston Golf Course and other areas less attractive to resident Canada geese	Overall negligible impact	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	Overall negligible impact	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
Cumulative impacts	Beneficial cumulative impacts for visitors who enjoy Canada geese at the park Negligible cumulative impacts for visitors who do not enjoy Canada geese at the park		Beneficial cumulative impacts for visitors who enjoy Canada geese at the park Beneficial cumulative impacts for visitors who do not enjoy Canada geese at the park		Beneficial cumulative impacts for visitors who enjoy Canada geese at the park Beneficial cumulative impacts for visitors who do not enjoy Canada geese at the park		Beneficial cumulative impacts for visitors who enjoy Canada geese at the park Negligible cumulative impacts for visitors who do not enjoy Canada geese at the park		Beneficial cumulative impacts for visitors who enjoy Canada geese at the park Negligible cumulative impacts for visitors who do not enjoy Canada geese at the park	

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MODERATE LEVEL OF WETLANDS MANAGEMENT WITH HIGH LEVEL OF RESIDENT CANADA GOOSE MANAGEMENT

This alternative was removed from further consideration following a detailed analysis of the resources and following the roundtable discussion. It was determined that this alternative had the most controversial resident Canada goose management techniques and that the alternative in general was very similar to alternative B. This alternative retained the intensive resident Canada goose management techniques of alternative B, both lethal and non-lethal, and combined it with a less intensive wetlands management plan. This alternative assumed that less aggressive wetland management might be needed if the resident Canada goose population is highly controlled.

TECHNIQUES DISMISSED FROM FURTHER CONSIDERATION

Several techniques that were considered for the alternatives were also dismissed during the process of alternative formulation. The following techniques were eliminated from further consideration for the management of wetlands and resident Canada geese at Anacostia Park.

WETLAND MANAGEMENT TECHNIQUES

Maintenance Dredging—The alternatives described above include the creation of tidal guts in areas of the wetlands that do not continuously receive tidal water flow. These tidal guts would be created through a one-time dredging activity. The NPS has eliminated maintenance dredging of the existing and created tidal guts due to the high costs associated with the effort. This element is not economically feasible.

Hard Containment—Hard containment, including sheet piling and riprap would not be used to completely surround wetland areas. The purpose of containment is to temporarily hold sediment in place. Hard containment surrounding the entire wetland has been dismissed since sheet piling and riprap are typically permanent materials. This element is not technically or economically feasible.

RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES

Harassment Techniques—Harassment techniques that involve the use of pyrotechnics, propane cannons, distress calls, and lasers were dismissed. Due to the concerns discussed below, these types of harassment techniques were dismissed as reasonable alternative elements. In general, harassment techniques provide a short-term temporary relief. Success of harassment techniques varies depending on the size of the property, size of resident Canada goose population, and time of year the harassment techniques are used (Paulin and Drake 2004). Pyrotechnics, propane canons, and distress calls were dismissed because they conflict with and up-to-date or valid park plan, statement or purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement the elements. Specifically, the use of soundmaking devices does not assist the park in protecting natural sounds (NPS 2006a). The use of lasers and hazing with water spray would cause great environmental impacts. Below is a short description of harassment techniques that were dismissed.

Pyrotechnics—Pyrotechnics are devices that make a loud noise intended to scare geese away from an area. Pyrotechnics include screamers and banger shells (shot out of a starter-type pistol) and shell crackers (shot out of a 12-gauge shotgun). Detonating pyrotechnics would be loud and irritating to the surrounding communities.

Propane Cannons—Propane cannons are devices that ignite propane gas to produce a loud explosion at timed intervals. This technique is extremely loud. The park is urban and the use of propane cannons would disturb surrounding residences and communities.

*Distress C*alls—This element involves using a recording of distress calls of Canada geese. Distress calls are most effective when played back loud enough to be heard by geese at a distance. When using this element, geese quickly habituate to distress stimulus (French 2001).

Lasers—Lasers used as a harassment tool are relatively low power, long-wave length lasers that can disperse species under low light conditions. Lasers cannot be pointed directly at people, roads, and aircraft (French 2001). This technique may be an acceptable tool; however, public safety is a concern and this technique can be costly.

Hazing with Water Spray Devices—In public use areas, this is not a viable tool due to increased noise levels that could disturb the surrounding residences. In addition the use of a water spray device would likely create areas of ponding throughout the park, including the recreation fields.

Noisemaking devices—Noisemaking devices that could be mounted on vehicles, hand-held, or operated remotely such as emergency sirens, nautical horns, and electric whistles played at loud levels to scare geese were dismissed. Firing non-projectile blanks from firearms or starter guns and firing bangers, screamers, and whistle bombs from a 15-millimeter launcher are additional scare and harassment devices that were also dismissed from further consideration. It is likely that the resident Canada goose population would habituate to these noisemaking harassment techniques. While some of these devices are occasionally used in other parks, Anacostia Park's location within the metropolitan area and the public's close proximity to areas where these devices would be used makes these devices too disruptive. Visitors playing golf or on adjacent playing fields would be constantly disrupted by noise.

Nest Destruction—Landowners and local governments who intend to oil eggs or destroy nests must register and log these activities on the USFWS website. Registration must be completed before egg oiling and nest destruction activities are undertaken. Egg oiling and nest destruction can only be completed after registration between March 1 and June 30. Additionally, participants in the program must return to the USFWS website by October 31 to report the number of nests and eggs destroyed, even if no eggs or nests were destroyed. Registration is only valid for one season, and must be renewed each year before nests and eggs may be destroyed (USFWS 2009). Resident Canada geese typically nest within 150 feet of the water (Smith et al. 1999). When goose nests are destroyed, Canada geese may re-nest in or near the first or original nest. Re-nesting is more common when nest failure occurs early in the egg-laying period. If nest destruction occurs after more than one week of egg incubation, re-nesting is rare (Smith et al. 1999). Nest destruction was considered but dismissed from further analysis during the process of alternative formulation. When nests are destroyed resident Canada geese may re-nest in or near the first or original nest.

Tolerance Zones—NPS personnel considered establishing areas within the park that would be considered resident Canada goose nesting tolerance zones and non-tolerance zones. The purpose of the tolerance zone is to allow resident Canada geese to continue to reproduce and sustain a viable population. The purpose of the non-tolerance zone is to focus resident Canada goose management efforts in those areas identified for wetland management and restoration. The tolerance zones would include areas set aside where geese would be allowed and they would not be disturbed by the management techniques discussed in each alternative. These sites would be easily accessible and would offer the geese preferred habitat for foraging and nesting. The sites would include feeding areas, good sight lines, and access to bodies of water. The non-tolerance zones would not allow resident Canada geese to nest or forage in the selected areas. Nesting areas would be visited on a daily basis; those nests built within the no tolerance zones would be removed and destroyed. This alternative was not considered technically viable since it would be impossible to keep geese from any given area because there is no fencing within the park and geese could move in and out of areas by flying. In addition, moving geese would shift the problems associated with the geese to other areas within the park or neighboring property, which would not meet the project objectives or resolve the need.

Exclusion Techniques (electric fencing)—There are many safety concerns associated with the use of electric fencing for goose management. Fences may need to be place in public areas since resident Canada geese are found throughout Anacostia Park. Other types of exclusion fencing do not pose the same harm to visitors and can be effective deterrents. Therefore, because of public safety concerns and other adverse environmental affects (Drake and Paulin 2003), this type of exclusion fencing was dismissed.

Capture and Relocation—This technique includes capturing resident Canada geese and relocating them to an area of sufficient distance from the park to ensure that they would not return. Capturing resident Canada geese within Anacostia Park and relocating them would be in violation of NPS Policy regarding translocation. Relocating resident Canada geese to a different area would require permits. In addition, if resident Canada geese were to relocate, they may ultimately cause similar problems within the new location. Due to the concerns discussed above relating to policy and feasibility, capture and release was dismissed as a reasonable alternative element. This would be in conflict with up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement.

Introduction of Mute Swans—This technique involves the introduction of mute swans to Anacostia Park. Swans are characterized as aggressive birds and will defend their territory, especially during breeding seasons. Mute swans are more tolerant of other waterfowl and may only defend the immediate area around their nest. This is not a viable technique because mute swans may act as decoys and can attract geese to waterbodies (USDA 2002). In addition, it is against NPS policy to introduce a non-native species (NPS 2006a). This is not technically or economically feasible and would be in conflict with up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement.

Lure Crops—This technique includes fields of grain that have been planted and purposefully left for geese to consume. Due to the need of the park to have to use a nearby agricultural field located outside of park boundaries, this technique was dismissed. In addition, this technique may lead to an increase in bird density locally because birds are attracted to the abundance of food (French 2001). This was dismissed because it is not technically feasible and it may lead to other adverse environmental impacts outside the park.

PREFERRED ALTERNATIVE

Alternative B fully meets all project objectives; alternative B is the preferred alternative.

The selection of the preferred alternative was accomplished during a roundtable meeting on March 8, 2010. Meeting attendees included the project team (Anacostia staff, NPS Regional Director, and representatives from CUE). During the roundtable meeting, the project team discussed how each of the alternatives fully meets, partially meets, or fails to meet the project objectives. The results of the roundtable discussion concluded that alternative B is the preferred alternative. Alternative B fully meets all the project objectives listed above due to the high number of resident Canada goose management techniques including lethal control, scare and harassment program, habitat alteration, and egg oiling. This alternative also proposes extensive wetland restoration opportunities including managing invasive plant species, creating new shoreline buffers with native species, creating tidal guts, and daylighting. Other alternatives proposed did not fully meet each of the objectives.

In addition, to meeting the project objectives, all impacts to natural resources, (with the exception of resident Canada geese) are beneficial as a result of alternative B and include the following: soils, geology, water quality, floodplains, wetlands, aquatic resources, terrestrial vegetation, and wildlife (not including the resident Canada goose). These resources are described in more detail in the paragraphs that follow.

The majority of the wetland and resident Canada goose management techniques included under alternative B would not diminish the character-defining features or the overall integrity of historic resources and would have negligible impacts (*no adverse effect* for Section 106) on historic structures and districts. However, seawall breaks and daylighting, which are future wetland management techniques considered under alternative B, could have up to a long-term moderate adverse impact (*adverse effect* for Section 106) on the Anacostia River Seawall, which is potentially eligible for the NRHP. Future NEPA compliance would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Similarly, some of the management techniques under alternative B would require ground-disturbing activities that could result in direct, long-term minor to moderate adverse impacts (*adverse effect* for Section 106) to archeological resources. Additional documentation of archeological resources and NEPA compliance would be necessary to assess possible impacts to archeological resources as a result of alternative B. If impacts to cultural resources were found to be of such magnitude that a finding of *adverse effect* under Section 106 of the National Historic Preservation Act results, then NPS would consult with the District of Columbia State Historic Preservation Office and the Advisory Council. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during future Section 106 consultation as stipulated in a formal Memorandum of Agreement.

Although it is possible that adverse effects could occur to cultural resources as a result of alternative B, the following beneficial impacts to natural resources would occur:

- **Soils**—Beneficial impacts as a result of wetland and resident Canada goose management techniques proposed, which would improve the existing wetlands, create new wetlands, and reduce goose herbivory of wetlands which would increase wetland vegetation and rootmass, thus stabilizing soils adjacent to the river and reducing actual soil loss during rain events.
- **Hydrology**—Beneficial impacts as a result of the suite of potential techniques to improve the hydrology of the watershed including: erosion control techniques; removing/modifying structures that negatively affect the marsh; creating tidal guts; potential enforcement of no wake zones along the River; investigating the effects of extreme water level change; and considering altering water elevations; the combination of these techniques would infiltrate stormwater into soils, thus mimicking natural drainage processes and reducing the volume of stormwater runoff that enters the Anacostia River during rain events; stream and channel flow would also be improved by removing and/or modifying structures that impede flow.
- **Water Quality**—Beneficial impacts through reducing the resident Canada goose population in the park which would decrease the number of fecal droppings and decrease the amount of erosion from excessive grazing, thus improving water quality through decreased pathogens and sedimentation; new wetlands proposed or restored can serve as a trap for nutrients and sediment (and associated pollutants and pathogens binding to sediment) carried by runoff from surrounding uplands or contiguous wetlands, thereby improving water quality in the Anacostia River.
- **Floodplains—**Floodplain function would improve in localized areas of the park through improvements to wetlands; additional vegetative buffer plantings along the river; and the removal

of impervious surface in the watershed as well as potential flood attenuation through wetland restoration techniques.

- **Wetlands**—The high wetland and resident Canada goose management techniques proposed would enhance existing wetland areas at the park and restore or create new wetland areas resulting in beneficial impacts; it is expected that with rapidly reduced goose browsing pressure, the herbivory previously observed in wetland vegetation would start to reverse and may allow the vegetation to become more resilient (through increased rootmass and propagules) to goose herbivory the following spring.
- **Aquatic Resources**—For alternative B, improvements to wetland vegetation through restoration and resident Canada goose management would indirectly benefit aquatic resources, including finfish, benthic macroinvertebrates, and shellfish because revegetation, stabilization, and changes to hydrology would improve habitat and food sources for aquatic species.
- **Terrestrial Vegetation and Wildlife**—Alternative B would result in overall beneficial impacts on vegetation due to wetland management practices, new plantings, and a reduction in herbivory which would improve native vegetation communities; this alternative would also result in beneficial impacts on wildlife (not including resident Canada geese) because improvements to habitat and food sources would positively impact population structure and numbers in the park.

The only adverse impact to natural resources as a result of alternative B includes adverse impacts to resident Canada geese within the park due to lethal reduction activities. 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.

For visitor use and experience, there would be different expectations for different users of the park. For alternative B, it is the intent of NPS to manage a population of, and not eradicate, the resident Canada geese. NPS recognizes some Canada geese would remain in the park and would include both resident geese and migratory geese. For this alternative, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. Similarly, impacts to visitors who do not enjoy resident Canada geese at the park would be beneficial since the resident Canada goose population would be reduced under alternative B.

SUMMARY−CONSISTENCY WITH SECTIONS 101(B) AND 102(1) OF NEPA

The NPS requirements for implementing NEPA include an analysis of how each alternative meets or achieves the purposes of NEPA, as stated in sections 101(b) and 102(1). Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Council on Environmental Quality (CEQ) Regulation 1500.2 establishes policy for federal agencies' implementation of NEPA. Federal agencies shall, to the fullest extent possible, interpret and administer policies, regulations, and public laws of the United States in accordance with the policies set forth in NEPA (sections 101(b) and 102(1)); therefore, other acts and NPS policies are referenced as applicable in the following discussion.

Fulfills the Responsibilities of Each Generation as Trustee of the Environment for Succeeding Generations

Alternatives B, C, D, and E provide increased protection to wetlands at Anacostia Park by establishing wetland and resident Canada goose management guidelines that reduce impacts on the restored wetlands from the resident Canada geese. Applying both resident Canada goose and wetland management techniques would not only benefit the restored wetlands in the park when compared to the no action alternative, but would also provide protection to other resources including soils, water quality, vegetation, and wildlife.

Alternative B provides the highest level of wetlands and resident Canada goose management by combining the most aggressive wetland techniques with intensive resident Canada goose management techniques including lethal control. Alternative B would reduce herbivory on wetland vegetation by implementing an intensive lethal control program, altering the preferred habitat of resident Canada geese, and establishing a scare and harassment program. Alternative B would also implement various wetland management techniques, including use of erosion control techniques, creating tidal guts, and considering daylighting and seawall breaks, that would restore, protect, and maintain wetland functions. Restoring wetlands would also benefit other wildlife within the area. Alternative B would fully meet the purpose of fulfilling the responsibilities of each generation as trustee for the environment.

Alternative C includes moderate wetlands management with moderate resident Canada goose management. This alternative assumes that more intensive wetland management would be needed to counteract the resident goose population that would remain in the area. Alternative C would include a variety of resident Canada goose management techniques including lethal control, increasing vegetative buffers, and implementing a scare and harassment program. Overall, these techniques would reduce the amount of herbivory by geese within the restored wetland areas. Wetland techniques would restore, protect, and maintain the wetland functions, including hydrology and vegetation. Techniques may include erosion control, planting efforts, and managing invasive plant species. Wetland restoration would also benefit other wildlife in the area. Consequently, alternative C would also fully meet the purpose of fulfilling the responsibilities of each generation as trustee of the environment.

Alternative D includes a plan for low wetlands management and low resident Canada goose management. Alternative D combines less aggressive wetland management techniques with lethal resident Canada goose management one time during the life of the plan if necessary. Wetland management techniques include managing invasive plant species, considering new rain garden areas, and removing or modifying structures that result in erosion or clogging the marsh. Resident Canada goose management techniques include minimal alteration of preferred habitat, and continuation of the park's egg oiling program.

Although, wetland and resident Canada goose management techniques would improve conditions when compared to the no action alternative, benefits would be short-term and wetland functionality would continue to decrease. Consequently, alternative D would only meet the purpose of fulfilling the responsibilities of each generation as trustee of the environment to a moderate degree.

Alternative E combines the most aggressive wetlands management technique with intensive non-lethal resident Canada goose management techniques. Alternative E restores, protects, and maintains wetland functions by using erosion control techniques, creating tidal guts, and considering daylighting and seawall breaks. Although resident Canada goose management techniques would not include lethal control, benefits to the wetlands could result from modifying preferred goose habitat, initiating an intensive scare and harassment program, and continuing reproductive controls. The benefits from wetland management would continue to be largely offset by the large size of the resident Canada goose population at the park. Therefore, alternative E would only meet the purpose of filling the responsibilities of each generation as trustee of the environment to a moderate degree.

Alternative A, the no action alternative, would not change the current wetland and resident Canada goose management at the park. The park would continue to maintain the current goose exclusion fencing and conduct yearly egg oiling. Goose herbivory, invasive plant species, erosion, and loss of wetland function would result in further degradation of wetlands, water quality, and wildlife habitat. Due to the continued degradation of the wetlands and wildlife habitat, alternative A would not fully meet the purpose of fulfilling the responsibilities of each generation as trustee for the environment.

Ensure for all Americans Safe, Healthful, Productive, and Aesthetically and Culturally Pleasing Surroundings

Alternatives B and C would fully meet the purpose of ensuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings. Alternatives B and C would include high to moderate resident Canada goose management techniques as described above. Minimizing the size of the resident Canada goose population at the park, would reduce the amount of goose feces throughout the park lands. This reduction would improve the health and safety of visitors at the park and the natural aesthetics of the park. The wetland and resident Canada goose management techniques would also improve the aesthetics of the area by restoring the wetlands and other vegetation throughout the park.

Alternatives D and E would meet the purpose of ensuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings, but only to a moderate level. Alternative E would include low wetland and resident Canada goose management as described above. If needed a one-time lethal control effort would be implemented. The reduction of the population would reduce the amount of goose feces throughout the park, which would benefit the health and safety of park visitors and natural aesthetics. However, since other resident Canada goose management strategies would be minimal, it is likely that the population may re-establish. Alternative E includes high wetland management and low resident Canada goose management as described above. Since no lethal control would be used in alternative E, it is likely that the large resident Canada goose population at Anacostia would continue to destroy wetlands and goose droppings throughout the park grounds would continue to be a problem. The wetland management techniques would restore and protect the wetlands; however, the benefits to the wetlands would be offset by the large resident Canada goose population size.

Alternative A would not fully meet the purpose of ensuring for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings. Alternative A includes minimal wetland and resident Canada goose management techniques. The resident Canada goose population would continue to destroy the wetlands throughout the park. In addition, goose feces throughout the park lands would continue to be a problem, which would increase health and safety concerns and decrease the aesthetic and cultural landscape of the park.

Attain the Widest Range of Beneficial Uses of the Environment without Degradation, Risk of Health or Safety, or other Undesirable and Unintended Consequences

Alternatives B and C would fully meet the purpose of attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences. Alternatives B and C would continue to allow a wide range of visitor use opportunities. The decrease in the resident Canada goose population would improve the health and safety of recreating at the park, by reducing the amount of goose feces throughout the park lands, including the playing fields which are used for multiple sporting events. These alternatives have been designed to allow multiple uses of the park without further degradation of water quality, vegetation, wildlife, and special status species. Alternative B offers additional uses of the park if new boardwalks and trails were constructed.

Alternatives D and E would meet the purpose of attaining the widest range of beneficial uses of the environment without further degradation, risk of health and safety, or other undesirable or unintended consequences, but only to a moderate level. Alternatives D and E would continue to allow a wide range of visitor use opportunities; however, the health and safety of individuals would continue to be an issue since, the large resident Canada goose population would most likely continue. Alternative D would only allow a onetime lethal control reduction and alternative E would not include lethal control. Goose feces throughout the park would continue to be high and reduce the river's water quality. In addition, it is likely that the resident Canada goose population would continue to destroy the wetland areas.

Alternative A would not fully meet the purpose of attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences. Under the no action alternative, the park would continue minimal wetland and resident Canada goose management strategies including maintaining goose exclusion fencing, egg oiling, and removal of invasive plant species. The resident Canada goose population would continue to destroy the wetlands throughout the park. Goose feces would continue to be a problem throughout the park including the playing fields and Langston Golf Course. Visitors would continue to recreate at the park; however, health and safety of visitors would continue to be a concern.

Preserve Important Historic, Cultural, and Natural Aspects of our National Heritage and Maintain, wherever Possible, an Environment that Supports Diversity and Variety of Individual Choice

Alternatives B and E would meet the purpose of preserving important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice, but only to a moderate level. Alternatives B and E include a high level of wetland and resident Canada goose management techniques (no lethal control for alternative E). Some of the proposed techniques may adversely impact the historic and archeological resources throughout the park. The wetland and resident Canada goose management techniques may alter the historic setting in the vicinity of Kenilworth Gardens, Langston Golf Course, and Anacostia Park. Some techniques such as, daylighting, seawall breaks, and creating tidal guts may require ground disturbing activities that could impact known or undiscovered archeological resources. However, restoring the wetlands throughout the park would benefit the natural aspects of the park including water resources, vegetation, wildlife habitat, and special status species.

Alternatives C and D would meet the purpose of preserving important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice, but only to a moderate degree. Alternatives C and D include wetland and management techniques that would benefit the overall natural environment, including water resources, vegetation, wildlife habitat, and special status species. The wetland and resident Canada goose management techniques proposed under alternative C and D would require a limited scope of ground disturbing activities that could impact known or unknown archeological resources. In addition, the limited techniques proposed would create negligible impacts to the historic setting of Kenilworth Gardens, Langston Golf Course, and Anacostia Park.

Alternative A would meet the purpose of preserving important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice, but only to a moderate level. Under alternative A, the park would continue to manage wetlands and resident Canada goose population through maintaining goose exclusion fencing, egg oiling, and managing invasive plant species. The continuation of the current management practices would not result in impacts to the historic structures and districts or to archeological resources. However, the natural aspects of the park would continue to degrade. The resident Canada goose population would continue to destroy the wetland areas throughout the park. In addition, water resources, vegetation, and wildlife habitat would continue to degrade.

Achieve a Balance between Population and Resource use that would Permit High Standards of Living and a Wide Sharing of Life's Amenities

Balancing population and resource use under the plan/EIS would include protecting the resources unimpaired for the enjoyment of present and future generations and providing access for visitors to experience the natural resources of the park. NPS *Management Policies 2006* states that the enjoyment that is contemplated by the *Organic Act* is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. As discussed above, alternatives B and C would continue to provide a variety of visitor activities throughout the park. Alternatives B and C would implement a variety of wetland and resident Canada goose management techniques that would restore and protect the wetland areas throughout the park. In addition, alternatives B and C would reduce the resident Canada goose population using lethal control and maintain the population through the life of the plan. Alternatives B and C would have the greatest benefit to the natural resources of the park including water resources, vegetation, wildlife habitat, and special status species. Given this, alternatives B and C would fully meet this purpose because each action alternative would provide the public access to share the park's amenities and would protect the resources so that they would be available for future generations.

Alternatives D and E would meet the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities, but only to a moderate level. Alternatives D and E would implement a limited number of wetland and resident Canada goose management techniques described above. Since lethal control would be limited in alternative D and prohibited in alternative E, it is likely that the large size of the resident Canada goose population at the park would continue. Although portions of the wetlands throughout the park may be restored, it is likely that the benefit would only be short-term, due to the continuation of the large resident Canada goose population. Alternatives D and E would continue to offer a variety of visitor uses, however, portions of the park would continue to degrade.

Alternative A would not fully meet the purpose of achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities. Under the no action alternative, the park would continue minimal wetland and resident Canada goose management techniques including maintaining goose exclusion fencing, egg oiling, and managing invasive plant species. The resident Canada goose population would remain in large numbers and goose herbivory would continue to threaten wetland vegetation. Resident Canada geese would continue to deplete the wetlands and cause adverse impacts to water resources and wildlife habitat. Although, visitors would have the opportunity to use the park for a variety of uses, resources would continue to degrade.

Enhance the Quality of Renewable Resources and Approach the Maximum Attainable Recycling of Depletable Resources

Action alternatives B, C, D, and E would fully meet the purpose of enhancing the quality of renewable resources and approach the maximum attainable recycling of depletable resources. For the reasons discussed above, each alternative would enhance the quality of and protect the park's biological and physical resources to some extent. Alternatives B and C would provide the greatest protection of these resources since it would allow for the most wetland and resident Canada goose management techniques and it would allow lethal control throughout the life of the plan. Alternatives D and E would protect the park's biological and physical resources, but to the least degree when compared to the other action alternatives. Alternative E would include the least amount of wetland and resident Canada goose management techniques. Lethal control could only be used one time throughout the life of the plan if necessary. Wetland management would also be minimal; however, the park would still plant and widen vegetated buffers, use passive seedbank restoration efforts, address upland runoff, and create new rain gardens. These techniques would benefit the park's resources. Although alternative E would not allow lethal control, this alternative would allow high wetlands management and moderate resident Canada goose management. Restoring the park's wetlands would enhance other resources including water resources, vegetation, and wildlife habitat.

Alternative A would not meet the purpose of enhancing the quality of renewable resources. Under the no action alternative, the resident Canada goose population would continue to thrive and deplete the wetlands throughout the park. Other resources including water resources, vegetation, and wildlife would also continue to degrade.

The second purpose, "approach the maximum attainable recycling of depletable resources," is less relevant to the wetland and resident Canada goose management plan, as it is geared toward a discussion of "green" building or management practices. Alternatives B and E may include the construction of new boardwalks and trails. Environmentally appropriate design standards and materials would likely be used to minimize impacts to depletable resources. There would be no construction related to the no action alternative (alternative A), so this purpose would not apply.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment. The NPS, in accordance with the U.S. Department of the Interior policies contained in the Department Manual (515 DM 4.10) and CEQ's Forty Questions, defines the environmentally preferred alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in NEPA (section 101(b)) (516 DM 4.10). The CEQ's Forty Questions (Q6a) further clarifies the identification of the environmentally preferred alternative stating, "this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981).

Alternative B has been selected as the environmentally preferred alternative because it is the alternative that would best protect the biological and physical environment by ensuring an immediate as well as a long-term reduction in resident Canada geese within the park that could be sustained over the life of the plan and allow the wetland vegetation to recover from goose herbivory. All impacts to natural resources, (with the exception of resident Canada geese) are beneficial as a result of alternative B and included the following: soils, geology, water quality, floodplains, wetlands, aquatic resources, terrestrial vegetation, and wildlife (not including the resident Canada goose). These resources are described in more detail in the paragraphs that follow. Although alternatives B and C are very close in meeting the goal that identifies the environmentally preferred alternative, alternative B was selected primarily because of its greater certainty in achieving the resident Canada goose goal through high wetland and high resident Canada goose management techniques and all of the beneficial impacts associated with alternative B for natural resources. Alternatives A, D, and E were not considered environmentally preferred because of their lack of effect on resident Canada goose numbers in the park through low resident Canada goose management or lack of lethal reduction activities, which would result in potential adverse effects on the biological and physical resources of the park over the life of the plan.

The majority of the wetland and resident Canada goose management techniques included under alternative B would not diminish the character-defining features or the overall integrity of historic resources and would have l negligible impacts (*no adverse effect* for Section 106) on historic structures and districts. However, seawall breaks and daylighting, which are future wetland management techniques considered under alternative B, could have up to a long-term moderate adverse impact (*adverse effect* for Section 106) on the Anacostia River Seawall, which is potentially eligible for the NRHP. Future NEPA compliance would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Similarly, some of the management techniques under alternative B would require ground-disturbing activities that could result in direct long-term minor to moderate adverse impacts (*adverse effect* for Section 106) to archeological resources. Additional documentation of archeological resources and NEPA compliance would be necessary to assess possible impacts to archeological resources as a result of alternative B. If impacts to cultural resources were found to be of such magnitude that a finding of *adverse effect* under Section 106 of the National Historic Preservation Act results, then NPS would consult with the District of Columbia State Historic Preservation Office and the Advisory Council. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during future Section 106 consultation as stipulated in a formal Memorandum of Agreement.

Although it is possible that adverse effects could occur to cultural resources as a result of alternative B, the following beneficial impacts to natural resources would occur, thus justifying alternative B as the environmentally preferred alternative:

- **Soils**—Beneficial impacts as a result of wetland and resident Canada goose management techniques proposed which would improve the existing wetlands, create new wetlands, and reduce goose herbivory of wetlands which would increase wetland vegetation and rootmass, thus stabilizing soils adjacent to the river and reducing actual soil loss during rain events. Alternative B is the most beneficial to soils compared all other alternatives because this alternative proposes the most hydrology techniques, greatest planting density effort, most wetland restoration projects in combination with lethal population reduction activities for geese to reduce grazing pressure of vegetation from resident Canada geese.
- **Hydrology**—Beneficial impacts as a result of the suite of potential techniques to improve the hydrology of the watershed including: erosion control techniques; removing/modifying structures that negatively affect the marsh; creating tidal guts; potential enforcement of no wake zones along the River; investigating the effects of extreme water level change; and considering altering water

elevations; the combination of these techniques would infiltrate stormwater into soils, thus mimicking natural drainage processes and reducing the volume of stormwater runoff that enters the Anacostia River during rain events; stream and channel flow would also be improved by removing and/or modifying structures that impede flow. Even though alternatives B and E propose the most intensive hydrology techniques, alternative E does not include lethal population reduction activities for geese to reduce grazing pressure of vegetation from resident Canada geese. Therefore, alternative B is the most beneficial alternative to hydrology.

- **Water Quality**—Beneficial impacts through reducing the resident Canada goose population in the park which would decrease the number of fecal droppings and decrease the amount of erosion from excessive grazing, thus improving water quality through decreased pathogens and sedimentation; new wetlands proposed or restored can serve as a trap for nutrients and sediment (and associated pollutants and pathogens binding to sediment) carried by runoff from surrounding uplands or contiguous wetlands, thereby improving water quality in the Anacostia River. Alternative B is the most beneficial to water quality compared all other alternatives because this alternative proposes the most hydrology techniques, greatest planting density effort, most wetland restoration projects in combination with lethal population reduction activities for geese to reduce grazing pressure of vegetation from resident Canada geese.
- **Floodplains**—Floodplain function would improve in localized areas of the park through improvements to wetlands; additional vegetative buffer plantings along the river; and the removal of impervious surface in the watershed as well as potential flood attenuation through wetland restoration techniques. Alternative B is the most beneficial to floodplains, because alternative C includes only limited removal of structures and least invasive stream/stormwater outfall modifications and no seawall breaks and no daylighting are proposed for alternative C to reconnect the floodplain with the Anacostia River. Although alternative E proposes similar techniques compared to alternative B, the floodplain benefits from a full suite of wetland management techniques proposed without a resident Canada goose population (lethal) reduction may be either completely offset or take longer to realize for alternative E.
- **Wetlands—**The high wetland and resident Canada goose management techniques proposed would enhance existing wetland areas at the park and restore or create new wetland areas resulting in beneficial impacts; it is expected that with rapidly reduced goose browsing pressure, the herbivory previously observed in wetland vegetation would start to reverse and may allow the vegetation to become more resilient (through increased rootmass and propagules) to goose herbivory the following spring. Compared to alternative B, which is the most beneficial to wetlands, alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density. Although alternative E proposes similar techniques compared to alternative B, the benefits to wetlands from a full suite of wetland management techniques proposed in alternative E without a resident Canada goose population (lethal) reduction would not have a beneficial impact on wetlands.
- **Aquatic Resources**—For alternative B, improvements to wetland vegetation through restoration and resident Canada goose management would indirectly benefit aquatic resources, including finfish, benthic macroinvertebrates, and shellfish because revegetation, stabilization, and changes to hydrology would improve habitat and food sources for aquatic species. Alternative B is the most beneficial to aquatic resources compared all other alternatives because this alternative proposes the most wetland techniques in combination with a lethal population reduction activities for geese to reduce grazing pressure of wetland vegetation from resident Canada geese.
- **Terrestrial Vegetation and Wildlife**—Alternative B would result in overall beneficial impacts on vegetation due to wetland management practices, new plantings, and a reduction in herbivory which would improve native vegetation communities; this alternative would also result in

beneficial impacts on wildlife (not including resident Canada geese) because improvements to habitat and food sources would positively impact population structure and numbers in the park. Alternative B is the most beneficial to terrestrial resources compared all other alternatives because this alternative proposes the most techniques that would benefit vegetation and wildlife in combination with a lethal population reduction activities for geese to reduce grazing pressure of vegetation from resident Canada geese.

The only adverse impact to natural resources as a result of alternative B includes adverse impacts to resident Canada geese within the park due to lethal reduction activities. 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.

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Chapter 3: Affected Environment

CHAPTER 3: AFFECTED ENVIRONMENT

This "Affected Environment" chapter describes the existing environmental resources of the areas that would be affected if the Proposed Action were implemented. The descriptions, data, and analyses focus on the specific conditions or consequences that may result from implementing the Proposed Action as required by Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision Making,* which sets forth the policy and procedures by which NPS will comply with NEPA (NPS 2011).

A description of existing environmental conditions provides a better understanding of planning issues and establishes a benchmark by which the magnitude of environmental effects of the proposed action, the no action alternative, and other alternatives can be compared. The information in chapter 3 is organized by the same environmental topics used to organize the impact analysis in chapter 4. Figures 17 through 19 present a general location map of Anacostia Park.

PHYSICAL RESOURCES

This section discusses soils within the study area.

SOILS

The Anacostia Watershed has seen major alterations to its soil from the past 150 years of development. Major alterations of the tidal portion of the Anacostia River by the USACE began in the 1920s and left fill materials (Udorthents soils) along much of the riparian buffer in the District portion of the Anacostia River. The majority of the soils within Anacostia Park are considered Udorthents (USDA NRCS 2006). Udorthents are comprised of very heterogeneous earth fill material that has deposited on poorly drained to somewhat excessively drained soils. Udorthents are composed of approximately 80 percent earthy material and 20 percent of other matter which may include bricks, or pieces of concrete or stone. The fill is a mixture of organic and inorganic waste materials, as well as sandy, gravelly, clayey, or silty soil materials. The thickness of the fill is variable, but is typically more than 20 inches. Permeability, available water capacity, runoff, and internal drainage are also quite variable (DCDOT 2006a). Most areas adjacent to the Anacostia River contain udorthents. In addition, udorthents are located at Poplar Point, park headquarters, RFK shoreline, Anacostia pavilion, picnic areas, ball fields, and Langston Golf Course (figures 20 through 22). Soils surrounding the park headquarters also contain urban lands (USDA NRCS 2006). The urban land mapping unit consists of areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces (DCDOT 2006a). Soils considered urban lands are also located around the RFK stadium and on the west bank of the Anacostia River near the 11th Street Bridge (figure 20 through 22).

Other soil classifications throughout Anacostia Park include Iuka sandy loam, Matapeake silty loam, Bibb sandy loam, Fluvaquents, Galestone, and Rumford soils, Fallsington sandy loam, Christiana silt loam, Keyport fine sandy loam, Sassafras gravelly sandy loam, Woodstone sandy loam, and Melvin silt loam (figures 20 through 22). The Iuka series consists of deep, moderately well drained, moderately permeable soils that formed in stratified loamy and sandy alluvial sediments. These soils are on nearly level flood plains. They are saturated with water at depths of 1 foot to 3 feet below the surface during wet seasons and are subject to flooding. Slopes range from 0 to 2 percent. These soils are located at the tennis courts and picnic area just south of Pennsylvania Avenue and at the Langston Golf Course (in Kingman Marsh). Small pockets of Iuka soils are located throughout Kenilworth Marsh (USDA NRCS 2006) (figures 20 through 22). Iuka soils are considered hydric soils in the District (USDA NRCS 2008). The definition of a hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils are one of the required criteria for a site to be characterized as a wetland and include soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation.

The Matapeake series consists of very deep, well drained, moderate to moderately slow permeable soils that formed in silty eolian sediments underlain by coarser fluvial or marine sediments. Slopes range from 0 to 8 percent. These soils are located at the basketball courts just south of Benning Road (USDA NRCS 2006) (figures 20 through 22).

The Bibb series consists of very deep, poorly drained, moderately permeable soils that formed in stratified loamy and sandy alluvium. These soils are on floodplains of streams in the Coastal Plain. Runoff for this soil is very slow and permeability is moderate with the water table within eight inches of the surface most of the year. Slopes range from 0 to 2 percent and the erosion hazard is none to slight. This soil is limited in use for building, gardens, lawns, and recreational uses because of the high water table and potential of flooding. These soils can provide suitable habitat for many wildlife species. These soils are located within the small islands and Langston Golf Course at Kingman Marsh and the wetland areas on the west bank of the Anacostia River just south of the Baltimore Washington Parkway. The Bibb series also make up the majority of the soils within the Kenilworth Marsh area (USDA NRCS 2006) (figures 20 through 22). Bibb soils are also considered hydric soils in the District (USDA NRCS 2008).

Fluvaquents are typically found in floodplains and have a slope of 0 to 2 percent. These soils have a high potential for flooding and a high water table. Because of these characteristics, these soils have severe limitations for buildings, gardens, lawns, and recreational uses. Although they have these limitations, these soils do provide suitable habitat for many wildlife species and can be used as natural areas and habitat. A small area of fluvaquent soils is located in the Anacostia River Fringe Wetlands adjacent to the Anacostia River just south of Benning Road. Additionally, small pockets of fluvaquent soils are located throughout Kenilworth Marsh (USDA NRCS 2006) (figures 20 through 22). Fluvaquents are also considered a hydric soil in the District (USDA NRCS 2008).

Small areas Galestone and Rumford soils and Fallsington sandy loam are located near the entrance to the Kenilworth Aquatic Gardens (USDA NRCS 2006) (figure 20). Galestone and Rumford soils consist of very deep, somewhat excessively drained, moderately rapid permeable soils that formed in marine deposits. Slopes range from 0 to 15 percent. The Fallsington soils consist of very deep, poorly drained, moderate to moderately slow permeable soils that formed in loamy marine and old alluvial sediments. Slopes range from 0 to 2 percent.

Small areas of Beltsville silt loam, Sassafras gravelly silt loam, Sunnyside fine sandy loam, Muirkirk variant complex, and Woodstown sandy loam are located on the west bank of the Anacostia River just north and south of the Maryland line (USDA NRCS 2006) (figure 20). The Beltsville silt loam and Woodstown sandy loam are very deep, moderately well drained soils with moderate permeability. The Sunnyside fine sandy loam and Sassafras gravelly silt loam are very deep, well drained soils with moderate permeability. The Muirkirk series consists of very deep, well drained to somewhat excessively drained, moderately slow to slowly permeable soils on uplands.

An area of Christiana silt loam and Keyport fine sandy loam soils are located within the Langston Golf Course (USDA NRCS 2006) (figure 20). These soils are considered very deep and moderately well drained. Permeability is very slow to slow in the Keyport series and moderate to moderately slow in the Christiana series.

FIGURE 17: ANACOSTIA PARK, NORTH AREA

FIGURE 18: ANACOSTIA PARK, CENTRAL AREA

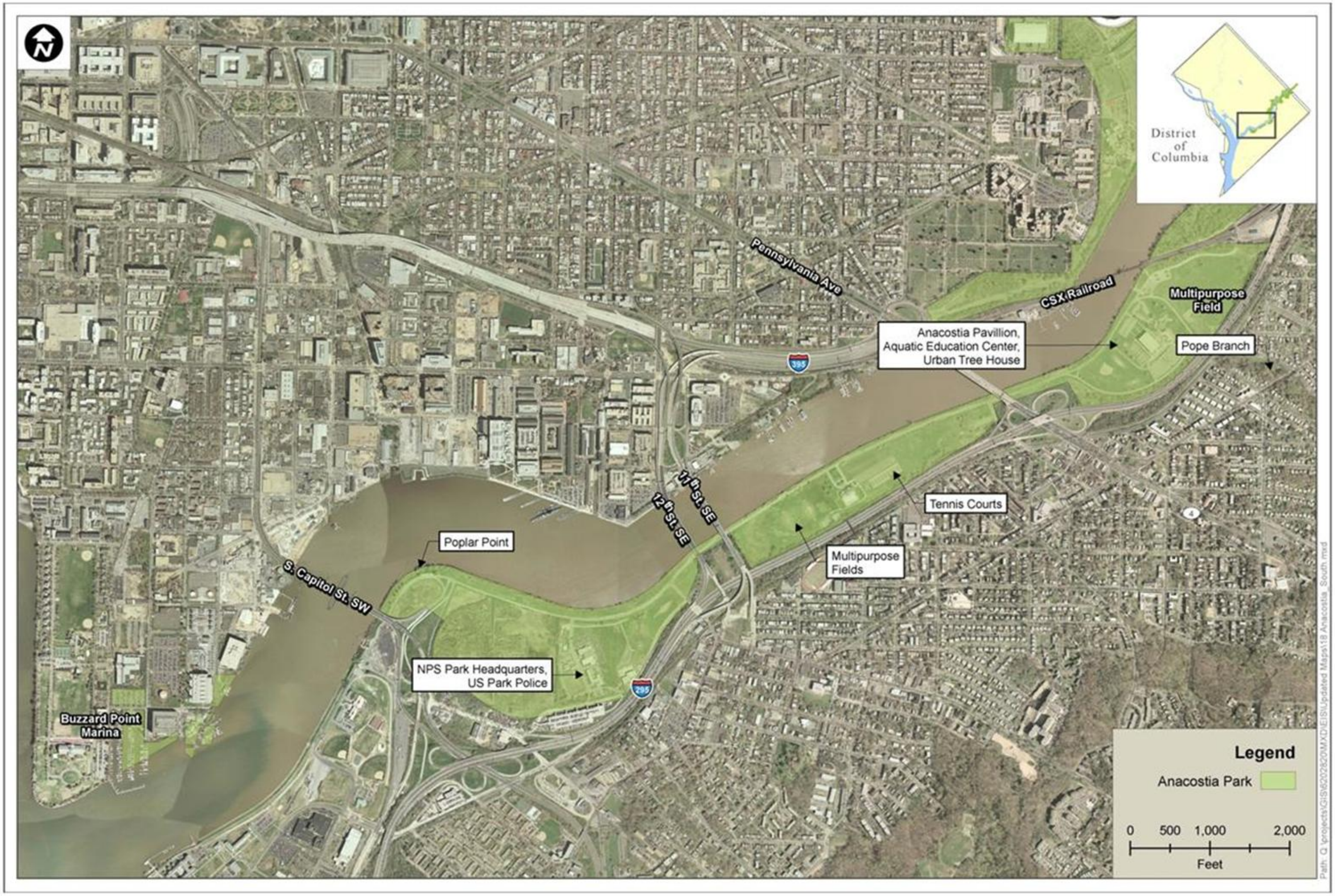


FIGURE 19: ANACOSTIA PARK, SOUTH AREA

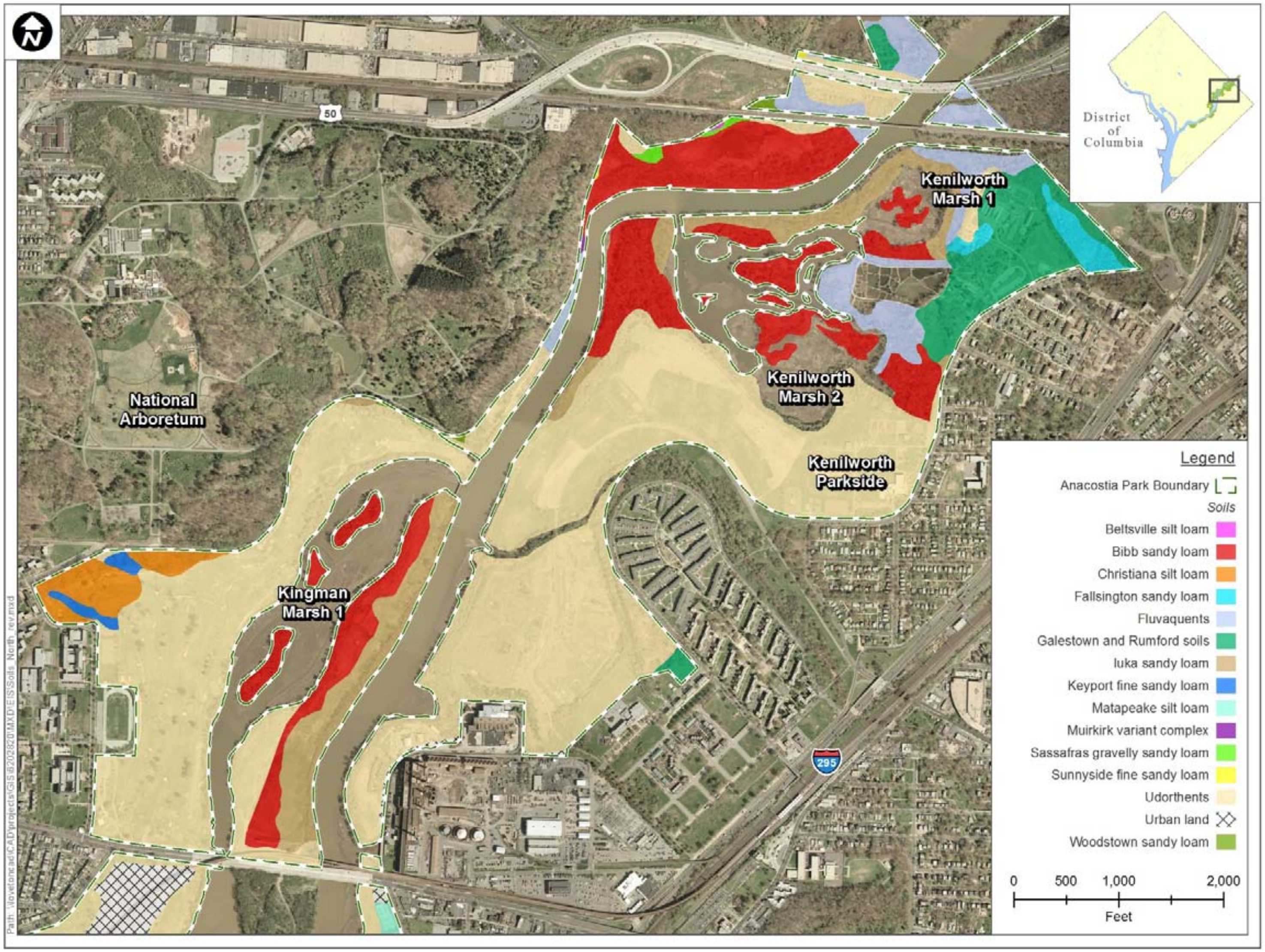


FIGURE 20: SOILS MAP OF ANACOSTIA PARK, NORTH AREA

FIGURE 21: SOILS MAP OF ANACOSTIA PARK, CENTRAL AREA

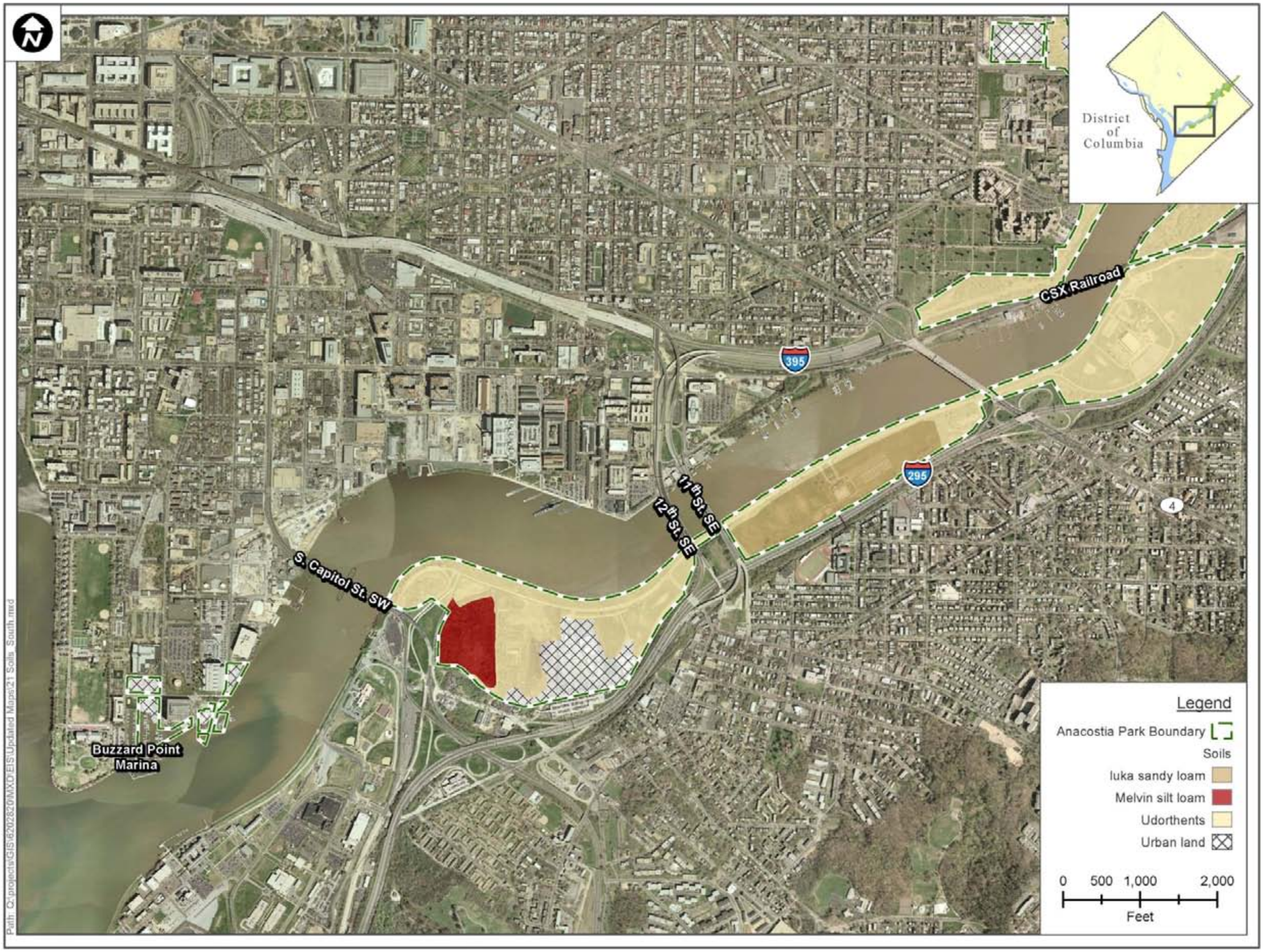


FIGURE 22: SOILS MAP OF ANACOSTIA PARK, SOUTH AREA

A small area of Melvin silt loam is located just east of the South Capitol Street Bridge near the park headquarters (USDA NRCS 2006) (figure 22). The Melvin series consists of very deep, poorly drained soils formed in silty alluvium on flood plains and in upland depressions. Slopes range from 0 to 2 percent.

Soil erosion occurs along the Anacostia River and its tributaries from the large amounts of stormwater rushing over the concrete and spilling out of stormwater pipes. Erosion has occurred in the tributaries from urban runoff and flash floods. Soil surrounding the outfall pipes along the seawall has eroded away due to the high velocity of the water spilling into the river. The seawall runs along the east and west bank of the Anacostia River. The seawall has failed in various areas, due to concrete stones falling out and water flow washing out the soil from behind the seawall. The loss of soil has created large scour holes behind the seawall, particularly in areas along the river bank below the CSX railroad tracks near the park headquarters. Construction along the river has also resulted in erosion of soils. Some small-scale erosion occurs due to the tidal action on the mud flats.

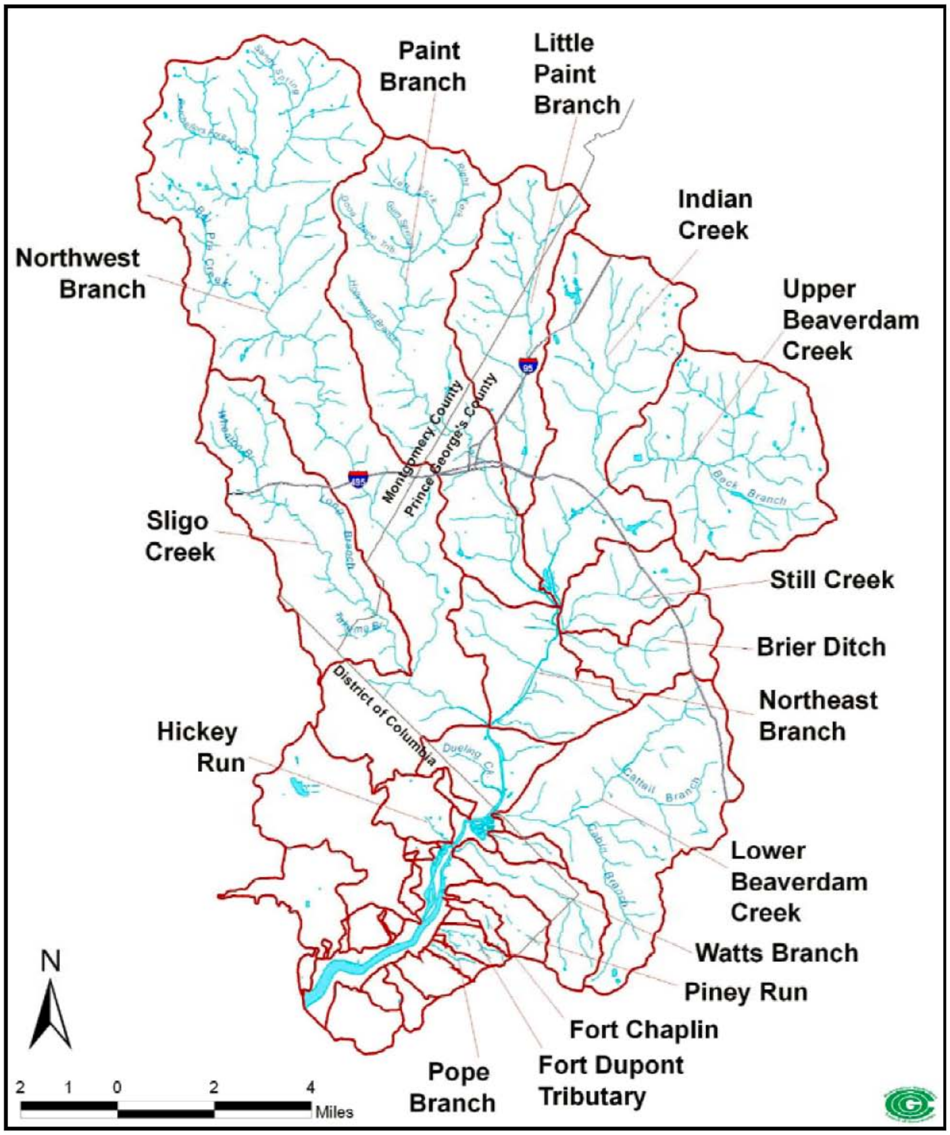
WATER RESOURCES

This topic includes hydrology, water quality, and floodplains.

HYDROLOGY

Anacostia Park is located within the greater Anacostia Watershed (figure 23), estimated at approximately 170 square miles, and drains portions of Montgomery and Prince George’s Counties in Maryland as well as the eastern portion of the District. 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 salt wedge from the ocean and the Chesapeake Bay does not persist past the District. Below the confluence in Bladensburg, the Anacostia River flows in a southwesterly direction for approximately 2.0 miles in Maryland and for approximately 6.7 miles through the eastern portion of the District. The Anacostia River joins the Potomac River at Hains Point in DC, approximately 108 miles upstream of the Chesapeake Bay near Point Lookout, Maryland. The NPS owns approximately 16 miles of shoreline along the Anacostia River. Overall, the morphology of the tidal Anacostia River system has been dramatically altered. 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 (DCOP 2003).

The Anacostia River receives drainage from Hickey Run, Lower Beaverdam Creek and Watts Branch subwatersheds (figure 23). Tributaries of the Anacostia River within Anacostia Park and the District of Columbia include Watts Branch, Hickey Run, Fort Dupont Creek, and Pope Branch (figure 23). Most of the lateral tributaries of the Anacostia River have been modified, to varying degrees, through enclosure within storm drain systems, and some are contained in combined storm/sanitary sewers (DCOP 2003). Watts Branch is the largest tributary to the Anacostia River and is partially in the District jurisdiction; the mainstem of Watts Branch is classified as a perennial stream by the USGS. The USGS maintains a stage recorder in the lower portion of Watts Branch and provides real-time stage data on line (DCDOH 2005). Hickey Run is a western tributary of the Anacostia River and discharges into the river just north of Kingman Marsh, near the southern border of the USDA National Arboretum (DCDOH 2003a). The mouth of the tributary is a broad tidal area and runs through the national arboretum to New York Avenue (DCDOH 2005). Fort Dupont Creek is located south of the East Capital Street Bridge and its confluence is located along the eastern shoreline of the Anacostia River. Pope Branch is located south of Fort Dupont Creek and its confluence is located along the eastern shoreline of the Anacostia River.



Source: AWRP and MWCOG 2009

FIGURE 23: ANACOSTIA WATERSHED AND SUBWATERSHEDS

Kenilworth Park and Aquatic Gardens is located within the upper, northeastern section of Anacostia Park and constitutes approximately 700 acres. This portion of the park includes the historic aquatic gardens, Kenilworth Marsh, ball fields, and other recreational facilities. Kenilworth Marsh is a restored freshwater tidal marsh on the Anacostia River located adjacent to the Kenilworth Aquatic Gardens. This area is a tidal wetland that was restored in 1993 by depositing dredged material onto existing mudflats. The current marsh has a direct hydrologic connection to the Anacostia River via a breach in the seawall along the Anacostia River. Kenilworth Aquatic Gardens is a 14-acre historic site dedicated to the cultivation and display of exotic aquatic plants located along the east bank of the Anacostia River.

Kingman Marsh is located along the Anacostia River, and separated from the river by Kingman Island; the island is intersected by both the Benning Road Bridge and the East Capital Street Bridge. Kingman Marsh is a 110-acre tidal freshwater impoundment that was created during the 1920s and 1930s to provide a recreational boating area for the District residents. The marsh is hydrologically connected to the tidal

Anacostia River by two inlets located at the northern and southern portions of Kingman Island (historically known as Burnham Barrier). The upper section of the lake is characterized by a dendritic tidal canal system, and during a low tide consists primarily of barren mudflats and areas with shallow water (DCDOH 2003b). The lower section of the lake has an average depth of 3 feet at low tide, with fewer mudflats and no tidal canal system. During a rising tide, water enters the lake through the inlets. The range between mean low and mean high tide is approximately 3.0 feet. Mean high tide elevation is 2.09 feet NGVD (DCDOH 2003b). The majority of sources of water entering the lake include tidal flow, sheet flow from periods of heavy rain, and stormwater outfalls. The lower and upper portion of the lake is connected by a 30-foot culvert located under the Benning Road Bridge (USACE 1994). In 2000, the USACE initiated the restoration of 42 acres of a freshwater tidal emergent wetland in Kingman Marsh.

The Kingman and Kenilworth tidal marshes experience on average a 3.0-foot tidal exchange twice daily such that portions of marsh area that are too low to support vegetation become exposed mudflat at low tide. Both marshes are low energy in that they lie behind island/berm structures that protect them from the energies of the main Anacostia channel (USGS 2004).

Generally, the Anacostia River Basin receives approximately 40 inches of precipitation annually, and this precipitation is fairly evenly distributed throughout the seasons of the year. Therefore, high river flows can occur during any month. Water slows as it leaves the Piedmont Plateau and enters the Coastal Plain physiographic province (DCFWD 2001). In this location, the Anacostia River acts like a lake or sink due to slow water movement. Because time flushing in the Anacostia is dependent upon the tide, water may reside in the river for extended periods of time before reaching the downstream Potomac River (DCFWD 2001). The average flush time for the Anacostia River is 20 days, but a 40-day flush time is not uncommon during the fall season (DCFWD 2001). Under periods of extremely low flow, this residence time can be as long as 100 to 110 days (MWCOG 2007). Flow in many segments of the tidal of the river can move either upstream or downstream, depending on tidal conditions. In the downstream portions of the river, hydrodynamics are dominated by the direction and magnitude of the tidal surge. The mean annual stream flow for the Anacostia, as measured at the upstream flow gages, is 139 cubic feet per second (DCDOH 2003a).

HYDROLOGY AND THE ROLE OF CLIMATE CHANGE

Hydrology is currently being affected by and would continue to be affected by climate change. The most relevant known and predicted impacts of climate change on hydrology at the park include mean sea level rise, coastal flooding, drought, and the increase in extreme weather events such as intense precipitation and storm events. Hydrology would be affected by climate change through alterations in base flow and depth (Erwin 2009). However, no large annual change to streamflow is expected in the mid-Atlantic region, due to the offset of seasonal changes (NPS 2010c). While mean annual changes in streamflow are uncertain, winter and spring flows and the potential for winter and spring flooding would likely increase (NPS 2010c). Diminished summer/early fall flows are also expected as a result of climate change, partially due to increased evaporation associated with higher warm season temperatures (NPS 2010c). Climate change could also alter hydrology through changes to the hydroperiod (Erwin 2009). A hydroperiod is the number of days per year that an area of land is dry or the length of time that there is standing water at a location. The hydroperiod of a wetland is the length of time and portion of year the wetland holds ponded water. Therefore, changes in hydroperiod as a result of climate change could affect the productivity, diversity, and distribution of wetlands as a function of hydrology. Climate change could also cause increased flooding and increased flood runoff, resulting in a decrease in recharge of some floodplain aquifers (Erwin 2009). Generally, climate change could affect the hydrology of individual wetland ecosystems through changes in precipitation and temperature regimes (Erwin 2009).

Sea levels provide an important key to understanding the impact of climate change. By combining local rates of relative sea level change for a specific area based on observations with projections of global sea level rise (IPCC 2007), coastal managers and engineers can analyze and plan for the impacts of sea level rise for long-range planning. Tide stations are therefore used to measure local sea level, which refers to the height of the water as measured along the coast relative to a specific point on land. In the district, a mean sea level trend has been developed from data collected at tide station (8594900) in the district (NOAA 2012). Based on monthly data collected from 1924 to 2006, the mean sea level trend is 3.16 millimeters/year (with a 95% confidence interval of +/- 0.35 mm/yr), which is equivalent to a change of 1.04 feet in 100 years (NOAA 2012). Using this trend, it is possible that the mean sea level of the Anacostia River could increase by a total of 1.872 inches during the life of this project (15 years). The science team for this project considered climate change and predicted that the Anacostia River could rise approximately 2 inches during the 15-year life of this plan. In addition, shoreline armoring (such as the sheet piling at the Anacostia River Fringe Wetlands along the River) would influence the ability of both habitats and biota to adapt to sea level rise (Strange et al. 2008). Specifically, shoreline protection structures can block inland migration of wetlands and the placement of hard structures reduces sediment inputs from upland sources and increases erosion waterward of a structure (Strange et al. 2008). Tidal elevations, even changes as small as inches, are extremely important parameters to consider in wetland restoration and management as well as long-term planning for this project.

It is also very likely that the frequency, intensity and duration of coastal flooding would increase as mean sea levels rise and affect hydrology. Changes in coastal storms are uncertain, but it is very unlikely that coastal storm systems would weaken to such a large extent as to offset the effects of higher mean sea levels (NPS 2010c). It is expected that the 1 in 10 year flood event may occur more than twice as often as today based on conservative IPCC-based sea level rise projections (NPS 2010c). It is predicted that short-term (monthly to seasonal) droughts would increase in frequency, intensity, and duration during summer and fall. Changes in long-term (multi-year) droughts are unknown (NPS 2010c). Intense precipitation events are likely to increase across a range of time scales (sub-hourly to daily), leading to more severe flooding which can ultimately affect hydrology (NPS 2010c).

WATER QUALITY

Although the designated use of the Anacostia River has been a Class A Water (Primary Contact Recreation) by Federal Water Quality Standards, it has been recognized for many years that water quality in the Anacostia River are highly degraded due to point source, non-point source pollution, and refuse (USEPA and NOAA 2009) from historic toxic contamination, sewer overflows and leaks, and urban stormwater runoff. The Chesapeake Bay Program (CBP) designated the Anacostia River as one of the three most polluted watersheds in the Chesapeake Bay (CBF 2006). The lower Anacostia River is essentially an embayment of the Potomac River with very low flow. Even though the lower portion of the Anacostia River located within the District is tidally influenced and exhibits a 3.0 foot average tide height twice daily, the river has a very slow flushing rate, which prevents flushing that might otherwise remove some of the contamination (USEPA and NOAA 2009). Therefore, heavy siltation, accumulation of toxic metals and organic chemicals in sediments, and sewage overflows all contribute to poor water quality in this section of the river (NPS 2004a). The District Water Quality Standards (WQS), Title 21 of the District of Columbia Municipal Regulations (DCMR) specifies the categories of beneficial uses of waterbodies. Class A and Class B waters must achieve or exceed water quality standards for specified pollutants. The waters are classified on the basis of current use and designated beneficial uses as described below in table 7.

TABLE 7: WATERBODY CLASSIFICATION AND DESIGNATED USE

Waterbody Name	Current Use	Designated Use
Anacostia River	B, C, D, E	A, B, C, D, E
Hickey Run	B, C, D	B, C, D
Watts Branch	B, C, D	B, C, D
Other Anacostia River Tributaries	B, C, D	A, B, C, D

Source: DCDOH 2003a

NOTES: Class A - primary contact recreation
Class B- secondary contact recreation
Class C- protection and propagation of fish, shellfish, and wildlife
Class D- protection of human health related to consumption of fish and shellfish
Class E- navigation

Water quality conditions in the tidal Anacostia River have historically been poor. Generally, low dissolved oxygen (DO) concentrations, suspended solids, and high fecal coliform bacteria counts are characterized as major water quality issues (USACE 2002). The water quality of (Kingman) Marsh has also been characterized as poor due to high water temperatures, low DO concentrations, and pollution (USACE 1994). Total suspended solids (TSS) have been listed by the USEPA for total maximum daily loads (TMDLs) as a pollutant in the Anacostia River which directly affects water quality. TSS reduces water clarity, blocks sunlight necessary for SAV, reduces oxygen levels, clogs fish gills, and smothers fish eggs and aquatic insects (CBF 2006). Other specific contaminants of concern in the Anacostia River include lead, mercury, PCBs, PAHs, dichlorodiphenyltrichloroethane (DDT) and chlordane (NPS-USGS 2007). Many water quality parameters that are monitored violate the District's water quality standards to support aquatic life, including DO concentrations. Specifically, the Anacostia River and Kingman Marsh continue to receive nonpoint discharges derived from the intensively developed (impervious) adjacent areas as well as impacts from combined sewer overflows (CSOs) along the river. These CSOs cause high fecal coliform concentrations in violation of the District standards for swimming and elevated levels for nutrients (USACE 1994). The existing poor water quality in the Anacostia has led to fish advisories and consumption restrictions and has severely limited recreational fishing. Stormwater runoff from RFK and the surrounding parking lots is discharged into Kingman Marsh. Overall, poor water quality in Kingman Marsh and the Anacostia River contributes to aquatic ecosystem issues including low numbers of tolerant fish and macroinvertebrate species (USACE 2002).

The water quality of the Anacostia River is being affected by the resident Canada geese due to herbivory on wetland plants and as a result of fecal droppings.

The water quality of the Anacostia River is being affected by the resident Canada geese as a result of both herbivory on wetland plants and fecal droppings, but it is unknown whether the Anacostia River is measurably affected by fecal droppings from geese since this has not been studied at the park. Wetlands are generally considered nitrogen- or nitrogen and phosphorus limited, which results in the rapid uptake of nitrogen and phosphorus from the water column. The herbivory on wetland plants by the resident Canada goose population decreases the function of the wetlands, which ultimately increases the amount of nutrients within the Anacostia River. In addition, fecal droppings from the geese can degrade overall water quality, particularly in areas where the pathogens can concentrate (USFWS 1999). Fecal droppings increase the amount of fecal coliform, nitrogen, and phosphorus levels, and can carry pathogens such as *Cryptosporidium* species, *Giardia* species, *Salmonella* species, and *Escherichia coli* bacteria (Rutgers 2004). Fecal matter from geese has not been demonstrated to affect water quality or human health at Anacostia Park. Fecal matter is described as a contributing factor to water quality in combination with other factors such as effects of goose herbivory. Additionally, the impact of this fecal matter has not been studied at Anacostia Park, and it is likely that the contribution of fecal droppings from resident Canada geese is small when compared to other sources of pollution.

In addition to these water quality issues, the lower tidal section of the Anacostia as well as Kingman Marsh and tributaries to the Anacostia River within Anacostia Park have been classified by the District as an Impaired Segment under Section 303(d) of the Clean Water Act. Section 303(d) of the Federal Clean Water Act and regulations developed by USEPA require states to prepare a list of waterbodies or waterbody segments that do not meet water quality standards even after all the pollution controls required by law are in place. Waterbodies or waterbody segments not meeting the appropriate water quality standards are considered to be impaired. Impaired segments are waters that do not or are not expected to meet water quality standards as given in the Clean Water Act. The law requires that states place the impaired waterbody segments on a list referred to as the 303(d) list and develop TMDLs for the waterbodies on the list. The USEPA has established TMDLs, which limit the amount of pollutants that can enter a waterbody, and a high priority has been placed on controlling these factors along the lower Anacostia River (NPS 2004a). As a result of the impairment of the Anacostia River, human fish consumption advisories have been placed by the District and Maryland due to PCB, methlymercury, and pesticide contamination. This issue is discussed in more detail in *Visitor Health and Safety*.

The pollutants causing impairment have been listed through the Section 303(d) Program in a draft 2008 document for the lower Anacostia River and Kingman Marsh (DCDE 2008). Additional tributaries to the Anacostia River that also have pollutants on the 303(d) list include the following: Watts Branch, Hickey Run, Fort Dupont Creek, and Pope Branch (DCDE 2008). The 2008 list included the following pollutants causing impairment in the waterbodies mentioned above: bacteria, organics, TSS, metals, oil & grease, biological oxygen demand (BOD), total PCBs, Bis(2-ethylhexyl) phthalate, total residual chlorine, and trash (DCDE 2008). Table 8 presents the pollutants causing impairment for each waterbody within Anacostia Park as well as the TMDL establishment date and the priority ranking for TMDL development. The 2008 list includes for the first time trash as a pollutant causing impairment. Recent estimates from the Metropolitan Washington Council of Governments (MWCOG) indicate that approximately 20,000 tons of trash and debris enter the Anacostia River annually. The main source of this trash problem is litter and illegal dumping (AWRP and MWCOG 2007).

Additionally, the 2008 list includes bacteria (fecal coliform bacteria). The Anacostia is affected by high levels of bacteria, due to leaking sewers, sewer overflows, pet waste and wildlife (MWCOG 2007). The majority of the fecal coliform bacteria enter the Anacostia River through CSO outfalls that are typically found in older cities such as the District. These systems were designed to collect rainwater runoff, domestic sewage, and industrial wastewater all in the same system. Most of the time, combined sewer systems transport all of their wastewater to a sewage treatment plant. However, during periods of heavy rainfall or melting snow the volume of wastewater going into the sewers can exceed the capacity and excess wastewater empties directly into nearby streams, rivers, or other water bodies (USEPA 2007). There are 15 CSO outfalls located on the Anacostia River (DCWASA 2008). The two largest CSO outfalls include the Northeast Boundary CSO, which drains into the Anacostia River near RFK Stadium and East Capitol Street, and the “O” Street Pump Station, which drains into the Anacostia River just below the Washington Navy Yard. DCWASA estimates that combined sewers overflow into the Anacostia and Potomac Rivers about 75 times annually, and spill approximately 1.5 billion gallons per year into the Anacostia River alone (DCWASA 2008). This combination of untreated sewage and stormwater has negative effects on water quality and aquatic life and is the main reason for the bacteria TMDL for the Anacostia River. As a result of a consent decree that the USEPA signed with the DCWASA in 2004 to improve water quality in the Anacostia and Potomac Rivers and Rock Creek, a 20-

year Long-Term CSO Control Plan has been drafted. This plan includes three deep underground storage tunnels, including side tunnels to reduce flooding rehabilitation of existing pumping stations and the elimination of 14 overflow outfalls, four of which are located in the Anacostia Watershed (DCWASA 2008). When the project is fully implemented, CSO discharge would be reduced by a projected 98 percent along the Anacostia River (DCWASA 2010).

TABLE 8: IMPAIRED DISTRICT WATERS AND POLLUTANTS WITHIN AND ADJACENT TO ANACOSTIA PARK

303(d) Listing Year and Category	Waterbody or Segment Name	Pollutants or Pollutant Categories Causing Impairment	TMDL Establishment Date	Priority Ranking for TMDL Development
1998, Category 4A	Lower Anacostia River (Segment 1)	• BOD	December 2001	High
		• Bacteria • Organics • Metals • Oil & Grease	October 2003	High
		• TSS	July 2007	High
		• PCBs	October 2007	High
1998, Category 5	Lower Anacostia River (Segment 1)	• Trash	December 2012	High
1998, Category 4A	Kingman Marsh	• Bacteria • Organics • Metals • Oil & Grease	October 2003	High
Tributaries to the Anacostia River Adjacent to Anacostia Park				
1998, Category 4A	Lower Watts Branch (Segment 1)	• Bacteria • Organics • TSS	October 2003	High
1998, Category 4A	Hickey Run	• Bacteria • Organics	October 2003	High
2002, Category 5	Hickey Run	• Bis(2-ethylhexyl) phthalate • Chlorine (total residual)	December 2012	High
1998, Category 4A	Fort Dupont Creek	• Bacteria • Metals	October 2003	High
1998, Category 4A	Pope Branch	• Bacteria • Organics • Metals	October 2003	High

Source: DCDE 2008

Category 4A: Waterbody or segment of a waterbody for which TMDLs for pollutants causing impairments have been approved or established by USEPA may be placed in this category.

Category 5: Waterbody or segment of a waterbody with at least one designated use not attained or threatened and a TMDL is needed. A waterbody or segment of a waterbody may be placed in this category even if TMDLs have been approved for some of the pollutants/pollution identified as causing non-attainment. All necessary TMDLs for a waterbody or segment of a waterbody must be approved or established by USEPA in order to be placed in category 4A. The chemicals for which the Organics TMDL have been approved include chlordane, DDD, DDE, DDT, Dieldrin, Heptachlor Epoxide, PAH1, PAH2, PAH3, and Total PCBs. The chemicals for which the metals TMDL have been approved include arsenic, copper, lead, and zinc. Bacteria TMDLs have been approved for fecal coliform bacteria.

FLOODPLAINS

EO 11988, "Floodplain Management," issued May 24, 1977, directs all federal agencies to avoid both long- and short-term adverse effects associated with occupancy, modification, and development in the 100-year floodplain, when possible. Floodplains are defined in this order as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent greater chance of flooding in any given year." Flooding in the 100-year zone is expected to occur once every 100 years, on average.

NPS has adopted guidelines pursuant to EO 11998 stating that NPS policy is to restore and preserve natural floodplain values and avoid environmental impacts associated with the occupation and modification of floodplains. The guidelines also require that, where practicable alternatives exist, Class I actions should be avoided within a 100-year floodplain. Class I actions include the location or construction of administration, residential, warehouse, and maintenance buildings, non-excepted parking lots, or other man-made features that by their nature entice or require individuals to occupy the site. In addition, NPS proposed actions that may adversely affect floodplains must comply with Director's Order #77-2: *Floodplain Management*. *Floodplain Management* states that flood conditions and associated hazards must be quantified; appropriate actions (an alternative site, or effective mitigation and/or warning and/or evacuation planning) must be taken to manage floodplain conditions and flood hazards; and a formal statement of findings (SOF) must be prepared. In addition, NPS must protect and preserve the natural resources and functions of floodplains; avoid the long- and short-term environmental effects associated with the occupancy and modification of floodplains; and avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks; and restore, when practicable, natural floodplain values previously affected by land use activities within floodplains.

The study area for floodplains includes all portions of the park within the park boundary. Generally, the 100-year floodplain extends several hundred feet from the river in the park boundary. Exceptions include the areas surrounding estuaries and tributaries of the Anacostia River. Figures 24 through 26 show the 100-year and 500-year floodplains along the Anacostia River.

The study area for floodplains includes all portions of the park within the park boundary.

A flood protection levee is located along the east bank of the Anacostia River and extends from Poplar Point to the southwest corner of the Naval District Washington (NDW) Anacostia Annex, approximately 9,700 feet (1.84 miles) (figure 26). The majority of the levee is an earthen berm, but approximately 1,100 feet of the levee is constructed of concrete. The concrete floodwall is located along the bulkhead of the NDW Anacostia Annex Marina (DCOP 2003). Additionally, a seawall stabilizes portions of both the western and eastern banks of the Anacostia River. Conditions of the seawall vary; some portions of the seawall are deteriorating due to vegetation growth, age, soil erosion, and leaking stormwater systems and other portions of the seawall are currently being replaced (DCOP 2003).

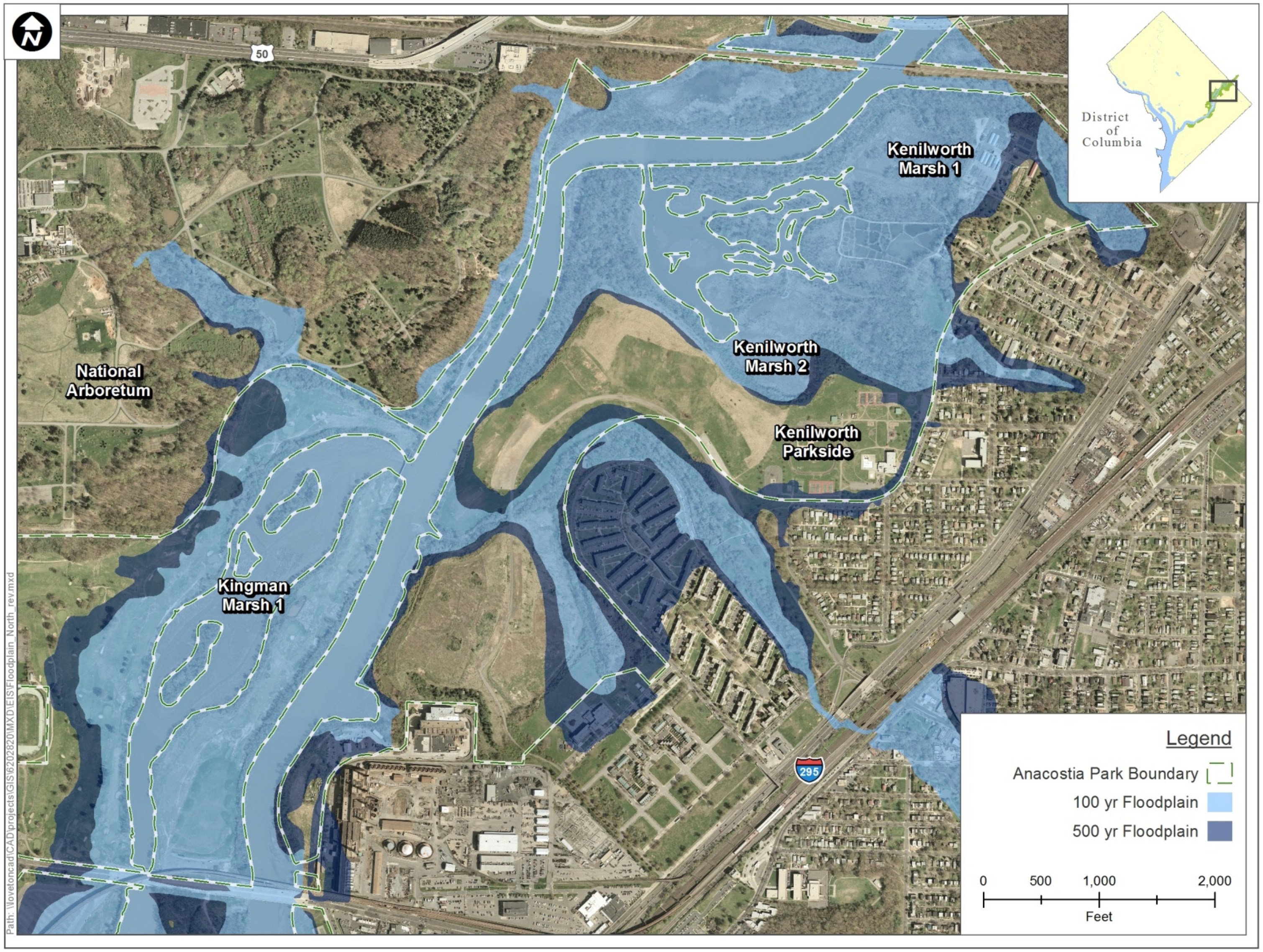


FIGURE 24: FEMA FLOODPLAIN MAP OF ANACOSTIA PARK, NORTH AREA

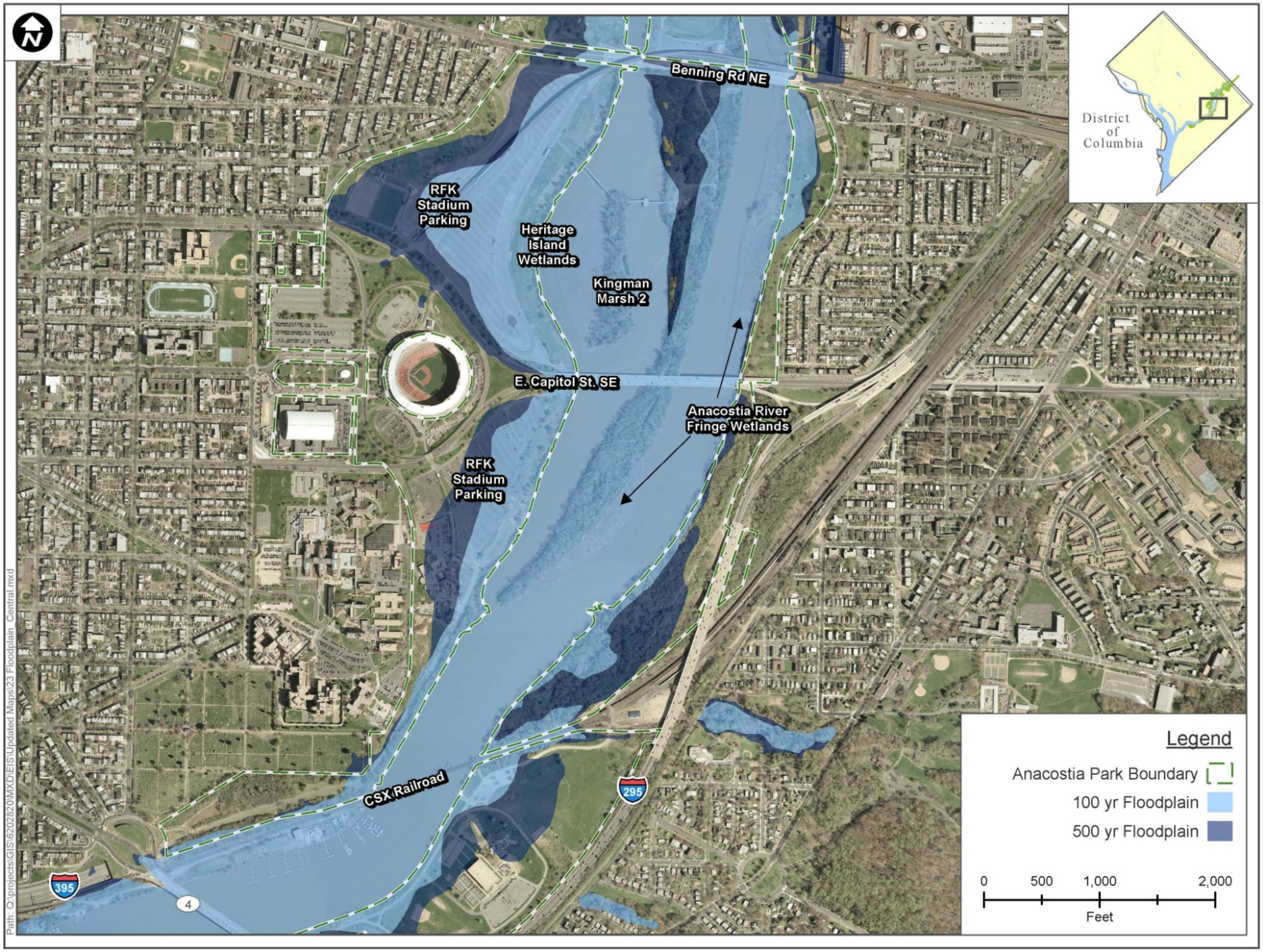


FIGURE 25: FEMA FLOODPLAIN MAP OF ANACOSTIA PARK, CENTRAL AREA

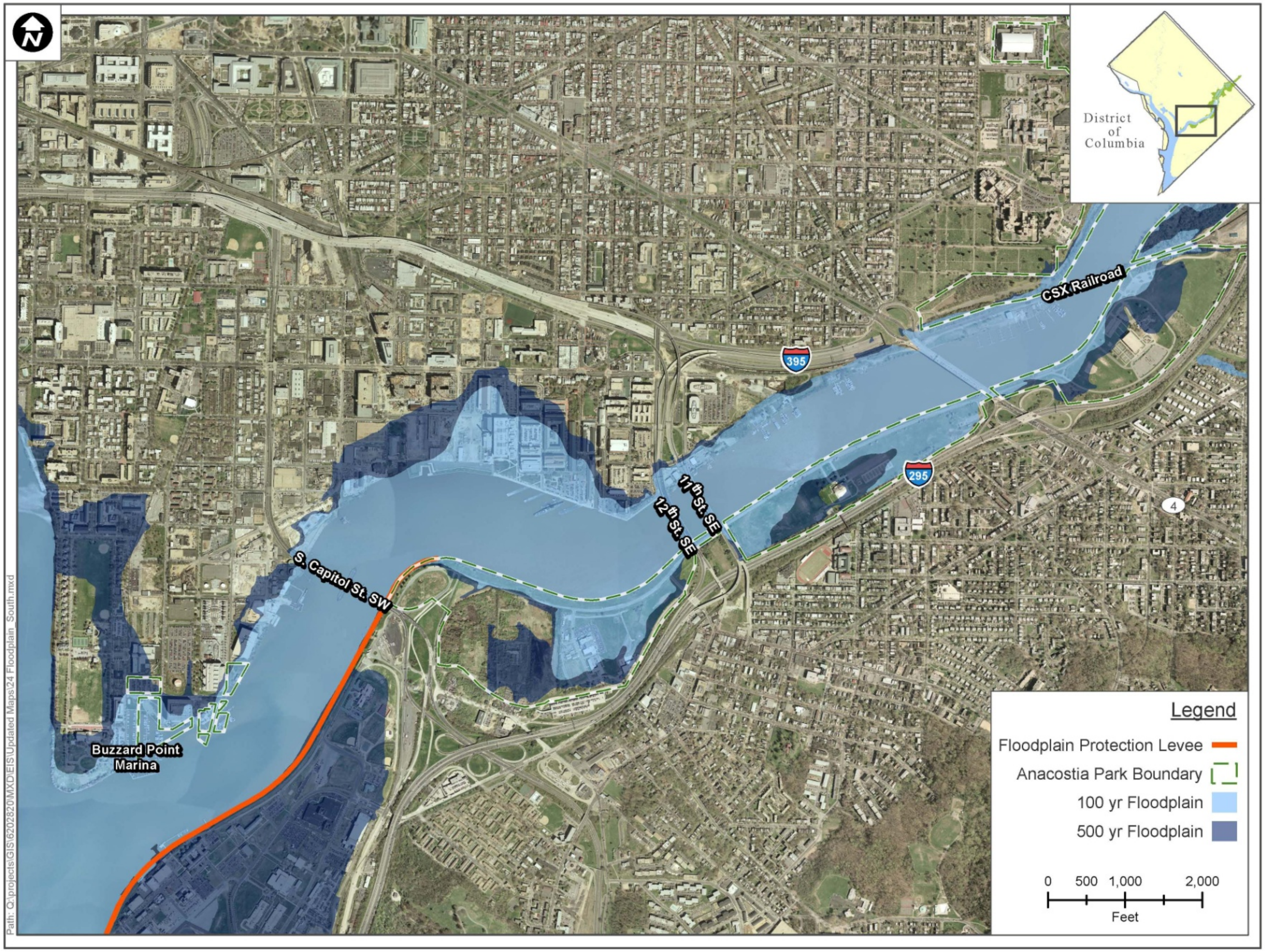


FIGURE 26: FEMA FLOODPLAIN MAP OF ANACOSTIA PARK, SOUTH AREA

WETLANDS

> *The NPS has adopted a goal of "no net loss of wetlands."*

Under Director's Order #77-1: *Wetland Protection,* the NPS has adopted a goal of "no net loss of wetlands" as well as established the policies, requirements, and standards through which the NPS will meet its responsibilities to protect and preserve wetlands. The Order states that "Where natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human activates, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbance conditions." Additionally, "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." EO 11990, "Protection of Wetlands," directs all federal agencies to avoid, to the extent possible, the 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. In the absence of such alternatives, parks must modify actions to preserve and enhance wetland values and minimize degradation.

For the NPS, any area that is classified as a *wetland* according to the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) is subject to NPS Director's Order #77-1: *Wetland Protection*. Under the Cowardin definition, a wetland must have one or more of the following three attributes:

1. At least periodically, the land supports predominantly hydrophytes (wetland vegetation);
2. The substrate is predominantly undrained hydric soil; or
3. The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

The Cowardin wetland definition encompasses more aquatic habitat types than the definition and delineation manual used by the USACE for identifying wetlands subject to Section 404 of the Clean Water Act. The 1987 *Corps of Engineers Wetlands Delineation Manual* requires that all three of the parameters listed above (hydrophytic vegetation, hydric soil, wetland hydrology) be present in order for an area to be considered a wetland. The Cowardin wetland definition includes such wetlands, but also adds some areas that, though lacking vegetation and/or soils due to natural physical or chemical factors such as wave action or high salinity, are still saturated or shallow inundated environments that support aquatic life.

The District DOE has established the Water Quality Division (WQD) to restore and protect the surface and ground waters of the District. The Program was established under the authorities of the District Water Pollution Control Act and the federal Clean Water Act. The Water Quality Control component fulfills the function of policy planning as well as regulatory control of surface water, groundwater, and wetlands. Program components of the WQD include water quality monitoring functions that encompass the bioassessment of wetlands and river fringes. The WQD does not have their own set of specific wetland criteria, but the WQD must review projects prior to permit issuance when the waters of the District are impacted.

HISTORY OF ANACOSTIA WETLANDS

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 (figure 27). 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, Kingman Island, and Kenilworth Marsh, were created or enlarged by the USACE during the reclamation work.

Benning Road Bridge 1927 across Anacostia River with dredged portion downstream (right side) and still intact freshwater tidal wetlands upstream (left side of photograph). Photo shows complete conversion of wetlands to fastland and tidal water below Benning Road (USGS 2006b).

FIGURE 27: HISTORIC PHOTOGRAPH OF THE ANACOSTIA RIVER

Public and government interests in restoring wetlands in the Anacostia River watershed grew in the 1980s when the NPS began working in collaboration with others concerned about the health of the watershed to restore nearly 100 acres of tidal wetlands along the Anacostia River. 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 agreement to the Chesapeake Bay Recovery Program.

Even with the restoration of Kenilworth Marsh, Kingman Marsh, Heritage Island Wetlands, Anacostia River Fringe Wetlands, Bladensburg Marina and the Anacostia East Wetland Mitigation Project referred to as ANA-11 (representing approximately 120 acres), less than 180 acres of tidal emergent wetlands currently exist in the Anacostia between Bladensburg and the confluence with the Potomac River. (AWRP and MWCOG 2009).

PREVIOUS WETLAND RESTORATION EFFORTS

Numerous efforts by various federal, local, and community organizations have been completed, are currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. Many of these restoration efforts are located either within or adjacent to Anacostia Park, including Kenilworth Marsh, Kingman Marsh, Anacostia River Fringe Wetlands, Heritage Island Wetlands, Pope Branch, Hickey Run, Watts Branch, and Poplar Point (figures 28 and 29). Although wetland habitats are being restored within Anacostia Park, some are being damaged in part by resident Canada geese that are overgrazing the wetland plants. The 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, reducing the survival of the plantings. Besides grazing pressures from resident Canada geese, other wetland restoration issues that have been observed at Anacostia Park include incorrect hydrologic regimes (too much inundation to vegetation or too little submersion of vegetation); planting methods including species selection and existing seed bank; insects and disease; engineered marsh soils; and removal of invasive plant species.

The District Department of Health (DOH), Environmental Health Administration (EHA) is the lead agency implementing many wetland and watershed restoration projects in the Anacostia within the District. Key partners for these restoration projects include the USACE-Baltimore District, NPS, USDA-NRCS, the USEPA, the USGS Patuxent Wildlife Research Center, District DOE, MWCOG, and the USFWS. One of the restoration goals of the Anacostia Watershed is to increase wetland acreage, and many wetland restoration projects have already been completed or are scheduled for completion (MWCOG 2007).

The following is a brief summary and the status of each project either completed or currently planned for implementation by the District DOH EHA (DCDOH undated):

Kenilworth Marsh—Kenilworth marsh is a 77-acre restored freshwater tidal marsh on the Anacostia River located adjacent to the Kenilworth Aquatic Gardens (figure 28). The area was originally drained during past dredging operations, which created mudflats. In 1993, 32 acres of emergent wetland were created by the USACE in cooperation with the MWCOG and the NPS (Syphax and Hammerschlag undated). The marsh was created by depositing dredged material back onto the existing mudflats to create fill areas of higher elevation separated by tidal guts (Syphax and Hammerschlag n.d.). The fill areas were planted with approximately 350,000 plants of 18 species to re-establish marsh vegetation as part of the restoration effort. The current marsh has a direct connection with the Anacostia River via a breach in the seawall along the river and supports diverse plant and animal communities. A walking trail (River Trail) borders the northern wetland and makes its way to the breach in the seawall, while a boardwalk extends from the Kenilworth Aquatic Gardens to the southern portion of the marsh. The boardwalk and adjacent River Trail currently provide opportunities for visitors to interact with the environment. Public access to this type of habitat is rare, especially in the context of a large metropolitan city.

Kingman Marsh—The goal of this project was to restore over 40 acres of freshwater tidal wetlands in the Kingman Marsh area (figure 28) in order to increase plant and animal diversity and improve the filtering capacity of the Anacostia (USACE 1999). This project was completed in 2000. Monitoring efforts are continuing in connection with other wetlands that have been restored in Kenilworth Park.

Kingman Island—The goal of this project was to restore the southern half of Kingman Island (figure 28) as a natural recreational area (DCDOH undated). Habitat restoration efforts focused on enhancement of vernal pool habitat on Heritage Island, the creation of varied habitat niches, the removal of trash, and the creation of a meadow on Kingman Island. The U.S. Navy completed the reconstruction of the pedestrian bridges in August 2001. Construction of this project has not yet been scheduled (DCDOH undated).

FIGURE 28: TIDAL AND NON-TIDAL WETLAND RESOURCES AT ANACOSTIA PARK EVALUATED DURING THE APRIL 2008 SURVEY, NORTH AREA

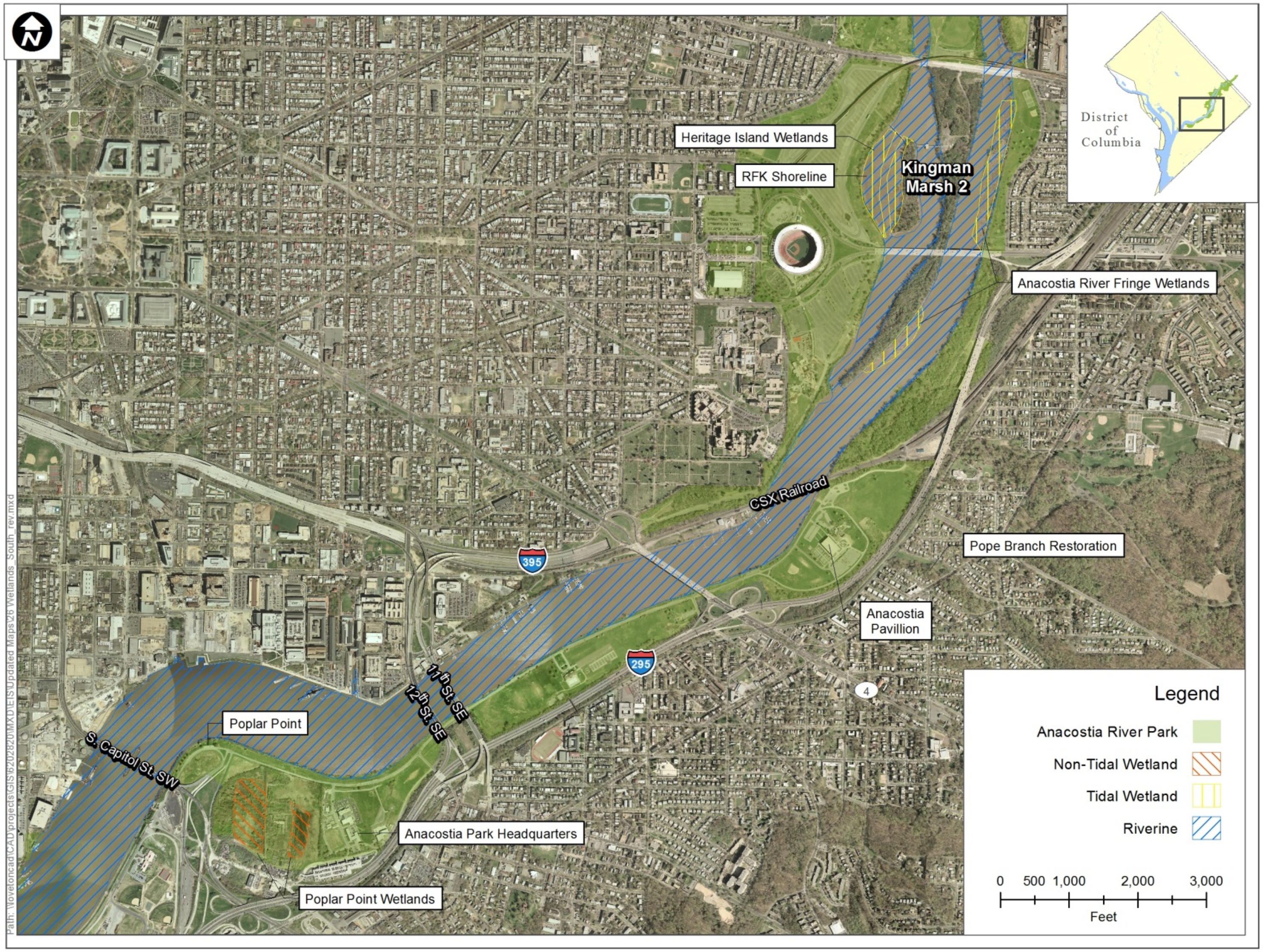


FIGURE 29: TIDAL AND NON-TIDAL WETLAND RESOURCES AT ANACOSTIA PARK EVALUATED DURING THE APRIL 2008 SURVEY, SOUTH AREA

Anacostia River Fringe Wetlands—The goal of this project was to restore 16 acres of tidal wetlands along the shores of the Anacostia River adjacent to Kingman Island (figure 28) (DCDOH undated). The Anacostia River Fringe Wetlands were created by temporarily installing sheet piling that contained the dredge material until it settled and vegetation was fully established. As with the Kingman Marsh wetlands, these wetlands increased the number of beneficial plants and fish in the river and improved the water quality of the Anacostia River. Restoration of the wetlands was completed in the fall of 2003 (DCDOH undated), but the sheet piling was never removed as originally intended. Removal of the sheet piling would require additional NEPA compliance.

Heritage Island Wetlands (Heritage Marsh) —The goal of this project was to create an additional 6 acres of emergent wetlands in Kingman Marsh adjacent to the RFK parking lot (figure 29) (USACE 2002). These wetlands complement the existing Kingman Marsh wetlands and provide additional habitat and water quality treatment (USACE 2002). An additional goal of this project was to create a deeper tidal channel that would allow for canoe and fish passage though the lake at low tide.

Lower Anacostia Park Enhancements-Pope Branch Restoration—The goal of this project was to restore habitat and improve water quality in lower Anacostia Park (DCDOH undated). Restoration efforts included planting of native trees, restoring tidal and non-tidal wetlands, and opening a portion of Pope Branch that is currently piped under portions of Anacostia Park (DCDOH undated) (figure 28).

Hickey Run Restoration—The objective of this project was to improve water quality and habitat conditions of Hickey Run, much of which runs through The U.S. National Arboretum (DCDOH undated) (figure 28). Improvements included installation of a stormwater management facility to filter pollutants such as oil and grease, trash traps to capture floatables, instream restoration to rebuild channelized portions of the stream as well as community and business outreach in the highly urbanized upper reach of the stream in order to reduce pollutant loading. This project has not yet been completed, but is scheduled to occur in the near future (DCDOH undated).

Watts Branch Restoration—The goal of this project was to restore the in-stream habitat and improve the water quality of Watts Branch (DCDOH undated) (figure 28). Restoration was achieved through reconstructing stream sections to better accommodate stormwater flows and addressing source control of runoff through implementation of low impact development projects (DCDOH undated).

Poplar Point—The goal of this project was to conduct an environmental assessment, site remediation and wetlands restoration of property under the jurisdiction of the District (DCDOH undated) (figure 29). The project includes constructing an entrance to Anacostia Park from Poplar Point (DCDOH undated).

Benning Power Plant Inlet—In 1996 PEPCO replaced the old intake inlet with an intake pipe system that extended to the main Anacostia River channel. The NPS worked with the utility company to use sediment displaced by the new intake system to reconstruct approximately 0.50 acre of emergent tidal marsh in the old inlet and along a small fringe area of the River just above Benning Road Bridge. Interpretive waysides and a brochure titled "Ecology of the Anacostia River" were developed.

WETLAND DELINEATION METHODOLOGY

Wetlands within Anacostia Park and adjacent areas administered by the NPS were field-investigated by wetland biologists in April 2008 to collect information related to the existing conditions of the current wetlands (figures 28 and 29). The National Wetland Inventory data provided by USFWS and information provided by park staff were incorporated into the survey strategy.

Both tidally influenced (referred to as tidal) freshwater wetland systems and the non-tidal wetland systems are present within Anacostia Park on lands administered by NPS. The majority of the tidal wetlands are represented by the degraded wetland areas either enhanced or restored by the NPS in cooperation with USACE and other entities. The tidal wetlands are located within the channel of the Anacostia River or have a direct connection to the river through the seawall that exists along the majority of the Anacostia Park's shoreline. Non-tidal wetlands within Anacostia Park are typically smaller in size than the tidal wetlands. Forested, scrub-shrub, emergent, and open water non-tidal wetlands are present. Many of these wetlands appear to be remnant wetlands that have been cut off from their historic connections to the Anacostia River by dredging and realignment of the river, construction of the seawall along much of the Park's shoreline, and the construction of embankments for transportation projects, such as Route 50 – New York Avenue and the railroad tracks used by Amtrak. The tidal and non-tidal wetlands of Anacostia Park support native plant and animal species. However, common reed and purple loosestrife are present in both types of wetlands within Anacostia Park; these plants are characterized as invasive plant species and pose management difficulties for the wetland areas within Anacostia Park.

EVALUATION OF WETLAND FUNCTIONS AND VALUES

The existing wetland conditions were evaluated during the April 2008 field investigation, based on wetland functions and values described in three locally applicable functional assessment methodologies or guidelines: 1) NPS Procedural Manual #77-1: *Wetland Protection* (NPS 2008b); 2) the Wetland Evaluation Technique (WET) (Adamus et al. 1987); and 3) the Descriptive Approach or New England Method (NEM) (USACE 1995). While all three procedures include numerous similarly defined function and value variables, they also include several unique variables specific to that methodology. To be consistent with NPS guidelines, all of the variables evaluated in the field were grouped into three categories, including Biotic Functions, Hydrologic Functions, and Cultural Values. Variables unique to a specific procedure are also noted in the definitions provided below.

The wetland functions and values evaluation for the Anacostia Park wetlands are presented in table 9 and described in more detail in the following paragraphs. See figures 28 and 29 for the locations of the tidal and non-tidal wetlands at the park. NPS Procedural Manual #77-1: *Wetland Protection* includes two additional categories, Research/Scientific Values and Economic Values. Because the variables listed for these categories overlap with several of the variables listed for the three categories described above, they have been incorporated into these other described categories. The definitions for what was considered for the wetland function and value variables evaluated are described in more detail below.

TABLE 9: COMPARISON OF FUNCTIONS AND VALUES FOR ANACOSTIA PARK WETLANDS

		Wetland Site Name										Number of Sites that Provide Function or Value
		Non-Tidal Wetlands				Tidal Wetlands						
		West Bank Wetlands				Kenilworth Marsh	Kingman Marsh	Kenilworth Marsh			Fringe Wetlands	
	Functions and Values	North	Central	South	Poplar Point	River Trail	RFK Shoreline	South Fill Area - 1st Platform	South Fill Area - Island	South Fill Area - Viewing Platform	North	
Biotic Functions	Fish/Shellfish Habitat, Aquatic Diversity/ Abundance, and Economic Fisheries Value	X	---	X	---	---	X	X	---	X	X	**6**
	Wildlife Habitat, Wildlife Diversity/ Abundance, and Faunal Productivity	X	X	X	X	X	X	X	X	X	X	**10**
	Native Species, Habitat Diversity, and Floral Productivity	X	X	X	X	X	X	X	X	X	X	**10**
	Threatened & Endangered Species	---	---	---	---	X	---	---	---	---	---	**1**
Hydrologic Functions	Flood Attenuation/ Alteration and Economic Flood Protection Value	X	X	X	---	X	X	X	X	X	X	**9**
	Ground Water Discharge & Streamflow Maintenance	X	X	X	---	X	X	X	X	X	X	**9**
	Ground Water Recharge	X	X	X	X	X	---	X	X	X	---	**8**
	Sediment/Toxicant/ Pathogen Retention	X	X	X	X	X	X	X	---	X	X	**9**
	Water Supply	---	---	---	---	---	---	---	---	---	---	**0**
	Nutrient Removal/ Retention/Transformation & Water Purification	X	X	X	X	X	X	X	---	X	X	**9**
	Production Export & Detrital Export to Downstream Systems	X	X	X	---	---	X	X	X	X	X	**8**
	Sediment/Shoreline Stabilization & Erosion and Sediment Control	X	X	X	---	X	X	X	X	X	X	**9**

Functions and Values		Wetland Site Name										Number of Sites that Provide Function or Value
		Non-Tidal Wetlands				Tidal Wetlands						
		West Bank Wetlands				Kenilworth Marsh	Kingman Marsh	Kenilworth Marsh			Fringe Wetlands	
		North	Central	South	Poplar Point	River Trail	RFK Shoreline	South Fill Area - 1st Platform	South Fill Area - Island	South Fill Area - Viewing Platform	North	
Cultural Values	Recreation/Economic Tourism Value	X	---	---	X	X	X	X	X	X	X	**8**
	Uniqueness/Heritage	---	---	---	---	---	---	---	---	---	---	**0**
	Education, Research/Scientific Value, and Interpretation	---	---	---	---	X	X	X	X	X	X	**6**
	Visual Quality/Aesthetics	X	X	X	X	X	X	X	X	X	X	**10**
	Historical Value	---	---	---	---	---	X	X	X	X	---	**4**
	Archeological Value	---	---	---	---	---	---	---	---	---	---	**0**
Total # of Functions and Values		12	**10**	**11**	**7**	**12**	**13**	**14**	**11**	**14**	**12**	**N/A**

Biotic Functions

- **Fish/shellfish habitat (NPS/NEM) and aquatic diversity/abundance (WET)**—the effectiveness of seasonal or permanent watercourses associated with a wetland to provide habitat and the essentials necessary for life for a diversity of types and abundance of populations of fish/shellfish and other aquatic organisms. The economic value of the fishery (NPS) was also considered in this variable. Both resident and migratory species were considered.
- **Wildlife habitat (NPS/NEM) and wildlife diversity/abundance (WET)**—the effectiveness of a wetland to provide habitat and the essentials necessary for life for a diversity of types and abundance of populations of wildlife species typically associated with wetlands, their associated water bodies, and the wetland edge. Both resident and migratory species were considered. Faunal productivity (NPS) has also been included in this variable.
- **Native species and habitat diversity (NPS)**—the potential of a wetland to yield and support a wide variety of native plant species and diverse habitat types. Floral productivity (NPS) has also been included in this variable.
- **Threatened and endangered species**—the suitability of a wetland to support and/or provide the habitat requirements specific to threatened and/or endangered species.

The assessment for the biotic functions category revealed that all of the wetland sites provided wildlife habitat, native species, and habitat diversity/abundance. Fish/shellfish habitat and aquatic diversity/abundance functions were provided at two of the five non-tidal wetland sites and four of the five tidal wetland sites. Threatened and endangered species were observed at one non-tidal wetland site only.

Hydrologic Functions

- **Flood attenuation/alteration**—The effectiveness of a wetland in reducing flood damage from prolonged periods of precipitation by storing and desynchronizing (i.e., gradually releasing at lower heights/velocities) floodwaters. The economic value of flood protection (NPS) has also been included in this variable.
- **Ground water discharge—**The potential of a wetland to discharge groundwater to the surface. The wetlands ability to help maintain stream base flow (NPS) has also been included in this variable.
- **Ground water recharge—**The potential of a wetland to contribute water to an aquifer.
- **Sediment/toxicant/pathogen retention (NEM/WET)—**The effectiveness of a wetland to reduce or prevent degradation of water quality by acting as a trap for sediments, toxic substances or pathogens in runoff water that could adversely affect aquatic and terrestrial life.
- **Water supply (NPS)—**The possibility that a wetland can contribute water for human consumption.
- **Nutrient removal/retention/transformation (NEM/WET)—**The effectiveness of a wetland to serve as a trap for nutrients carried by runoff from surrounding uplands or contiguous wetlands, and the wetlands ability to process these nutrients into other forms. The wetland also functions to prevent the adverse effects associated with excess nutrients entering aquifers or surface waters, including streams, rivers, lakes, ponds or estuaries. Water purification (NPS), or the potential of a wetland to decontaminate and refine water, has been included in this variable.

- **Production export (NEM/WET)**—The effectiveness of a wetland to produce food or other usable products for living organisms (including humans). Detrital export to downstream systems (NPS) has been included in this variable.
- **Sediment/shoreline stabilization (NEM/WET)**—The effectiveness of a wetland to stabilize streambanks against shear stresses and/or protect shorelines against erosion by reducing forces caused from waves. Other erosion and sediment control functions (NPS), such as reduction of water velocities and binding of the soil, have been included in this variable.

For the non-tidal wetlands assessed, all five sites provided groundwater recharge, sediment/toxicant retention, and nutrient removal/transformation. Four of the five non-tidal wetland sites provided flood attenuation/alteration, groundwater discharge, water purification, and sediment/shoreline stabilization and three non-tidal wetland sites provided production export. For the tidal wetlands assessed, all five sites provided flood attenuation/alteration, groundwater discharge, production export, and sediment/shoreline stabilization. Four of the five tidal wetland sites provided sediment/toxicant retention, and nutrient removal and three of the five sites provided groundwater recharge. None of the non-tidal or tidal wetlands assessed provided water supply.

Cultural Values

- **Recreation (consumptive/non-consumptive) and tourism**—The suitability of a wetland and associated watercourses to provide active and/or passive recreational opportunities for both local and non-local populations. Consumptive use includes activities such as hunting and fishing that diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive use includes activities such as hiking, birding, boating and canoeing, that do not diminish the resources of the wetland. The economic value of tourism (NPS) has also been included in this variable.
- **Uniqueness/heritage (NEM/WET)**—The effectiveness of a wetland or its associated water bodies to provide certain wetland attributes or special functions and values related to aspects of public health, recreation and habitat diversity. This may include the wetlands overall health and appearance, its role in the overall ecology of the area, or its relative importance as a typical wetland class for the geographic location. It should be noted that both the NEM and WET procedures typically include sites with archeological and historical significance, and sites providing critical habitat for endangered species under this variable, but for the field evaluation efforts, these characteristics were each included as separate variables.
- **Education/scientific value (NPS/NEM)**—The suitability of a wetland to serve as an “outdoor classroom,” as a “reference site” for scientific study or research on un-impacted ecosystems, or for interpretation (NPS).
- **Visual quality/aesthetics (NPS/NEM)**—The effectiveness of a wetland in contributing to the visual or aesthetic quality or pleasing nature of the surrounding landscape.
- **Historical value**—The possibility that a wetland contributes to the historical significance and value of a site or region.
- **Archeological value**—The possibility that a wetland contributes to the archeological significance (e.g., shell mounds, burial sites, etc.) and value of a site or region.

All of the non-tidal and tidal wetland sites provided visual quality/aesthetics. For the non-tidal wetlands assessed, three of the five sites provided recreation/tourism and one site provided education/scientific value. None of the non-tidal wetland areas assessed had historical value. For the tidal wetlands assessed all five of sites provided recreation/tourism and education/scientific values; four of the tidal wetland sites provided historical value. None of the non-tidal or tidal wetlands provided uniqueness/heritage or archeological value.

TIDALLY INFLUENCED FRESHWATER WETLANDS

Historically, the Anacostia estuary was a fully functional freshwater tidal marsh system (USGS 2006b). Freshwater tidal wetlands occur in sites where flooding occurs in response to lunar or wind tides, but where the water has less than the 0.5 parts per thousand salt content used to define fresh water (NCDENR 2010). Tidal fresh waters occur in rivers, where freshwater flow keeps out salt water, and along the large sounds where distance from seawater inlets keeps the water fresh. Freshwater tidal wetlands are structurally diverse and can support a variety of different habitat types as well as numerous wildlife species, including breeding bird habitat. Along the Anacostia River, the habitat types supported by freshwater tidal wetlands can include low marsh, high marsh, mud flats, substrate that supports SAV, and further inland wet meadows and forested wetlands. The plant species diversity and vegetation of tidal freshwater marshes vary with salinity, duration of inundation, and disturbance. Mud flats are important components of tidal freshwater marshes and include areas fully exposed only at low tide. Mudflats can be bare or sparsely vegetated with either emergent vegetation or SAV. Like mudflats, SAV is an important component of tidally-influenced wetlands, provides a wide array of ecological services, and is very sensitive to water depth and substrate (Strange et al. 2008). SAV is a resource topic that was considered but dismissed as discussed in detail in Chapter 1. Limited SAV occurs in the study area and the establishment of new areas of SAV is outside of the scope of this plan/EIS. Tidally-influenced wetlands at Anacostia Park include the Anacostia River Fringe Wetlands, RFK shoreline, Kingman Marsh, and the wetlands within the Kenilworth Aquatic Gardens (figures 28 and 29). Wetland functions were evaluated in April 2008 for the following tidally-influenced freshwater wetland areas:

Kenilworth Marsh—Kenilworth Marsh is a restored freshwater tidal marsh on the Anacostia River located adjacent to the Kenilworth Aquatic Gardens. The current marsh has a direct connection with the Anacostia River via a breach in the seawall along the river and supports diverse plant and animal communities. A walking trail (River Trail) borders the wetland to the north and makes its way to the breach in the seawall, while a boardwalk extends from the Kenilworth Aquatic Gardens to the southern portion of the marsh. The boardwalk and adjacent River Trail currently provide opportunities for visitors to interact with the environment. Public access to this type of habitat is rare, especially in the context of a large metropolitan city. Native plant species present in the Kenilworth Marsh include cattails, willow, pickerelweed, reed canary grass (*Phalaris arundinacea*), marsh hibiscus (*Hibiscus moscheutos*), jewelweed (*Impatiens capensis*), and yellow pond lily. Wild rice is also present but was not observed during the field visit due to the time of year of the survey. Non-native, invasive plant species were also present. Common reed and purple loosestrife are present, as well as other invasive species being managed by NPS.

Kingman Marsh—Kingman Marsh has been the site of two recent large-scale restoration efforts. The first effort restored 40 acres of tidal wetland at Kingman Marsh and was completed in 2000 through support by the USEPA, USACE, NPS, and the District and Prince George’s County governments (USGS 2006b). In the past several decades, sediment had accumulated in this area, turning the man-made open freshwater lake into an unvegetated mudflat. The restoration process involved using a hydraulic dredge to pump Anacostia River channel sediments into two separate containment cells at Kingman Marsh, as described below.

The northern portion of Kingman Marsh (Kingman Marsh 1) is located north of Benning Road and includes about 30 acres surrounded by the Langston Golf Course. Following the completion of sediment and contouring activities at this area, the following wetland species were planted in June of 2000: arrow arum, soft-stemmed bulrush, soft rush, pickerelweed, duck potato, common three-square, and yellow pond lily. This area was deliberately reconstructed lower than Kenilworth Marsh (mostly mid and low marsh less than 2.0' NGVD '29), so as not to incur as many invasive, non-native species establishment (particularly common reed and purple loosestrife) as occurred at the higher elevations of Kenilworth Marsh (USGS 2006b). It is likely that resident Canada geese were responsible for the initial vegetation declines in this area, but that in succeeding years, eroding and consolidating sediment along with higher water levels in 2002 and 2003 made it difficult for the marsh to recover from grazing effects of resident Canada geese (USGS 2006b).

The southern portion of Kingman Marsh (Kingman Marsh 2) is located south of Benning Road and consisted of about 5 acres adjacent to RFK Stadium to the west and Heritage Island Wetlands to the east. Heritage Island Wetlands were included within the analysis of Kingman Marsh for this plan/EIS. Following dewatering and consolidation, the resultant sediment flats covered about 35 acres. After sediment deposition had occurred, the site was contoured and graded and then planted with 700,000 plugs, which were comprised of seven native wetland plant species. In May of 2000 the same wetland plant species that were planted in Kingman Marsh 1 were also planted in the Kingman Marsh 2: arrow arum, soft-stemmed bulrush, soft rush, pickerelweed, duck potato and common three-square, as well as yellow pond lily in lower spots around the restored marsh edges. Similar to the northern area, the planted marsh at the southern wetland initially performed well, but soon began to decline. The initial cause of decline is believed by many to be the herbivory of the plantings by resident Canada Geese (USGS 2006b). Since initial restoration, the elevation of the marsh surface subsided and made the area unsuitable for re-colonization by wetland plants. The presence of the resident Canada Geese and the erosion of the marsh surface have caused the area to be dominated by mudflat habitat.

RFK Shoreline—This wetland area was restored inside Kingman Marsh along the shoreline of the Anacostia River and adjacent to the RFK Stadium parking lot. It is the most recently restored wetland in Kingman Marsh and has benefited from lessons learned through past wetland creation projects along the Anacostia River. Past experience with lack of wetland success caused by herbivory by resident Canada geese and erosion of the marsh surface has influenced the design of this wetland. This wetland was restored by the placement of dredged material behind a dike constructed from coir logs. The coir logs hold the sediment in place so that the elevation of the marsh surface remains stable. The sediment is stabilized by the coir logs and the vegetation growing in the marsh so the elevation of the marsh surface remains at a level capable of maintaining plant growth. The area was planted with native species including yellow pond lily, cattails, pickerelweed, hibiscus, and *Scirpus* species. Common reed is present but is limited to a relatively small area immediately adjacent to the landward edge of the marsh. Additionally, this marsh is protected by a goose exclusion perimeter fence as well as internal and overhead barriers to keep resident Canada geese from entering the wetland and grazing on the plant material.

Anacostia River Fringe Wetlands—The River Fringe Marsh is comprised of two separate areas. The northern portion of the Anacostia River Fringe Wetlands is located in the Anacostia River approximately between Benning Road and East Capital Street. This area was created by temporarily bulkheading a portion of the mainstem of the Anacostia River with sheet piling. The sheet piling was originally installed as a temporary measure to contain the dredged material until it adequately settled and vegetation became fully established to hold the material in place. The sheet piling has been in place since the original construction of these marshes. Since these wetlands are now vegetated, the NPS intends to remove the sheet piling in the near future. Removal of the sheet piling would require additional NEPA compliance. The tide inundates this wetland regularly and a combined sewer outfall is located within the wetland. The wetland was planted with native species, including cattail, willow species, soft rush, and jewelweed; the invasive species common reed has been observed at this wetland. The southern portion of the Anacostia

River Fringe Wetlands is located in the Anacostia River along the southeastern shoreline of Kingman Island. This wetland was not evaluated in detail during the April 2008 fieldwork.

NON-TIDAL WETLANDS

The following non-tidal or freshwater wetlands were evaluated in Anacostia Park in April 2008 (figures 28 and 29):

Westbank Wetlands (WB)—The Westbank wetlands are generally located opposite Kenilworth Marsh on the west bank of the Anacostia River and include three separate wetlands (north, central, and south). These wetlands are non-tidal and difficult for the public to access. The north Westbank wetland is the northernmost wetland within Anacostia Park and borders the Maryland-District boundary. It is a backwater area within the floodplain that receives floodflow from the Anacostia River and drainage from the stormwater management facility located west of the wetland. Vernal pools were observed within the scrub shrub and forested habitat between the river and the wetland. The fringe of the pond includes red maple (*Acer rubrum*), river birch (*Betula nigra*), black willow, and sweetgum (*Liquidambar styraciflua*). The central Westbank wetland is a narrow wooded stream system on the north side of the Amtrak tracks. The stream flows east to the Anacostia River and possibly receives flow during extreme flood events. There is a large area of ponding due to beaver activity. Tree species present include red maple and various oak species (*Quercus* spp.). Herbaceous species present include cattails, reed canary grass, cinnamon fern (*Osmunda cinnamomea*) and royal fern (*Osmunda regalis*). The south Westbank wetland was the largest non-tidal wetland complex visited during the April 2008 fieldwork. This wetland is located within the floodplain of the Anacostia River. This system receives flow from two unnamed tributaries to the Anacostia River and is comprised of open water, emergent, scrub-shrub, and forested wetlands. A man-made berm is present along the Anacostia River in the area of this wetland. The berm is breached at the outlet of one of the streams; however, there is little tidal influence on the system. Common reed is present within the emergent wetland areas; other plants present include reed canary grass, purple loosestrife, boxelder (*Acer negundo*), and green ash (*Fraxinus pennsylvanica*).

River Trail Wetland—The River Trail wetland is located north and east of Kenilworth Marsh. The forested and open water wetland is located between berms and the River Trail embankment. It flows into the Kenilworth Aquatic Gardens through a metal pipe beneath the River Trail. The wetland buffer species present at the site include red maple, flowering dogwood (*Cornus florida*), cattails, spicebush (*Lindera benzoin*), and southern arrowwood.

Poplar Point Wetland—The wetland at Poplar Point is an emergent wetland located south of the Anacostia Park Headquarters building and along the southern shoreline of the Anacostia River. The Poplar Point Wetland is comprised of two separate wetland areas located immediately adjacent to each other. This wetland has a levee on the east and is located at a former facility that was operated by the Architect of the Capitol. A Metro subway tunnel passes beneath this area, which was recently disturbed by the construction of the Metro tunnel. The wetland is isolated from the Anacostia River and its hydrology appears to be sustained by groundwater and precipitation. The plant species present includes soft rush, black willow, and common reed grass.

WETLANDS AND THE ROLE OF CLIMATE CHANGE

Wetlands are currently being affected by and would continue to be affected by climate change, specifically sea level rise. Sea level rise is projected to permanently inundate low-lying coastal areas and increase shoreline erosion and wetland loss (NPS 2009d). For example, an elevation that may support high marsh plants under current conditions may become dominated by low marsh species in 50 years as a result of rising water levels. Chronic sea-level rise is also advancing the salinity gradient upstream in rivers on the Atlantic Coast. A salinity gradient refers to the difference in the salt concentration between saltwater and freshwater. When the salinity gradient advances, it means that a higher salt concentration is moving into the more upstream, typically freshwater areas. This phenomenon could lead to changes in vegetation types and the conversion of some tidal freshwater marshes into more salt-tolerant marshes from the increased salinity. Tidal freshwater marshes are also threatened by invasive plants such as common reed grass (*Phragmites australis*) which displace native vegetation (MDNR 2005). Specifically, climate change may increase opportunities for invasive plant species such as common reed to spread because of this species' adaptability to disturbance and efficiency to colonize (Erwin 2009), although water levels also influence the distribution of common reed. Restored wetland areas that are currently at the lower end of the elevation scale, such as Heritage Island wetlands, may suffer loss of vegetation and community health. Upper elevation wetlands, some of which currently invaded by common reed, might benefit from an increased water level. For example, Kenilworth Marsh is currently at an elevation that makes it susceptible for common reed invasion; this location may benefit from increased water levels, with the expectation that common reed would be precluded by increased water levels. Other areas such as lower Kingman Lake may no longer support emergent wetland vegetation because these areas could be inundated as a result of sea level rise. It is known that changes in climate significantly affect vegetation phenology, morphology, distribution, growth, and reproduction (NPS 2009d). In general, coastal wetlands would survive if increase in sediment surface elevation equals the rate of relative sea level rise or if they are able to migrate inland or to areas of higher elevation (NPS 2009d). For example, shoreline protection structures can block inland migration of wetlands (Strange et al. 2008). In areas where neither sufficient accretion nor migration can occur, increased tidal flooding can stress marsh plants through waterlogging and changes in soil chemistry, leading to a change in species composition and vegetation zones (Strange et al. 2008). There is also a prediction of increased storm events, which cause flooding and scouring, resulting in erosion of vegetation. The science team for this project considered climate change and predicted that the Anacostia River could rise approximately 2 inches during the 15-year life of this plan. Tidal elevations, even changes as small as inches, are extremely important parameters to consider in wetland restoration and management as well as long-term planning for this project.

NATURAL RESOURCES

This section discusses the natural resources within the study area, including aquatic resources (benthic invertebrates, finfish, and shellfish), terrestrial resources (vegetation and wildlife) as well as resident Canada geese. NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. Please see chapter 1, "Authority to Manage Resident Canada Geese," for a description of laws and regulations allowing NPS to manage wildlife and natural resources.

AQUATIC RESOURCES

Historically, the Anacostia River was a valuable spawning ground and nursery area for anadromous fish and provided habitat for other aquatic species as well. Today the fishery remains below its potential because of poor water quality, such as low DO concentrations. Aquatic life including, fish, shellfish, and macroinvertebrates can be harmed when DO levels decrease below 5 milligram per liter (mg/L) of DO (USEPA 2000). Dissolved oxygen levels typically decrease due to high levels of nutrients, particularly nitrogen, in the water column (USEPA 2000). Excessive nutrients enter the system through runoff and stimulate algal growth, which in turn uses up the oxygen needed to maintain healthy fish and shellfish populations. The Anacostia River's DO regularly fall below the standard and at times it approaches zero (DCFWD 2001). Aquatic resources that have been observed within Anacostia Park such as benthic invertebrates, shellfish, and finfish are discussed in more detail in the following sections.

Benthic Invertebrates

Generally, the benthic invertebrate fauna of the Anacostia River consists of species that are typically tolerant of a variety of water quality and structural habitat conditions (USACE 2002). Species commonly found include pollution-tolerant oligochaetes (segmented aquatic worms) and chironomids (non-biting midge larvae). A benthic macroinvertebrate survey documenting the pre-and post-restoration status of urban freshwater tidal wetlands in the Anacostia River was completed from the period of 2002 through 2004 (USGS 2006a). During this survey, both Kingman Marsh and Kenilworth Marsh showed that over 95 percent of the organisms counted at Kingman were either chironomids or oligochaetes and the count was over 85 percent at Kenilworth (USGS 2006a). These recent benthic surveys have supported the conclusion that the absence of less pollution tolerant species indicates the existence of environmental stressors such as lack of cover in unvegetated areas and likely polluted sediments (contaminated with stable organic chemicals like PCBs, chlordane and PAHs as well as some metals) (USGS 2006a). The existing bottom of Kingman Marsh is commonly associated with lentic systems, which appear sterile due to the lack of structural cover available, the lack of sand or silt substance, and the absence of SAV (USACE 2002).

Overabundant resident Canada geese have grazed and caused the major loss of vegetation and community richness at Kingman Marsh. It has been concluded that the loss of vegetation and the subsequent erosional substrate at the restored Kingman Marsh (2000) due to wildlife grazing (primarily resident Canada geese) has affected the macroinvertebrate community development (USGS 2006a). This has created open areas in the marsh, which in turn has led to sediment scouring. Even though erosional substrates are not ideal conditions for most macroinvertebrates, and can suppress the overall taxa richness of the marsh, the substrate is ideal for pollution-tolerant macroinvertebrates such as chironomids and oligochaetes. The macroinvertebrate communities present at Kingman Marsh is a good indication of a disturbed, somewhat polluted area being composed of the extremely large concentrations of pollution tolerant chironomids and oligochaete families (USGS 2006a).

Finfish

The finfish species that inhabit the Anacostia River consist primarily of resident and migratory fish species that are generally at least moderately tolerant of pollution (USACE 1994). The three main types of fish that have been observed in the Anacostia River include resident inhabitants of the freshwater tributaries and main channel; anadromous fish (such as shad species [*Dorosoma* and *Alosa* sp.] or striped bass [*Morone saxatilis*]), which live in marine or estuarine waters but return to freshwater to spawn; and catadromous fish (such as the American eel [*Anguilla rostrata*]), which live in freshwater but migrate to the sea to spawn (NOAA 2007b). Historically, the Anacostia was a valuable spawning ground and nursery area for anadromous fish. Today, the fishery remains below its potential due to poor water quality. Generally, most of the river's problems come from excess sediment and bacteria as well as low DO. Aquatic life, including fish, requires a minimum DO of 5 mg/L. DO levels typically decrease due to high levels of nutrients, particularly nitrogen, in the water column (USEPA 2000). The river's DO regularly falls below the standard and at times approaches zero. However, the District fisheries biologists recorded a total of 52 different fish species in the Anacostia mainstem during a survey conducted from 1990 through 1999. Today, biologists routinely document on average of about 34 different fish species common in the mainstem of the river within the boundaries of the District (DCFWD 2001). Table D-1 in appendix D presents the fish species that have been recorded by the NPS as occurring in the Anacostia River within Anacostia Park. Both Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) have been possibly extirpated from the District according to the District DOE Wildlife Action Plan (DCDE 2006). However, NOAA-Fisheries stated in a letter dated November 22, 2005 that shortnose sturgeon have been documented in the Potomac River, but are only transient species in the Anacostia River; these species are therefore not discussed further in this plan/EIS.

It has been demonstrated that Kingman Marsh provides tidally influenced habitat (USACE 2002). The existing fish fauna consists of species that are typically tolerant of a variety of water quality conditions. Species commonly found in Kingman Marsh include gizzard shad (*Dorosoma cepedianum*), common killifish (*Fundulus* sp.), eastern silvery minnow (*Hybognathus regius*), pumpkinseed (*Lepomis gibbosus*), white perch (*Morone americana*), and spottail shiner (*Notropis hudsonius*). The nature of the existing lake bottom is commonly associated with lentic systems, or non-flowing or standing water bodies, such as lakes or ponds even though fish in Kingman Marsh move with the ebb and flood of the tide of the Anacostia River (USACE 2002). The bottom composition of Kingman Marsh consists of mud and silt, with very little cobble or gravel. Therefore, appropriate substrate materials required for the spawning success of many fish species (gravel, cobble, and/or boulder) are absent in Kingman Marsh and many portions of the Anacostia River (USACE 1994). Natural and artificial structures submerged in the water provide adequate escape cover for many fish species. However, structural cover within Kingman Marsh is limited to the bridge supports of the Benning Road and East Capitol Street Bridges as well as the bridge supports for the pedestrian walkway that connect Heritage Island with Kingman Island and the riprap along the shorelines of the marsh and the islands (USACE 1994).

Shellfish

Only two species of mussels have been identified in Anacostia Park. The eastern floater mussel (*Pyganodon cataracta*) and the tidewater mucket mussel (*Leptodea ochracea*) have been observed in the park and both are included on a June 24, 2003 list of Animals of Anacostia Park and Kenilworth Park and Aquatic Gardens (NPS 2003).

VEGETATION AND WILDLIFE

This topic includes terrestrial vegetation and habitat, wildlife species, as well as invasive species.

General Vegetation and Habitat

Within Anacostia Park, the types of terrestrial vegetation and habitat include riparian buffers, upland forests, open meadows, and planted landscaped areas (NPS 2004a). There are also emergent wetlands and forested wetland habitats in the park; these habitats are discussed in detail in the “Wetlands” section.

> *Within Anacostia Park, the types of terrestrial vegetation and habitat include riparian buffers, upland forests, open meadows, and planted landscaped areas.*

- Riparian buffers which can sometimes be encompassed in the forested wetland category, exist along the shoreline of the Anacostia River in the floodplain. In particular, areas north of Benning Road are heavily forested and provide a natural riparian buffer that protects the river from erosion, filters stormwater runoff, and provides habitat for numerous wildlife species. Common plant species that have been observed along the shoreline of Kingman Marsh in the park include black cherry (*Prunus serotina*), black willow, silky dogwood (*Cornus amomum*), dwarf sumac (*Rhus copallinum*), and staghorn sumac (*Rhus typhina*). Common non-native invasive species observed along the shoreline of Kingman Marsh include Asian bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) (USACE 2002).
- Upland forests are also located within Anacostia Park north of Benning Road. These habitats are generally located beyond the floodplain and the riparian buffers in the more upland (less wet) areas. Dominant plant species that have been observed within Anacostia Park in this habitat include white mulberry (*Morus alba*), black locust (*Robinia pseudo-acacia*), willow oak

(*Quercus phellos*), box elder (*Acer negundo*), northern catalpa (*Catalpa speciosa*), and slippery elm (*Ulmus rubra*). Common non-native invasive species observed in upland forest habitat include tree-of-heaven (*Ailanthus altissima*), tartarian honeysuckle (*Lonicera tatarica*), princess tree (*Paulownia tomentosa*), and mimosa (*Albizia julibrissin*) (NPS 2004a).

- Landscaped areas within Anacostia Park include maintained right-of-ways along roads and bridges that span across the park, and several maintained recreational fields. Typical vegetation in these areas includes various grass species, white clover (*Trifolium repens*), and English plantain (*Plantago lanceolata*).
- Open meadows are another habitat located within Anacostia Park – there are approximately 27 acres of managed meadows within Anacostia Park, not including the 15 acres that exist at Kenilworth Gardens (NPS 2004a).

The NPS definition of an exotic species (commonly referred to as non-native, alien, or invasive) is: 1) those species that occupy or could occupy park lands directly or indirectly as a result of deliberate or accidental human activities and 2) a species that is not a natural component of the natural ecosystem at that place (NPS 2006b). Invasive species can be plants, animals, or other organisms such as microbes. In accordance with the “Removal of Exotic Species Already Present” section of NPS *Management Policies 2006* and EO 13112, “Invasive Species,” all exotic plant species that are not maintained to meet an identified park purpose will be managed up to and including eradications if the exotic species meet any of the following situations:

- Interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or
- Disrupts the genetic integrity of native species, or
- Disrupts the accurate presentation of a cultural landscape, or
- Damages cultural resources, or
- Significantly hampers the management of the park or adjacent lands, or
- Poses or creates a public health or safety hazard (NPS 2006a).

Invasive plant species pose a serious threat to the natural environment because normally, there are no natural conditions to keep them under control. Invasive plant species can out-compete native vegetation for sunlight, nutrients, and moisture. Invasive plant species tend to have relatively rapid growth rates and often survive in disturbed areas or drought conditions; however, not all exotic plant species are necessarily characterized as invasive species.

In order to manage invasive plants on park lands, the NPS have deployed seventeen Exotic Plant Management Teams throughout the country, including the NCR-EPMT. The team uses chemical, mechanical, and biological methods to control the non-native, invasive plant species in the area. The NCR-EPMT top ten target species include bush honeysuckles (*Lonicera* spp.), common reed, English ivy (*Hedera helix*), Japanese barberry (*Berberis thunbergii*), Japanese honeysuckle, Japanese knotweed (*Polygonum cuspidatum*), mile-a-minute (*Persicaria perfoliata*), multiflora rose (*Rosa multiflora*), tree of heaven, and wisteria (*Wisteria sinensis*).

In 2001, the NCR-EPMT based out of the CUE of the NPS began controlling non-native invasive (exotic) plants in National Capital Parks - East with surveys and treatment in Kenilworth Aquatic Gardens. Treatments began in Anacostia Park in 2002. More recently (in 2005), the team began survey and treatment in the Arboretum corridor. Park staff and the EPMT identified two “target” species of primary interest - common reed and purple loosestrife for treatment at Kenilworth Aquatic Gardens and Anacostia Park. During initial surveys, the team only documented these two species. The target species for the Arboretum Corridor was kudzu (*Pueraria montana*). Any additional exotic species found within the treatment areas were treated; however, they have not been monitored as intensely as the target species (NPS 2006b). Table D-2 in appendix D presents a list of exotic plant species that have been treated within Anacostia Park from 2001 through 2006 (NPS 2006b). Treatment areas include portions of Kenilworth Aquatic Gardens, areas within Anacostia Park (along eastern shoreline of Anacostia River, south of I-295 bridge), and areas within the Arboretum Corridor (western shoreline of Anacostia River, across river from Kenilworth aquatic gardens rugby fields).

Additional invasive plant species that have been identified by the park within Anacostia Park include the following: hydrilla, spotted knapweed (*Centaurea stoebe*), yellow star thistle (*Centaurea solstitialis*), leafy spurge (*Euphorbia esula*), medusahead rye (*Taeniatherum caput-medusae*), musk thistle (*Carduus nutans*), porcelainberry (*Ampelopsis brevipedunculata*), dalmatian toadflax (*Linaria dalmatica*), yellowflag iris (*Iris pseudacorus*), barberry species (*Berberis* sp.), euonymus species (*Euonymus* sp.), and bamboo species (*Phyllostachys aurea*). In addition, the District DOE WAP is targeting the invasive plant species known as lesser celandine (*Ranunculus ficaria*) (DCDE 2006). The District DOE WAP has stated that invasive and alien plant and animal species are the overall biggest threat across both terrestrial and aquatic habitat types within the District (DCDE 2006).

Wildlife Species

The diversity of habitat within Anacostia Park, including riparian floodplains, emergent and forested wetlands, upland forests, and open meadows provide a unique natural environment to wildlife in an otherwise urban area. Kingman Marsh and other habitat features of Anacostia Park are located in a highly urbanized area of the city, which reduces habitat suitability for secretive or interior dwelling species adequate food sources, escape cover, and breeding habitats available. The National Capital Parks - East has documented 188 bird, 50 butterfly, 30 fish, 24 reptile, 18 amphibian, and 17 mammal species as either residents within or migrants passing through Anacostia Park as well as numerous other invertebrates (NPS 2003). Canada geese are specifically discussed in a separate below.

Birds

Anacostia Park is a refuge for birds within this urban area. The marsh areas provide good quality habitat to many birds that are not seen elsewhere in the District. Most birds in the area have become accustomed to regular human visitor presence and in some areas pollution, such as large amounts of trash. The NPS has listed 188 species of terrestrial, riparian, and aquatic birds in the lower Anacostia watershed, of which over 50 are associated with the aquatic environment (NOAA 2007b). Aquatic birds using the river include year-round residents, local breeding populations, and highly migratory species that either overwinter in the area or pass through to northern or southern destinations. Most breeding areas are limited to Kenilworth Marsh, Kenilworth Park, and Kingman Marsh. Other areas, including much of the mainstem Anacostia River, Washington Channel, and Tidal Basin, have developed shorelines and are only used for foraging. This section concentrates on the aquatic-dependent bird species, because this plan/EIS would ultimately manage wetland areas within Anacostia Park. The habitat use and feeding strategies of the aquatic birds that occur in the lower Anacostia River are summarized in table D-3 of appendix D (NOAA 2007b).

The largest groups of aquatic birds on the river are ducks and geese, loons, grebes, coots, and rails. Nearly 30 species represent these families in the study area, most of which are associated with Kenilworth Marsh, Kingman Marsh, and the mainstem of the Anacostia River in the upper river zone. The ducks, geese, coots, and rails are largely grazers and eat plants and insects (omnivorous). Canvasback duck

(*Aythya valisineria*), ringnecked duck (*Aythya collaris*), ruddy duck (*Tadorna ferruginea*), widgeon (*Anas americana*), wood duck (*Aix sponsa*), Canada goose, and snow goose (*Chen caerulescens*) are primarily grazers of aquatic and terrestrial plants. Several other species, such as mallards (*Anas platyrhynchos*), goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), and long-tailed duck (*Clangula hyemalis* are omnivorous, feeding on vegetation, insects, and small aquatic invertebrates. The mergansers, loons, and grebes are strong divers and swimmers and feed on fish and aquatic invertebrates. The ducks and geese primarily use the Anacostia River for overwintering, although a few species such as wood duck, mallard, and rails may breed during the spring and summer in the upper river (NOAA 2007b).

Nine species of wading birds within the family Ardeidae, which includes the herons, bitterns, and egrets, have been documented in less developed shoreline habitats along the Anacostia River. The great blue heron (*Ardea herodias*) primarily eats fish, while the smaller herons, bitterns, and egrets feed on fish, frogs, crustaceans, other aquatic invertebrates, and insects. Most of the wading birds are permanent residents, although cattle egrets (*Bubulcus ibis*) are largely an inland species that happen to breed near water. Eight species of sandpiper have been documented in the area. Most of the sandpipers breed in the Arctic or sub-Arctic and overwinter in Central to South America, so they are transient within the area. The exception is the spotted sandpiper (*Actitis macularia*) which breeds locally. The sanderling (*Calidris alba*) and dunlin (*Calidras alpina*) also overwinter in the region, but usually occupy coastal beaches. All of the sandpipers feed primarily on benthic invertebrates found in shallow water sediments. Marsh wrens (*Cistothorus palustris*) and green herons (*Butorides virescens*) are commonly found nesting or foraging in the marsh. When mudflats are exposed at low tide, they serve as ideal feeding areas for great blue herons, great egrets (*Ardea alba*), spotted sandpiper, solitary sandpiper (*Tringa solitaria*), semi-palmated sandpiper (*Calidris pusilla*), Wilson's snipe (*Gallinago gallinago*), least sandpiper (*Calidris minutilla*), pectoral sandpiper (*Calidris melanotos*) and killdeer (*Charadrius vociferous*); yellowlegs (*Tringa* sp) are also common and semipalmated plovers (*charadrius semipalmatus*) are occasionally observed (NOAA 2007b).

Three species of gulls and three species of terns have been seen along the Anacostia River. The laughing gull (*Larus* atricilla) eats fish, while the herring gull (*Larus* argentatus) is a scavenger. Both are permanent residents of the region. The ring-billed gull (*Larus delawarensis*) overwinters in the area, but breeds inland. The terns eat primarily fish, with the exception of the small least tern (*Sterna antillarum*), which also feeds on aquatic invertebrates. The terns and gulls are colony breeders with most breeding in the region, but it is not known whether colonies are present along the river. The least tern is not known to breed within the District. Two species of blackbird are common year-round residents of marshes and bogs of the upper river zone. The blackbirds are omnivores, feeding on aquatic invertebrates, grains, and seeds (NOAA 2007b).

Three other important fish-eating, permanent area residents include the osprey (*Pandion haliateus*), belted kingfisher (*Ceryle alcyon*), and double-crested cormorant (*Phalacrocorax auritus*). The osprey is one of the few raptors that have a strong association with water and an osprey that occupies the upper river zone likely has a very large home range. Osprey feed almost exclusively on fish, although they have been observed on occasion taking other prey such as birds, frogs, and crustaceans. The kingfisher lives in areas of Kenilworth Marsh and Kingman Marsh in the upper river zone. The kingfisher is also highly dependent on fish. The double crested cormorant breeds in both coastal and inland areas and eats fish almost exclusively (NOAA 2007b).

The USGS Patuxent Wildlife Research Center studied the bird communities at the Kingman and Kenilworth Marshes from 2001 to 2004. This study was conducted to use bird populations to track the health and progress of the reconstructed Kingman Marsh. Birds, especially marsh birds have been used as indicators for degree of wetland restoration success in the past (USGS 2004). Together 177 bird species were identified at both marshes comprising 14 taxonomic orders and 16 families, 137 species at Kingman

Marsh and 164 at Kenilworth Marsh (USGS 2004). At both wetlands, winter usage was notably greater than at other seasons; however, there were more species present during spring and summer. Three functional guilds were looked at in particular: wetland users, freshwater marsh users, and mudflat/shore users. Mudflat users were greatest during the winter while marsh users were greatest in the fall (USGS 2004).

Mammal Species

The NPS has recorded 17 species of mammals that have resided in or currently reside in Anacostia Park (appendix D, table D-1). As with the aquatic birds, these mammals are found primarily in the upper river zone and Kenilworth Marsh (NOAA 2007b).

The most common mammal species associated with either aquatic or riparian environments that have been observed within Anacostia Park include beaver (*Castor canadensis*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), and raccoons (*Procyon lotor*). Minks (*Mustela vison*) have also been observed within Anacostia Park, but are rarer than the aforementioned species. Foxes, squirrels, and opossums are also common mammalian residents of the surrounding woodland and white-tailed deer (*Odocoileus virginianus*) have been increasingly seen in recent years (NPS 2004a). The following paragraphs provide a more detailed description of these aquatic-dependent species, including preferred habitat (NOAA 2007b).

Beaver are almost exclusively aquatic, occupying rivers, streams, and wetlands. The species has been seen within Anacostia Park and may be a common inhabitant of the upper zone of the Anacostia River. Beaver eat only plants (herbivorous), most commonly consuming bark of certain hardwoods such as poplar, aspen, birch, cherry, willow, maple and alder, and also consume aquatic plants.

River otter are almost exclusively aquatic, occupying rivers, lakes, and other waters, but only those that show little human impact. The species has been documented within Anacostia Park, but are likely limited to less developed areas in the upper zone of the Anacostia River, although there have been recent reports of river otter utilizing the section of the Anacostia River adjacent to Kenilworth Marsh (NPS 2004a). Otter eat mainly fish, but will opportunistically eat crustaceans, insects, amphibians, birds, mammals, and turtles.

Muskrat inhabit freshwater streams, lakes, wetlands, ponds, brackish marshes, and salt marshes. They may occur in surface waters of Kingman Marsh, Kenilworth Marsh, and the upper zone of the Anacostia River. Muskrats are primarily plant eaters, feeding on roots and basal portions of plants, as well as shoots, stems, and leaves. Omnivorous populations, which supplement their diet of vegetation with crayfish, fish, frogs, turtles, and young birds, are also known to exist.

Mink are found associated with aquatic habitats of all kinds, including rivers, streams, lakes, and even ditches, as well as wetlands, and backwater areas. Within the project area, they are most likely to be found in the River's upper zone, Kenilworth Marsh and Kingman Marsh. Mink are opportunistic predators, taking whatever prey is abundant but are particularly fond of eating other mammals. Mink also hunt aquatic prey such as fish, amphibians, and crustaceans.

Raccoons are the most abundant and widespread medium-sized mammal in North America associated with riparian habitats. Raccoons are found near virtually every aquatic habitat, particularly various freshwater wetlands and salt marshes. The raccoon is an omnivorous and opportunistic feeder, eating fruits, nuts, grains, insects, frogs, crayfish, eggs, and virtually any animal and vegetable matter. The proportion of different foods in their diet depends on location and season, although plants are usually a more important component. They may focus on a preferred food when it is available.

Reptiles and Amphibians

The National Capital Parks - East has documented 24 reptile and 18 amphibian species at Anacostia Park (appendix D, table D-1). Most amphibian species and many reptiles spend all or critical parts of their life in wetlands. Reptiles including snakes and turtles that are able swimmers are likely found in wetland habitats. Many reptile species depend on wetlands for breeding and foraging for food including fish, frogs, and macroinvertebrates. Common turtle species that may be found in the wetland areas or within the Anacostia River include the common snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta picta*), red-bellied turtle (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternum subrubrum*), and the common musk turtle (*Sternotherus odoratus*). These turtle species use the land adjacent to the wetlands and river for nesting habitat. Common snake species that may be found within the wetlands and Anacostia River include the northern black racer (*Clumber constrictor*),black rat snake (*Elaphe obsoleta*), northern water snake (*Nerodia sipedon*), queen snake (*Regina serpemvittata*), northern brown snake (*Storeria dekayi*), and the eastern garter snake (*Thamnophis sirtalis*).

Amphibians are a natural wetland species and are sensitive to disturbances such as pollution and habitat alterations; therefore, amphibians have a great potential of acting as ecological indicators to assess the overall health of a wetland. Frog species that have been found within the marsh areas of Anacostia Park include the spring peeper (*Pseudacris crucifer*), bull frog (*Rana catesbeiana*), green frog (*Rana clamitans*), northern cricket frog (*Acris crepitans*), and wood frog (*Rana sylvatica*). These species breed within the wetland areas from early spring to early summer and aquatic larvae (tadpoles) remain within the wetlands throughout the metamorphous period of their life cycle. Salamander species that use the wetland areas within Anacostia include the spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), and the red spotted newt (*Notothalmus viridiscens*). The spotted and marbled salamanders are typically only found during the breeding season as they spend much of their lives underground. The red spotted newt uses the wetland areas during their larval stage, and then moves to terrestrial habitat during the juvenile stage, returning to the wetland habitat to breed.

Invertebrates

The National Capital Parks - East has documented 50 butterfly species and various other invertebrates at Anacostia Park (appendix D, table D-1). Invertebrates are common prey of many birds, reptiles, amphibians, and some small mammals throughout the park. Ducks rely heavily on invertebrates as a major source of food, especially during protein demanding periods, such as egg laying or molting (USFWS 1988). Many invertebrates species rely on wetlands for breeding and for larvae development. Common butterfly species at the park include the least skipper (*Ancyloxypha numitor*), summer azure (*Celastrina ladon*), clouded sulphur (*Colias philodice*), monarch (*Danaus plexippus*), Eastern tailed blue (*Everes comyntas*), and Eastern tiger swallowtail (*Papilio glaucus*). Common dragonfly species include the common green darner (*Ana junius*), Eastern amberwing (*Perithemis lenera*), and the black saddlebag (*Tramea lacerate hagen*). Other invertebrates using the wetland and riverine habitat throughout the park include the Eastern floater mussel (*Pyganodon cataracta*), praying mantis (*Mantis religiosa*), crayfish (*Orconectes* sp.), and Asiatic clams (*Corbicula fluminea*).

Invasive Wildlife Species

The District DOE WAP has stated that invasive (and exotic or alien) plant and animal species are the overall biggest threat across both terrestrial and aquatic habitat types within the District. Invasive species can include both plant and animal species and are described as species that are not native to the area and are likely to threaten the native biodiversity of the habitat. Examples of invasive wildlife within the urban areas of the District include mice and rats (USDA undated), which have become invasive in urban areas due to reasons associated with human development. The District DOE WAP addresses factors that can have substantial impact on wildlife conservation, such as management of invasive species (DCDE 2006). While the threat of invasive species is not unique to the District, the District does have a unique dilemma. Because all wildlife species are protected by District regulation – the Water Pollution Control Act of 1984, wildlife agencies are extremely limited in management actions for invasive animal and alien species.

Species of Greatest Conservation Need in the District

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 WAP 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 these species and priority habitat types. Currently there are 148 species and 13 priority habitat types listed for the District. A listing of the District species of greatest conservation need is located in appendix D, table D-4. Of the listed species of conservation need, a total of 15 birds, five mammals, 13 reptiles, 13 amphibians, four fish, and nine invertebrates have been identified within Anacostia Park. These species are listed in table 10.

TABLE 10: SPECIES OF GREATEST CONSERVATION NEED NOTED IN THE DISTRICT WILDLIFE ACTION PLAN THAT HAVE BEEN IDENTIFIED AT ANACOSTIA PARK

Common Name	Scientific Name
Birds	
Acadian Flycatcher	*Empidonax virescens*
American Bittern	*Botaurus lentiginosus*
American Black Duck	*Anas rubripes*
Bald Eagle	*Haliaeetus leucocephalus*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Bobolink	*Dolichonyx oryzivorus*
Brown Thrasher	*Toxostoma rufum*
Eastern Meadowlark	*Sturnella magna*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Least Bittern	*Ixobrychus exilis*
Northern Bobwhite Quail	*Corlinus virginianus*
Ovenbird	*Seiurus aurocapilla*
Red-shouldered Hawk	*Buteo lineatus*
Scarlet Tanager	*Piranga olivacea*
Wood Duck	*Aix sponsa*

Common Name	Scientific Name
Mammals	
Eastern Chipmunk	*Tamias striatus*
Eastern Cottontail	*Sylvilagus floridanus*
Gray Fox	*Urocyon cinereoargenteus*
Northern River Otter	*Lutra canadensis*
Virginia Opossum	*Didelphis virginiana*
Reptiles	
Common Musk Turtle	*Sternotherus odoratus*
Eastern Box Turtle	*Terrapene carolina*
Eastern Fence Lizard	*Sceloporus undulates*
Eastern Garter Snake	*Thamnophis sirtalis*
Eastern Hognose Snake	*Heterodon platirhinos*
Eastern Mud Turtle	*Kinosternon subrubrum*
Eastern Painted Turtle	*Chrysemys picta picta*
Five-lined Skink	*Eumeces fasciatus*
Northern Black Racer	*Coluber constrictor*
Northern Brown Snake	*Storeria dekayi*
Northern Ringneck Snake	*Diadophis punctatus edwardsii*
Redbelly Turtle	*Pseudemys rubriventris*
Spotted Turtle	*Chrysemys guttata*
Amphibians	
American Toad	*Bufo americanus*
Bullfrog	*Rana catesbeiana*
Fowler's Toad	*Bufo fowleri*
Marbled Salamander	*Ambystoma opacum*
Northern Cricket Frog	*Acris crepitans*
Northern Dusky Salamander	*Desmognathus fuscus*
Northern Spring Peeper	*Pseudacris crucifer*
Northern Two-lined Salamander	*Eurycea bislineata*
Pickerel Frog	*Rana palustris*
Redback Salamander	*Plethodon cinereus*
Red Spotted Newt	*Notophthalmus viridescens*
Upland Chorus Frog	*Pseudacris feriarum feriarum*
Wood Frog	*Rana sylvatica*

Common Name	Scientific Name
Fish	
Alewife	*Alosa pseudoharengus*
American Eel	*Anguilla rostrata*
American Shad	*Alosa sapidissima*
Blueback Herring	*Alosa aestivalis*
Invertebrates	
Crossline Skipper Butterfly	*Polites origenes*
Eastern Comma Butterfly	*Polygonia comma*
Great Spangled Fritillary Butterfly	*Speyeria cybele*
Little Glassywing Butterfly	*Pompeius verna*
Monarch Butterfly	*Danaus P. plexippus*
Question Mark Butterfly	*Polygonia interrogationis*
Red Admiral Butterfly	*Vanessa atalanta rubria*
Tidewater Mucket	*Leptodea ochracea*
Variegated Fritillary Butterfly	*Euptoieta claudia*

RESIDENT CANADA GEESE

Canada geese are federally protected by the Migratory Bird Treaty Act (16 USC 703-711).

Canada geese are federally protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the MBTA, promulgated in Title 50 CFR 13:21, and issued by the USFWS. Regulations governing the take, possession, and transportation of migratory birds under sport hunting seasons are authorized by the MBTA and annually promulgated in 50 CFR 20 by the USFWS. The MBTA provides for the protection and conservation of migratory birds (including resident Canada geese), while at the same time providing opportunities for people to use the resource for sport, recreation, and scientific endeavors (USFWS 2005). The MBTA also provides considerable flexibility for dealing with situations where birds may come into conflict with human interests, such as those posed by the increasing numbers of resident Canada geese (USFWS 2005). On August 10, 2006 a final rule was published in 50 CFR 20:21 authorizing state wildlife agencies, private landowners, and airports to conduct indirect and/or direct population control management on resident Canada goose populations. On August 20, 2007, a final rule was published expanding hunting methods during special September hunting seasons (50 CFR 20:21).

Migratory Canada geese typically arrive in the park in the early fall and migrate north toward Canada by the end of winter (mid-March) to breed in the summer. The resident subspecies giant Canada geese were captive birds that were released to restock the depleted migratory populations along the Atlantic Flyaway. Giant Canada geese from Minnesota and Wisconsin were introduced to Pennsylvania, Georgia, Maine, West Virginia, North Carolina, and South Carolina. In addition, 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 due to the length of time in captivity and formed year-round resident populations including the extensively urbanized area in the District, including Anacostia Park. For the purposes of this EIS, and for management purposes, the geese nesting within the conterminous United States in the months of March, April, May, or June or residing within the conterminous United States in the months of April, May, June, July, or August are collectively referred to as "resident" Canada geese (USFWS 2005).

General Ecology

Resident Canada geese are typically larger than the migratory type, ranging from twelve to fourteen pounds, but may be as large as eighteen pounds. In addition, resident Canada geese have longer necks and longer wingspans then their subspecies. The main behavioral differences between resident and migratory Canada geese involve nesting behavior, and life history strategies. The life history strategy of migratory Canada geese accommodates a short growing season and harsher conditions at breeding areas, and the rigors of migration. Resident Canada geese have adopted a strategy that allows for a greater allocation of energy to reproduction through forgoing migration and utilizing areas with ample and secure food sources. This results in higher potential population growth rates for resident Canada geese (USFWS 2007).

Resident Canada geese avoid hunting mortality through their extensive use of urban environments. Urban environments can provide all resident Canada goose life cycle requirements, at least for short periods, and allow geese to remain in urban "refuges" and avoid peak harvest periods (i.e., weekends). Urban resident Canada geese also likely benefit from the less dangerous predator communities within cities. Additionally, the larger size of resident Canada geese likely makes them even less susceptible to the predators they do encounter in both urban and rural areas (USFWS 2005, III-9).

Canada geese are herbivores, obtaining nutrition from plants, including their leaves, roots, seeds, and fruits. Geese prefer to feed on young and actively growing portions of plants that are high in protein. The geese are primarily grazers especially during the preparation of spring nesting, rapid growth of goslings, and during the post-nesting replacement of feathers. In order to obtain adequate levels of protein during these times, geese will feed constantly during daylight hours. When actively feeding, geese may defecate every three to four minutes. Resident Canada geese typically remain in areas associated with human activity and longer growing seasons year round. Their residency depends upon the consistent availability of food including crops, pastures, lawn vegetation, waste grains, and wetland vegetation.

In the spring and summer of 2000, approximately 700,000 emergent wetland plants consisting of six native species were planted over 35 acres at Kingman Marsh. Five years of post-reconstruction monitoring (2000-2004) was conducted by the USFWS and USGS for two elements: food chain accumulation of contaminants and vegetation establishment. The goals of the vegetation establishment monitoring were to measure and evaluate several parameters and processes to document both the status and degree to which the marsh achieved a wetland condition similar to what might be expected compared to local and reference wetlands (emergent freshwater tidal wetland habitat). To determine the vegetation status and trends, 17 one-meter wide transects were randomly established at Kingman Marsh to be read each year in May, July, and September for species and cover. The following parameters were analyzed during the study: vegetation biomass, soil structure, organic material in soil, soil pH, soil redox potential, seed source potential, bird use, hydrologic and sediment deposition, sediment elevation processes, and benthic and macroinvertebrates use.

Shortly after the plantings, the resident Canada geese ate entire sections of the new plants (USGS 2006b). Fencing was placed around the vegetation to keep geese out of the vegetated areas (USGS 2006b). Once the fencing was removed the following spring, the vegetation was almost completely eaten by the resident Canada goose population (Harris 2002). Of the species originally planted at Kingman Marsh, geese preferred pickerelweed and broad-leafed arrowhead (*Sagittaria latifolia*), but not arrow arum or soft rush (Harris 2002). Resident Canada geese exert a higher degree of grazing pressure on wetlands over migratory geese, because they typically feed year round on seedlings, plants, propagules, and roots. The five year monitoring project concluded that marsh establishment at Kingman was severely impacted from grazing by over-abundant resident Canada geese (USGS 2006b). In addition, longer periods of inundation reduce the ability of wetland vegetation to rebound from grazing as seedling germination is reduced and plant growth slowed, and erosion linked to grazing and subsidence led to lower than planned sediment elevations, which further hindered the ability of grazed wetlands to rebound (USGS 2006b). The District DOE WAP states that locally, one of the top five threats to emergent tidal wetlands is overbrowsing by resident Canada goose populations (DCDE 2006). A study of goose herbivory at Kingman marsh was completed from 2009 to 2011. The study involved monitoring fenced (exclosed) plots and unfenced control plots to document the effects of Canada goose herbivory on vegetation in Kingman Marsh. The exclosed plots used elevated fencing to permit access by herbivores such as fish and turtles but exclude mature Canada geese, whereas Canada geese had full access to the unfenced control plots. An analysis of the data collected from 2009-2011 documents that vegetation in the exclosed plots had significantly greater vegetative cover and species richness when compared to the vegetation in the unfenced control plots that were exposed to full Canada goose herbivory for three years (Krafft et. al 2012). Although the full U.S. Geological Survey study report must still undergo peer review, once completed, the NPS will make the final report available to the public.

June 2009

August 2009

Canada Goose Herbivory at the Park

Winter populations (including the migratory geese) are less important on marsh grazing impacts than the resident populations, which are present throughout the spring and summer growing periods (Paul et al. 2004).

Pair bonds are formed in the spring and are long-lasting until one of the pair dies. Pairs copulate over water during the spring and establish territories and build nests approximately 50 meters from a body of water. Nests are associated with raised areas that afford good visibility and include islands, hummocks, pond banks, muskrat houses, cliffs, trees, and other man-made structures. Resident Canada geese are highly philopatric (propensity to return to) to their previous nesting areas and often use the same nest site year after year. The average age of resident Canada geese during their first nesting is 2 to 3 years (4-5 years in migratory geese). Resident Canada geese typically have a higher concentration of nests in an area, and have slightly higher clutch sizes and lower hatchling mortality (Smith et al. 1999). Clutches of one to eight eggs are laid approximately one per day until the clutch is complete. Females spend 91 to 99 percent of their time incubating the eggs from 24 to 30 days. Ganders provide protection for the female during nesting, incubation recesses, and to assist in defending the nest against predators. After spending less than 24 hours in the nest following hatching, goslings are lead to brood-rearing areas with protein-rich vegetation and open water to provide escape from predators. The goslings will spend nearly all day feeding for six to eight weeks in order to build body tissue, replace natal down with juvenile body feathers, and grow wing feathers.

Adult resident Canada geese undergo a complete replacement of flight feathers each summer, which takes up to a month for most individuals. During this period, the birds are flightless and are vulnerable to predators and nuisance goose management practices. Molting geese select areas near open water that have good grazing and unobstructed views, namely parks and golf courses (Smith et al. 1999).

Migratory geese move south from their nesting or molting areas during the fall and winter in response to freezing temperatures, snowfall, and food availability. Fall migration may start as early as August for geese in northern areas. The migrating geese are extremely gregarious and are attracted to areas that provide adequate foraging opportunities, water, protection, and other Canada geese. The geese leave their wintering grounds in early spring and arrive at breeding grounds mid-April to mid-May. The spring migration flight requires about 12 times as much energy as loafing/resting. The average spring migration is a flight of 600 miles.

Resident Canada geese undertake short or no migration during the fall and winter. The geese that do migrate typically move to another area within the same state as their breeding ground or to a neighboring state where the weather is more feasible. Resident Canada geese use a variety of habitats in winter, including agricultural fields, parks, golf courses and open lawns in urban/suburban areas. Resident Canada geese often remain in urban areas during winter because those areas are typically not hunted, contain good roosting sites that remain ice-free well into winter, and have readily available foods, such as lawn grasses, supplemental feeding by local citizens, or waste grain on nearby croplands (USFWS 2005, III-16).

The USFWS (2006) stated that resident Canada geese have adapted well to living in habitats found in suburban and urban development and fly relatively short distances to winter compared with other migratory Canada goose populations. This combination of factors contributes to consistently high annual production and survival (USFWS 2006). In addition, the virtual absence of predators and waterfowl hunting in urban areas also increases survival rates in those urban portions of the population. Given these characteristics, most resident Canada goose populations are continuing to increase in both rural and urban areas (USFWS 2006).

Home Range

The annual distribution of migrant Canada geese along the Atlantic Flyway includes Quebec, Newfoundland, St John's, New Brunswick, Nova Scotia, and the eastern United States from Maine to northern South Carolina. The breeding range of the migratory geese extends from Labrador and Newfoundland westward to the Ungava Peninsula of Quebec. Nesting concentration occurs around Ungava Bay and along the northeastern shore of the Hudson Bay. Migratory geese winter from southern Ontario eastward to Prince Edward Island and southward to North Carolina. Wintering concentrations occur mainly in the Chesapeake Bay region and extend northward to New Jersey and New York (USFWS 1997).

The annual distribution of resident Canada geese includes southern Quebec, New Brunswick, Nova Scotia, and the eastern United States from Maine to northern Florida. Resident Canada geese breed locally throughout the Atlantic Flyway, extending into southern Ontario and Quebec. The geese are largely non-migratory, shifting distributions only slightly in the winter, depending on the severity of the weather. During the fall and winter, the migratory and resident Canada geese have an overlapping distribution (USFWS 1997).

Population Density

Total number of Canada geese (migratory and resident populations) in North America has increased from 980,000 in 1960 to 3,734,500 in 2000 (mid-winter survey) (USFWS 2005). The resident Canada goose was thought to be extinct from the 1930s to 1960s, but is now considered overabundant in many regions. The resident Canada geese populations are growing more rapidly than migrant species. In the Atlantic Flyaway, the resident Canada geese population increases 6 to 14 percent annually (NPS 2004a).

The annual survival rate for resident Canada geese is greater than 90 percent (USFWS 2005). There are few predators that regularly take adult resident Canada geese and other forms of natural mortality are limited. The largest source of adult mortality is hunting; most residential geese are exposed to hunting 50 to 100 days per year. Resident Canada geese avoid hunting mortality through the extensive use of urban environments. Gosling survival is generally high; however, most gosling mortality occurs within the first two to three weeks by predators including gulls, crows, ravens, raptors, foxes, raccoons, opossum, and owls. Resident Canada geese living in urbanized areas are subjected to herbicides, pesticides, pollution, automobiles, illegal takes, pets, and transmission of disease from domestic waterfowl. Resident Canada geese can attain an age of 20 years (Harris 2002).

In 2004, the population of resident Canada geese at Anacostia Park was estimated to be 500 to 600 birds, along the tidal Anacostia River, most of which can be found in the park and other public areas (NPS 2004a). During the fall and winter, the population increases by approximately 30 percent due to the return of migratory geese. Weekly monitoring of the resident Canada goose population was performed at the Kingman and Kenilworth Marsh areas from 2001 to 2003; the count results are displayed in table 11. The weekly counts were preformed April through September for resident Canada geese and October through March for resident plus migratory geese. The weekly counts were based on fixed five-minute point counts and observations made while walking between points by personnel from the USGS Patuxent Wildlife Research Center (NPS 2004a). During 2004 and 2005, goose counts were conducted three times annually when only resident Canada geese were present. The population was estimated to be 600 birds during these years (Paul et al. 2004).

TABLE 11: RESIDENT CANADA GOOSE COUNTS IN KINGMAN AND KENILWORTH MARSH, 2001 TO 2003

Site and Count Period	2001	2002	2003	Annual Average
Kingman Marsh				
Resident Canada Geese, April – September	171	216	139	175
Resident Canada Geese plus Migratory Geese, October – March	230	288	261*	260
Kenilworth Marsh				
Resident Canada Geese, April – September	51	26	37	38
Resident Canada Geese plus Migratory Geese, October – March	82	31	92*	68

Source: NPS 2004a

* Based on weekly counts conducted for October and November 2003 only.

Within Anacostia Park, Canada geese generally congregate in areas that are adjacent to Anacostia Drive and in Langston Golf Course. These sites provide large mowed areas immediately adjacent to the water, with large sections of shoreline free of vegetation, the preferred habitat of Canada geese. Nesting resident Canada geese in Anacostia Park appear to nest most frequently in the Kenilworth Marsh, as well as in the Kingman Marsh and Anacostia mainstem. Currently, the NPS organizes goose counts in Anacostia Park through volunteers. Volunteers are dispersed to sites identified on a map between Bladensburg and Poplar Point, and count all the geese in the area for five minutes. The technique was developed in consultation with professionals at Patuxent Wildlife Refuge. Counts have been conducted four times per year since 2004 (a total of 17 counts thus far). The total geese are counted during each survey at the following locations: Bladensburg, Kenilworth Marsh, Kingman Marsh (including Langston Golf Course), Heritage Island Wetlands, and Anacostia Park. Each location is divided into zones to describe the counts in more detail. The mean goose count for July (resident Canada goose population) from 2004 to 2008 was 676 geese, based upon counts that ranged from 521 geese to 783 geese (NPS 2009a) as presented in table 12. Due to the migratory geese, the numbers in December roughly double. There may be an inverse correlation between geese in the Kenilworth and Kingman Marshes. When the population at Kenilworth is abundant, the count at Kingman Marsh/Langston Golf Course is lower; and when the population is abundant at Kingman Marsh/Langston Golf Course, the counts at Kenilworth Marsh are lower. This was particularly true during early July when the geese were molting feathers. The majority of the Anacostia Park population of geese has been located at the Kingman Marsh/Langston Golf Course sites where there is open water for waddling and the open golf course for browsing (NPS 2009a). This area provides habitat that is safer from predators during the bird’s flightless period. In June 2010, a mean of 371 geese were counted at the Kingman Marsh/Langston Golf Course site (Bates 2010a).

TABLE 12: RESIDENT CANADA GOOSE COUNTS FROM 2004 TO 2011

Date	Bladensburg	Kenilworth	Kingman	Heritage Island	Anacostia Park, East	Day Total (Relative Abundance)
4/10/2004	86	175	184	100	42	587
7/17/2004	30	133	349	93	89	694
9/11/20004	56	32	2	83	189	362
12/9/2004	No Count Occurred					
4/13/2005	14	123	266	69	71	543
7/13/2005	83	52	337	118	1107	700
8/31/2005	8	304	31	226	176	745
12/2/2005	207	627	28	34	325	1,221
4/13/2006	55	138	187	77	77	534
7/6/2006	22	0	380	13	106	521
9/7/2006	52	178	59	89	118	496
12/7/2006	268	327	51	19	371	1,036
4/6/2007	24	110	195	51	43	423
7/10/2007	0	4	640	0	139	783
9/11/2007	57	101	6	155	68	387
12/4/2007	113	144	529	0	216	1,002
4/3/2008	28	99	201	30	43	401
7/10/2008	15	0	565	14	117	711
9/16/2008	143	107	45	62	101	458
12/9/2008	320	484	494	133	514	1945
4/7/2009	16	46	162	21	47	292
Flightless Period Counts, 2009 to 2011						
July 2009*	No Count	8	382	10	93	492
July 2009 CV	---	*0.56*	*0.42*	*1.28*	*0.15*	*0.6*
June 2010**	No Count	79	362	14	110	564
June 2010 CV	---	*0.04*	*0.19*	*0.26*	*0.2*	*0.17*
June 2011***	No Count	60	445	86	83	---
June 2011 CV	---	*0.30*	*0.17*	*0.39*	*0.46*	---
Total	**1,597**	**3,331**	**5,900**	**1,497**	**4,245**	**14,898**

Source: McKindley-Ward 2008; Bates 2010a; Milton 2012
*Average counts from nine days in July 2009 (July 6-10, 13, 17, 21-22)
**Average counts from five days in June 2010 (June 2-4, 7-8)
***Average counts from six days in June of 2011 (June 1-3, 6-8)
CV = coefficient of variation
Note: the Bladensburg counts are not located within Anacostia Park, but are presented in the table for comparison purposes and the numbers for individual areas are not as relevant as the total count for the entire Park.

The methodology for conducting goose counts has been changing since 2009 and will continue to change in the future in an attempt to reduce the coefficient of variation for the population and to concentrate on the flightless period when the majority of the Canada geese are resident geese. In July 2009, the goose counts were conducted for nine days spanning three weeks during the flightless period. The 2009 mean goose within these nine days at four sectors (Kenilworth, Kingman, Heritage Island, and Anacostia East locations) was 492 geese, with a range of 175 to 667 total geese per day for all sectors (NPS 2009a). In June 2010, the goose counts were conducted for five days spanning two weeks during the flightless period. The mean for 2010 within these five days at four sectors (Kenilworth, Kingman, Heritage Island, and Anacostia East locations) was 564 geese, with a range of 94 to 619 total geese per day for all sectors (Bates 2010a). The goose counts in 2011 were conducted during six days. The counts at Kingman for 2011 were the highest (at 445 total geese) since the count began in 2009. From 2004 through 2011, Kingman represents the location with the highest number of geese. For this plan/EIS, the 2010 mean of 564 resident Canada geese within Anacostia Park is the current number used for all sections that follow. Figures 30 through 32 present the approximate goose count locations, areas, and zones for counts at Kenilworth Marsh, Kingman Marsh, Heritage Island Wetlands, and Anacostia Park East.

Resident Canada Goose Management

Since 2004, the park and partners have oiled resident Canada goose eggs during the April nesting season along the tidal Anacostia River corridor from Bladensburg to Poplar Point. Nests are located, marked, and the eggs are coated with corn oil, which prevents gas exchange through the shell and prevents hatching (AWS 2006). Egg oiling has reduced the population of the number of resident Canada geese at Anacostia; however in the near future, this will not bring noticeable reductions in the population (AWS 2006).

At Langston Golf Course, a product was applied to the grass to deter the resident Canada geese but was expensive and ineffective in deterring geese. In addition, at one time, the golf course used a chase dog to drive the geese off the greens. This management practice was only used once.

Resident Canada Geese and the Role of Climate Change

As stated previously, freshwater tidal marshes are extremely productive and important for a wide range of bird species (Strange et al. 2008). Vegetation type, soil type, sediment inputs, and current ecological health can all affect the response to sea level rise. As a result of sea level rise, wildlife species such as Canada geese that depend on these habitats for activities such as foraging or nesting would vary in their responses to habitat changes, depending on species-specific responses to changes in inundation, salinity, vegetation structure and composition, and other habitat characteristics (Strange et al. 2008). Specifically, rising sea level can cause freshwater tidal marshes to erode at the waterward boundary, drown in place, and convert to open water (Strange et al. 2008). For example, an elevation that may support high marsh plants under current conditions may become dominated by low marsh species in 50 years as a result of rising water levels. Similarly, other areas such as lower Kingman Lake may no longer support emergent wetland vegetation because these areas could be inundated as a result of sea level rise. Tidal flats would be inundated as a result of sea level rise, and although changes in extent might be localized at first, scientists anticipate an overall reduction in forage habitat for shorebirds (Strange et al. 2008), which would most likely also reduce nesting areas for resident Canada geese. In areas where habitat is lost or degraded, the species that are dependent on marshes (birds, fish, invertebrates, and mammals) may show decreased growth, reproduction, or survival (Strange et al. 2008). In general, birds have exhibited a variety of responses to warming trends, including earlier breeding dates and range expansions (Marra et al. 2005 as cited in NPS 2009d). The science team for this project considered climate change and predicted that the Anacostia River could rise approximately 2 inches during the 15-year life of this plan. Tidal elevations, even changes as small as inches, are extremely important parameters to consider in wetland restoration and management as well as long-term planning for this project, including the management of resident Canada geese.

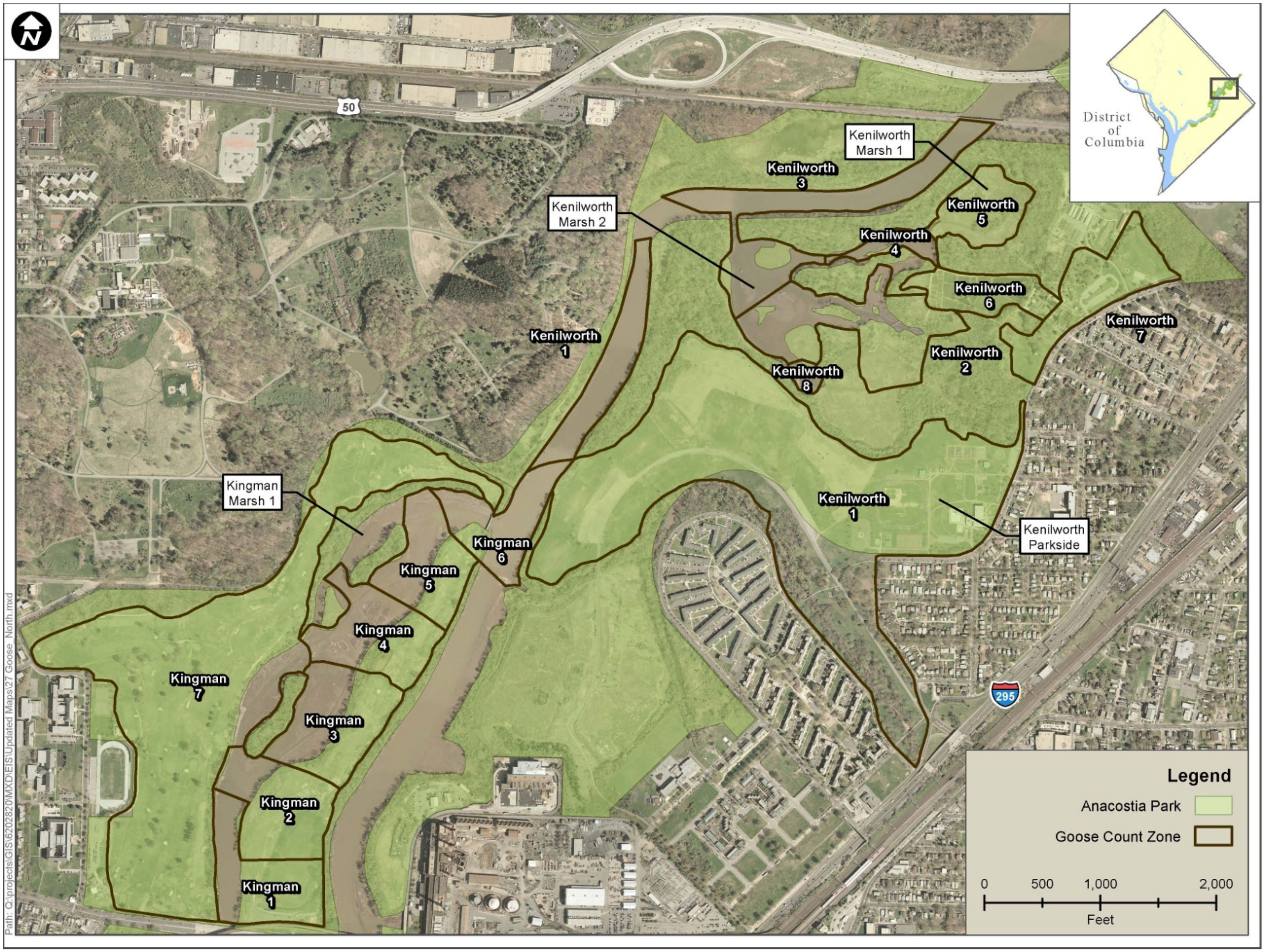


FIGURE 30: 2009 RESIDENT CANADA GOOSE COUNT LOCATIONS IN ANACOSTIA PARK, NORTH AREA

FIGURE 31: 2009 RESIDENT CANADA GOOSE COUNT LOCATIONS IN ANACOSTIA PARK, CENTRAL AREA

FIGURE 32: 2009 RESIDENT CANADA GOOSE COUNT LOCATIONS IN ANACOSTIA PARK, SOUTH AREA

CULTURAL RESOURCES

The consideration of cultural resources by NPS meets pertinent requirements of the NHPA and related legislation and implementing regulations.

Director's Order #28: *Cultural Resource Management* states that the NPS will protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with the policies and principles contained in the NPS *Management Policies 2006*. Section 106 of the NHPA, as amended, and as implemented in 36 CFR 800, requires federal agencies to consider the effects of federally funded, regulated, or licensed undertakings on cultural resources listed on or eligible for inclusion in the NRHP; moreover, the federal agency must afford the Advisory Council on Historic Preservation the opportunity to comment in the event that an undertaking would have an adverse effect on a cultural resource that is eligible for or listed in the NRHP. For the purposes of this plan/EIS, cultural resources impact topics include either recorded or potential historic archeological sites, prehistoric sites, and standing architectural structures, and historic districts. Cultural landscapes, ethnographic resources and museum collections were dismissed as impact topics. The consideration of cultural resources by NPS meets pertinent requirements of the NHPA and related legislation and implementing regulations.

For this study, efforts to identify cultural resources included a review of information provided by the park, supplemented by interviews with park staff, Washington, D.C. Historic Preservation Office, cultural resource survey data, and other published and unpublished sources. For historic structures and cultural landscapes, the principal sources reviewed were District Inventory of Historic Sites, NRHP nomination forms, and the NPS' List of Classified Structures (LCS) database. The LCS contains "information about historic and prehistoric structures in which the NPS has or plans to acquire any legal interest. Properties included in the LCS are either in or eligible for the National Register or are to be treated as cultural resources by law, policy, or decision reached through the planning process even though they do not meet all National Register requirements."

The study area considered for this plan/EIS includes the land within the current NPS jurisdiction of Anacostia Park.

HISTORICAL BACKGROUND

When Captain John Smith explored the Potomac River in 1608, he discovered a thriving American Indian village at the junction of the Potomac River and the Anacostia River. The Nanchotank (or Nacotchtank) Indians built villages along the shorelines, and it is from the word "anaquash," meaning a village trading center, that the river derives its name. European settlers did not fully begin to claim the land along the Anacostia River until the 1660s. The fertile soil was suitable for tobacco farming and settlers cleared the once forested land and developed farms.

When the site for the capital city of Washington, D.C., was chosen in 1790, the lands along the Anacostia River consisted mostly of plantations used for the cultivation of tobacco and grain. Small and large residences dotted the landscape on land patents dating from the seventeenth century (Engineering Science, Inc. 1989). In 1792, the Anacostia River, then known as the Eastern Branch (of the Potomac), was already developing as an important part of Pierre L'Enfant's plan for the new federal city. Tobias Lear, the personal secretary of George Washington, wrote in his 1793 report *Observations on the River Potomak and the Country Adjacent and the City of Washington* that:

> The eastern branch affords one of the finest harbors imaginable… The channel is generally so near the city, that a wharf extended 40 or 50 feet from the bank, with have water enough for the largest ships to come up, discharge and receive their cargoes. The

> land on each side of the branch is sufficiently high to secure shipping from any wind that blows… while vessels in the main river, if they should be caught there by ice, are liable to receive great injury, and are sometimes totally lost by it, those in branch lay in perfect security (Lear 1793).

Property owners and businessmen soon constructed wharves along the waterfront, and in 1799, the Navy Yard was built on the western shore of the Anacostia and further promoted waterfront development. Land clearing, farming, and construction activities led to the siltation of the Anacostia River early on and often inhibited transportation. Regular dredging occurred after 1875, and consequently, tidal flats along the river became exposed along with raw sewage in the mud and grasses. By the end of the nineteenth century, the flats had become a nuisance and were a health concern due to mosquitoes and pollution (Engineering Science, Inc. 1989).

As early as 1898, Congress authorized the dredging of the Anacostia River and directed that the reclaimed material placed on the flats "with the objectives of land reclamation, sanitation, and promotion of navigation and commerce" (Gutheim 1977). However, it was the McMillan Commission in 1901, led by Senator James McMillan, which set the stage for the development of Anacostia Park to provide gardens and recreational space for public use. Inspired by the *City Beautiful Movement* and L'Enfant's original Baroque Plan, the commission created a plan to guide the future development of the District towards the *City Beautiful Movement* aesthetics. In March 1901, McMillan Plan successfully passed a Senate resolution that developed plans for improvements to the District's park system. The 1902 plans discussed the development of the Anacostia Flats as a park, referred to as the "Anacostia Water Park."

The USACE began work on dredging the river and filling the flats in 1902 and the project continued until 1925. In order to sufficiently support the dredged material, a seawall was built along the shoreline (Gutheim 1977). After it was determined that the reclaimed area would be used for public purposes, Congress passed the Anacostia River Flats Act in 1914, providing for the acquisition, reclamation, and development of lands on both sides of the Anacostia River for highway and park purposes. The Commission of Fine Arts' annual report of 1914 identified the park an "important element in restoring the 'balance in development that had tended toward the northwest." The park was formally declared Anacostia Park in 1919 (Gutheim 1977).

In the summer of 1932, the park was used as a camp by World War I veterans. In the midst of the Great Depression, approximately 17,000 jobless World War I veterans gathered in the District to seek early payment of their promised war bonus. The majority of the veterans, who called themselves the *Bonus Expeditionary Forces*, set up camp in Anacostia Park, at that time still commonly called the Anacostia Flats. The marchers vowed to stay in the District until the Bill passed and were encouraged when it passed in the House of Representatives on June 15. As the number of veterans swelled to around 20,000, the Bill was ultimately defeated in the Senate. President Hoover eventually ordered the evacuation of all of the camps. On July 28, Army troops, led by General Douglas MacArthur, forced the veterans out of the camps on the western side of the river and destroyed their makeshift shelters. By the end of the day, over 100 people were injured. Hoover then sent orders to MacArthur stating MacArthur should not pursue the *Bonus Marchers* across the bridge at their main camp on the Anacostia Flats. Ignoring Hoover's orders, MacArthur crossed the bridge to the main camp in Anacostia Park, known as Camp Mark (PBS 2008). Fire erupted in the camp as the veterans retreated. Although the origin of the fire is unknown, the *Washington Post* reported, "early today the flames were burning a memorial across the sky in what may be the epitaph of the bonus army" (*Washington Post* 1932).

In 1933, the park was transferred to NPS, and additional improvements were made with the construction of golf courses, swimming areas, and playing fields. NPS facilities at that time were segregated, and Anacostia Park was no exception. While the Langston Golf Course was built in 1938 for African-

Americans, the Anacostia Field House, along with its swimming pool, was built in 1936 only for whites. The park expanded in 1938 when NPS acquired the Kenilworth Aquatic Gardens. Today the park continues as a unique multi-use park that emerged from the reclaimed riverbanks of the Anacostia.

HISTORIC STRUCTURES, DISTRICTS, AND OBJECTS

Listed and Eligible Resources

Two historic structures within the project area have been listed on the NRHP and include Kenilworth Aquatic Gardens and Langston Golf Course Historic District. In addition to these resources, two other resources have been determined as eligible for the NRHP and include the Anacostia Shoreline Pump Station and Anacostia Park itself. A brief description of these four resources is included in the paragraphs that follow.

Kenilworth Aquatic Gardens—The Kenilworth Aquatic Gardens (figure 33) began in 1882 as the hobby of W.B. Shaw, a retired Civil War veteran from Maine. Shaw purchased 37 acres of land along the eastern shore of the Anacostia River and began to grow water lilies on the marshy sections of the land. As the lilies thrived, Shaw created more ponds and began to hybridize the plants. In 1912, Shaw and his daughter Helen began to sell their lilies commercially and shipped thousands of the flowers to New York, Boston, and Chicago, as the gardens produced lilies that were not available anywhere else in the U.S. NPS acquired the gardens from Helen Shaw in 1938. Directly southwest of the gardens are the administration building built in 1912 and two original greenhouses built in 1913 that were used in the Shaw's commercial aquatic plant operations. The Kenilworth Aquatic Gardens make up the only site in the NPS whose primarily purpose is to raise and propagate aquatic plants (Dillon 1973, Section 8, 1).

FIGURE 33: KENILWORTH AQUATIC GARDENS

Kenilworth Aquatic Gardens was listed on the NRHP in 1978 and on the District's Inventory of Historic Sites in 1968. The property is historically significant as a designed landscape associated with the botanical study and development of water plants (Dillon 1973, Section 7, 1). Its contributing elements include the lily ponds, the ancient lotus pond, and the remaining original structures, which include the administration building (Aquatic Garden Visitor Center/Office), and the north and south greenhouses. Recreational structures built after the acquisition of the gardens by NPS, including the picnic areas, restrooms, and new greenhouses, are not considered historically significant (Dillon 1973, Section 7, 1-3). Currently, the Kenilworth Aquatic Gardens is the only area of Anacostia Park that has structures included in the park's LCS. There are five structures within the gardens that are listed on the LCS database and include the exterior tanks, greenhouse 1, greenhouse 2, administration building, and ponds and dikes.

Langston Golf Course Historic District—The Langston Golf Course (known today as Langston Legacy Golf Course) opened in 1939 after a long campaign by African-American golfers to gain access to local golfing facilities. The facility, named after John Mercer Langston, the first African-American elected to office in 1855, was originally built under the Works Project Administration (WPA) program as a segregated golf facility for African-American golfers. In 1938, the *Washington Post* reported:

> Transformation of a mosquito-infested 36-acre tract of waste land in Anacostia Park adjoining Benning Road and Kingman Marsh into a golf course and recreation center for colored citizens is nearing completion by WPA workers… (*Washington Post* 1938).

Although originally planned as an 18-hole course, limited funding only allowed for an initial nine holes to be built. The course was finally expanded in 1955, when it was enlarged to 18 holes. Langston Legacy Golf Course has been the home course of the nation's first golf club for African-American men (Royal Golf Club) and women (Wake Robin Golf Club). Langston is also home of the international Pro-Am tournament, the Capitol City Open, an event that has attracted many African-American professional golfers. Today the course retains most of its original layout, both the original nine holes and the nine holes that were added in 1955; however, minor changes have been made to accommodate playing conditions. The landscape character of the golf course along the river contributes to the qualities that make the site eligible for its listing on the NHRP (Cole 1989, Section 8; Langston Junior Boys and Girls Golf Club 2009).

Langston Golf Course Historic District is historically important because of its "symbolic association with the development and desegregation of public golfing and recreational facilities in the greater District area and with the growth of golf as a popular recreational and professional sport for African-Americans" (Cole 1989, Section 8). It is also significant as the home course of the Royal Golf Club and the Wake Robin Wake Club's home course. Both clubs were the first African-American golf clubs for men and women established in the U.S. and played an important role in the development of Langston Golf Course and the desegregation of the District's golf clubs. Additionally, the Langston Golf Course Historic District is also significant for its association with Harold L. Ickes, Secretary of the Interior (1933-1941), and his efforts to open all NPS facilities to African-American citizens (Cole 1989, Section 8).

The golf course's entire landscape within the parkland setting is a contributing feature of the historic district. As a whole, the district consists of 145 acres on a man-made landscape of grassy, undulating terrain. The district's boundary includes the Anacostia River on the east and Benning Road on the south. The complex western boundary consists of 26th Street, Spingarn High School, I Street, and 22nd Street. The northern boundary includes Maryland Avenue, M Street, and the southern boundary of the National Arboretum. Non-contributing features include the 1955 clubhouse, a 1977 maintenance shed, a 1985 driving range hut, the 1954 and 1977 bridges over Kingman Marsh, and the remnant of the miniature golf course built in the 1950s (Cole 1989, Section 7). No structures within the Langston Golf Course are listed on the LCS.

Anacostia Park—NPS considers Anacostia Park to be eligible for the NRHP as an historic district because of its association with historic events including the 1932 *Bonus Army* marches and the desegregation movement; its design and architecture as a part of the McMillan Plan, for the reclamation and construction of the seawall by the USACE; and for the construction of park facilities by WPA workers; and as its potential for yielding both prehistoric and historic archeological sites. The District State Historic Preservation Office (SHPO) has not formally concurred with this determination, but for the purpose of this plan/EIS, Anacostia Park is considered NRHP-eligible as a result of documentation and comments made by NPS and SHPO with regard to of the South Capitol Street EIS (Parsons Brinckerhoff 2008, Chapter 3). No formal historic district boundaries for the resource have been established; however, preliminary boundaries coincide with the current park boundaries.

Anacostia Shoreline Pump Station—The Anacostia Shoreline Pump Station was determined eligible for the NRHP in 2006 along with the Main Pump Station and the Poplar Point Pump Station (Parsons Brinckerhoff 2008, Chapter 3). The Anacostia Shoreline Pump Station is a small, one-story masonry structure with a hipped roof that sits on the eastern shore of the Anacostia River at poplar point (figure 34). The pump station was probably built in 1905 in conjunction with along with the Main Pump Station (O Street Station) on the west side of the river.

FIGURE 34: ANACOSTIA SHORELINE PUMP STATION

Additional Resources

Six additional structures, sites, and objects located within the Anacostia Park may be eligible for the NRHP, but have not been formally evaluated by the park. These six resources include:

- Anacostia Field House
- Anacostia River Seawall
- Seafarer's Boat Club
- Water Street Quonset Huts
- Bonus Marchers Campsite
- Stones of the Old United States Capitol Building.

If any of these could be impacted by any of the alternatives considered for proposed project, these resources should be evaluated for NRHP eligibility, so that impacts can be appropriately assessed. A description of these six resources is included in the paragraphs below.

Anacostia Field House—The Anacostia Field House is a Colonial Revival-style brick structure that was built in 1932 as a recreation center for white patrons. The outdoor pool, which is a part of building, was the scene of racial tensions in the summer of 1949 when attempts to desegregate the pool led to conflicts between white and African-American patrons. These incidents are emblematic of desegregation efforts and the Civil Rights Movement in the U.S. and within the National Park system.

Anacostia River Seawall—The seawall, which lines both sides of the Anacostia, is a result of a 50-year program implemented by the USACE in 1891 due to health and flooding issues associated with the condition of the river. As funding was made available through Congressional appropriations, the USACE dredged the river and filled the marshland that was known as the Anacostia Flats. In order to properly support the fill, a seawall of Potomac River stone was raised to an average high of four feet above mean low water. The riprap base of the wall was mostly built of salvaged stone from demolished structures including the Old Navy Yard Bridge. By the 1920s, the majority of the structure was completed along both sides of the river and around the man-made lake on the west side of the park known as Kingman Marsh (Overbeck 1985). The wall is considered historically important as an expression of the reclamation project that created Anacostia Park.

Seafarers Boat Club—The Seafarers Boat Club, currently known as the Seafarers Yacht Club, was established in 1945 by Lewis T. Green and is the oldest African-American yacht club on the East Coast. Green, a wood carver and a District public school vocational arts teacher, built boats as a hobby and petitioned the Department of the Interior for permission to access a site on the west side of the Anacostia River for a boat launch. Green organized a boat club, but his access request was rebuffed by the government. With the help of Mary McLeod Bethune and Eleanor Roosevelt, Green was finally able to gain permission from the Department of the Interior to rent the land in return for clearing the property. The club members improved the shoreline and constructed docks and a clubhouse on the site. The Seafarers Boat Club is significant as the first African-American boat club on the east coast and for its association with the desegregation of National Parks.

Water Street Quonset Huts—Two Quonset huts dating from the 1940s are located on Water Street at the base of the northbound 11th Street Bridge. These two prefabricated steel structures, which were illustrative of World War II prefabricated structures of the United States military, have been fitted with masonry facades.

Bonus Marchers Campsite—In the summer of 1932, Anacostia Park, then known as the Anacostia Flats, served as the main camp for the *Bonus Army*. Veterans and their families lived in the organized camp, which was called *Camp Mark*, in shanties and was often referred to as a large *Hooverville*. The camp was burned down while General MacArthur, against President Hoover's orders, pushed across the Anacostia River to clear out the camp. The camp and the fire were documented in a number of photographs and the images became synonymous with the *Bonus Army* and their efforts. While no physical remains of the camp are visible, the site is significant due to its historical association with the camp and the events that followed, known as the only time in American history when U.S. troops committed violence against their own veterans.

Stones of the Old United States Capitol Building—Granite slabs and sculptured stone from the exterior of the old U.S. Capitol building are located on the park grounds between Howard Road and the NPS headquarters building.

ARCHEOLOGICAL RESOURCES

Efforts to identify archeological resources included a review of studies and databases maintained by the NPS and the District SHPO.

For this study, efforts to identify archeological resources included a review of studies and databases maintained by the NPS and the District SHPO. There is no modern archeological overview for Anacostia Park, but a wealth of information is available in reports and investigations that have been conducted over more than a century of archeological study. Archeological sites were identified in what are now park lands as early as the 1880s, but urbanization and land-filling has made it difficult to investigate these sites in modern times.

As early as the late 1800s, investigations along the lower Anacostia River yielded an abundance of aboriginal (defined as being the first or earliest known of its kind present in a region) material culture. Local landowners amassed substantial collections of aboriginal artifacts, which sparked an interest in local prehistory. This growing interest resulted in the formation of the Anthropological Society of Washington in 1870. Members of this group, and other amateur archeologists, began to investigate the Anacostia area more intensively for evidence of its earliest inhabitants.

Many of the artifacts gathered by these early collectors are now housed in the National Museum of Natural History, but since most collectors kept no records, there is no data to place these objects in context. Approximately 45 sites have been identified and given site numbers along the Anacostia River, including 26 sites that are located within Anacostia Park. For many of these sites, only limited information is available, and the precise location and condition of many of the sites is unknown. A complete list of these sites, along with as much information about the site type and date is included in table 13.

S.V. Proudfit, an active member in the Anthropological Society of Washington who was among the more diligent 19th-century collectors, identified many of the sites within Anacostia Park. He was also one of the first explorers of the region to speculate about the location of the village of the Nacotchtank (Anacostan) Indians. Nacotchtank was a large trading center, ideally situated for its purpose along two natural trade routes - east-west across the mountains and north-south along the fall line. Based on Captain John Smith’s 1608 map and description of the village, Proudfit postulated that several sites he identified on the east bank of the Anacostia River might be the remains of the village (Proudfit 1889). William Henry Holmes of the United States National Museum (now the National Museum of Natural History) in the late 19th and early 20th centuries was another pioneer in the study of local prehistory. Like Proudfit, Holmes speculated on the location of the village of Nacotchtank, but concluded that it could be located anywhere along the east bank of the Anacostia River, from Giesboro Point to the vicinity of the present day Benning Bridge (Holmes 1889).

Several studies during the 1930s and 1950s focused on locating Anacostin Fort, a structure documented in early land records that may have been a later location of the village of Nacotchtank. After studying archival evidence, William Marye determined that the Fort was located on the east side of the Anacostia River, upstream from the John Philip Sousa Bridge, but did not conduct any investigations to verify its location (Bromberg et al. 1989). Louis D. Scisco concluded that the Fort was located on Poplar Point, based upon the quantity of tools and pottery recovered there (Bromberg et al. 1989). In 1957, Howard MacCord also favored Poplar Point as the Fort’s most likely location (Bromberg et al. 1989). MacCord also completed a study of a site along Beaverdam Creek (51NE1, also known as the Kenilworth Site). Site 51NE1 was located within Anacostia Park, but it was destroyed by the construction of the interchange of I-295 and New York Avenue (Flanagan et al. 1989).

TABLE 13: ARCHEOLOGICAL RESOURCES IN ANACOSTIA PARK

Site Number and Name	Description of Site
51NE5, GWU3	Unknown
51NE13	Unknown
51NE15	Prehistoric Woodland Period Camp/ Multi-Component
51NE10	Multi-component
51SE3	Contact Period and unknown Prehistoric Camp
51SE5	Contact Period and unknown Prehistoric Camp
51SE6	Prehistoric Contact Period/ Multi-Component
51SE7	Contact Period and unknown Prehistoric Camp
51SE8	Contact Period and unknown Prehistoric Camp
51SE9	Contact Period and unknown Prehistoric Camp
51SE10	Contact Period and unknown Prehistoric Camp
51SE11	Contact Period and unknown Prehistoric Camp
51SE12	Contact Period and unknown Prehistoric Camp
51SE13	Prehistoric Unknown
51SE15	Unknown
51SE16	Prehistoric Quarry
51SE20	Not listed/unknown
51SE22	Not listed/unknown
51SE26	Late Archaic camp, Multi-Component
51SE29, Correctional Treatment Facility	Prehistoric Unknown
51SE30	Prehistoric Unknown (lithic scatter)
51SE31	Prehistoric Woodland base camp
51SE32	Prehistoric Woodland period camp
51SE33	Prehistoric Unknown (lithic scatter)
51SE35	Prehistoric Unknown (lithic scatter)

In the late 1970s and early 1980s, the construction of the Washington Metropolitan Area Transit Authority's (METRO) Green Line necessitated several archival and archeological investigations. These studies pointed up the difficulty of archeological investigations in urbanized waterfront areas where massive filling had taken place. Archeological investigations at the site of the Anacostia METRO Station identified widespread prehistoric deposits possibly associated with the village of Nacotchtank, as well as remains of the Freedmen's Bureau settlement established after the Civil War (Louis Berger & Associates, Inc. 1986).

Engineering-Science, Inc. completed an archeological investigation in 1989 for the Barney Circle Freeway Project that also included portions of Anacostia Park (Flanagan et al. 1989). This study involved subsurface testing only in areas to be directly affected by highway construction and not in areas associated with landscaping or construction of facilities at Anacostia Park. Archeological testing revealed well-preserved remains at two sites (51SE25 and 51SE26) along the east bank of the Anacostia River, one of which (51NE26) is inside the park boundary (Flanagan et al. 1989). Both sites were recommended as eligible for listing in the NRHP and a general recommendation was developed for future testing in archeologically sensitive areas of the park. One area that was singled out in the 1989 Barney Circle Freeway report is directly east of the eastern terminus of the John Philip Sousa Bridge (the Pennsylvania Avenue Bridge) where the site of the former Anacostin Fort may have been located (Flanagan et al. 1989).

Later in 1989, in response to the proposed planting and grading activities at Anacostia Park, Engineering-Science, Inc. completed an archeological overview to identify archeologically sensitive areas within the park (Bromberg et al. 1989). The study area included park land on both sides of the Anacostia River from the 11th Street Bridge, upstream to the Benning Bridge. This study identified a number of areas within the park that have a high potential for archeological resources. The report noted that the portion of the park northwest of I-295 (the Anacostia Freeway) between the 11th Street Bridge and the John Philip Sousa Bridge along the east side of the river, has a very high potential to yield prehistoric archeological resources in primary contexts (Bromberg et al. 1989). This conclusion was based on previous investigations and the presence of three former tributary streams that once emptied into the Anacostia River in this area. The report noted that one area in particular, located east of the tennis courts and corresponding to Site 51SE7 or 51SE8, is “known for the richness of its archeological resources since the late 19th century and has been related to the historically documented aboriginal occupation of Nacotchtank” (Bromberg et al. 1989). The 1989 overview also identified a number of areas that were considered sensitive for historic archeological sites. Specific sites included the remains of various piers, wharves, ferries, and residential structures that were historically located along the riverfront (Bromberg et al. 1989).

PARK OPERATIONS AND MANAGEMENT

This topic includes the current management and operations at the park as well as the long-term management of resources and lands at the park; park management and operations refers to the availability of park resources to adequately protect and preserve vital park resources and provide for an effective visitor experience. The National Capital Parks - East includes 13 park sites, parkways, and statutory covering more than 8,000 acres of historic, cultural, and recreational parklands from Capitol Hill to the nearby Maryland suburbs. Anacostia Park and the Kenilworth Park and Aquatic Gardens are both under the management oversight of National Capital Parks - East. The two sites have a single site manager and a combined full time staff of approximately 20 individuals. This includes 9 interpretive rangers, 10 maintenance staff, and 1 administrative technician. These sites also have various seasonal staff, interns, and volunteers that serve critical needs.

Park management and operations refers to the availability of park resources to adequately protect and preserve vital park resources and provide for an effective visitor experience.

The park rangers at Anacostia have many different duties. The rangers develop and conduct interpretation programs for the public at the aquatic gardens and other areas throughout the park. They provide environmental education to students at local schools either at the park or offsite. Rangers work at the park’s roller rink, Aquatic Education Center, and aquatic gardens Visitor Center and bookshop. They work to coordinate visitor services, such as managing special use permits, special events in the park, and ball field league games. In addition, the park rangers coordinate with NPS volunteers. Some of the task park volunteers assist park rangers and staff with includes conducting trash and river cleanups throughout the park, wetland vegetation plantings, maintaining goose enclosures, planting trees, and conducting goose counts. Seasonal programs, such as the Student Conservation Association, also involve the park rangers and the public.

As part of the National Capital Parks - East, Anacostia Park and Kenilworth Park and Aquatic Gardens also have the support of other National Capital Parks - East staff including additional Grounds Maintenance, Facilities Maintenance, Natural Historic Resource staff, and others, as needed. The Langston Golf Course and the marinas within the park property are operated by outside concessionaires. The NPS does not supply these areas with park service employees.

RESOURCE MANAGEMENT

National Capital Parks - East currently has six permanent, full-time employees with duties in resource management. The resource management team is located in the park headquarters building and includes a chief resource manager, museum curator, historian, two park rangers, and biologist. The resource management team works at all parks within the National Capital Parks - East system, including Anacostia Park. At Anacostia, the resource management staff devotes much of their time to wetland and resident Canada goose management throughout the park. The staff has been monitoring the wetlands within the park for the past five years. The staff monitors plant growth, plant diversity, and the wildlife that utilize the wetland areas. Additionally, staff identifies areas with high counts of invasive plant species which are in need of treatment. The resource management staff works with the District Fish and Wildlife and the AWS to perform egg oiling during the resident Canada goose breeding season. They also conduct the quarterly goose counts within the Anacostia watershed (Syphax 2008).

MAINTENANCE

The Kenilworth Aquatic Gardens has four permanent maintenance staff. The primary tasks for maintenance staff at the gardens include the preservation of the lily ponds and the propagation of the lilies. There are five additional permanent maintenance staff that work within the remaining grounds of Anacostia Park. This staff is responsible for the daily upkeep of park grounds. Maintenance tasks include maintaining the grounds by mowing and trimming, trash removal, coordinating with the trash removal on the river (water skimmer), and sanitation (cleaning restrooms and picnic areas) (Syphax 2008). Other NPS maintenance staff is brought to the park on an as needed basis. This staff is used for plumbing, mechanical, electrical, construction, and painting jobs.

RESOURCE EDUCATION AND VISITOR PROTECTION

Resource Education

One of the chief functions of the NPS is to provide educational experiences to the visitors of the parks (NPS 2006a). The purpose of NPS interpretive and educational programs is to provide memorable educational and recreational experiences that help the public understand the meaning and relevance of park resources, and foster development of a sense of stewardship.

Anacostia Park offers a variety of educational and interpretive programs to park guests. The Kenilworth Aquatic Gardens are used for environmental education, nature study, and scientific research. Many school children and organizations from throughout the District metropolitan area gather at the gardens to learn about horticultural history, the propagation and varieties of aquatic plants, the diverse wildlife that inhabit the gardens, and the environment. Interpretive programs based on natural, horticultural, and historical aspects of the gardens, marsh, and surrounding woodlands are conducted by park rangers and by experts from various organizations.

The Urban Tree House, located in Anacostia Park, is a community-based environmental education program designed to enhance urban communities understanding of natural resources and environmental concepts. The curriculum is influenced by the surrounding aquatic environment, and emphasizes the watershed, the interdependence of land and water, and the impact of the city on the environment. The Urban Tree House education program is available for students in kindergarten through grade 12. Topics discussed in the program include ecology, freshwater and saltwater ecosystems, wetlands, forests, biodiversity, sustainability, solid waste, land use, transportation, air and water pollution, and environmental ethics.

The Aquatic Resource and Education Center in Anacostia Park offers a variety of live exhibits of fish and other aquatic species from the Anacostia River. The Center evolved from a partnership between the NPS, USFWS, and the Government of the District; and is operated by the District Fisheries and Wildlife Division. In 2005, a $1.2 million expansion was completed to include classrooms and offices, display areas, local fish exhibits, a fisheries laboratory, and an aquaculture facility. Several education programs are offered at the Center. Visitors and students can learn about the Anacostia River through aquatic resource presentations and tours of the facility given by fisheries biologists. Students are encouraged to engage in hands-on activities ranging from fish identification to water quality testing. The Center’s fish hatchery is operated to re-populate fish such as American shad, blueback herring, and hickory shad back to their historical spawning grounds.

Bridging the Watershed is an outreach program of the Alice Ferguson Foundation in partnership with NPS and area schools. The mission of the program is to provide meaningful educational experiences that connect students to their place in the natural and cultural world (BTW 2004).

High school students from around the District area visit national parks (including Anacostia Park) with their science classes to conduct field studies. Students are given the opportunity to take field measurements and observations just as a scientist would do. Bridging the Watershed offers teachers the opportunity to attend summer institutes which prepare teachers to incorporate the curriculum modules into science courses. A total of five modules are available for students and teachers, including *Assessing Exotic Invasive Species*, *Runoff and Sediment in the River*, *Trash: Make a Litter Difference*, *Assessing Benthic Macroinvertebrates*, and *Assessing Water Quality*. Park rangers work with the high school students to provide them with educational experiences and park interpretations. Rangers participate in special ranger workshops and the annual summer teacher/ranger institute.

Visitor Protection

The U.S. Park Police facility acts as a full service police department in Anacostia Park. There are a total of 22 officers that patrol the Anacostia area. The park police patrol areas throughout the park to help provide safe visits to all park visitors. Some of the major issues that park police take in hand include trash dumping, drug use, illegal fishing, crime, and disorderly conduct.

COOPERATION AND COORDINATION

The District and the USACE are cooperating agencies for this plan/EIS. The USACE has expressed that they would contribute funding in the future for wetlands restoration and maintenance in Anacostia Park.

On March 22, 2000, the following agencies entered into a MOU for the Anacostia Waterfront Initiative:

- General Services Administration
- The Government and District of Columbia
- Office of Management and Budget
- Naval District Washington

- Military District Washington
- Commandant 11th Wing
- Commanding Officer Marine Barracks Washington
- Department of Labor
- Department of Transportation
- National Park Service
- USACE
- USEPA
- Department of Housing and Urban Development
- District of Columbia Housing Authority
- Washington Metropolitan Area Transit Authority
- Smithsonian Institution
- National Capital Planning Commission
- District of Columbia Sports and Entertainment Commission
- National Arboretum of the USDA
- U.S. Small Business Administration.

These parties have joined together to create a new partnership that will help to attain a vision for the waterfront areas. This initiative will contribute to the revitalization of the surrounding neighborhoods, provide enhanced park areas, develop government-owned land for the benefit of the people of the District and the federal and District governments, increase access to the water, and enhance visitor participation in the activities and opportunities provided along the waterfront.

VISITOR USE AND EXPERIENCE

VISITATION

Visitation at Anacostia Park is tallied by five inductive loop counters at park entrance lanes at Fairlawn Avenue, Good Hope Road, Anacostia Drive South, and Howard Drive (two locations). Each traffic count is reduced by the number of non-reportable vehicles which is estimated at 400 vehicles per month (NPS 1996). A non-reportable vehicle would include vehicles from NPS employees, NPS contractors, volunteers, private tenants inside park boundaries, and from those who incidentally enter the park. The reduced traffic count is then multiplied by the persons-per-vehicle multiplier of 1.6 (NPS 1996). In addition to the traffic counters, the number of walk-in visitors, joggers, bicyclists, and bus visitors are added to the total.

The majority of the visitors to Anacostia Park are the residents of the surrounding neighborhoods.

The majority of the visitors to Anacostia Park are the residents of the surrounding neighborhoods. Annual visitation for the National Capital Parks - East system and Anacostia Park are displayed in table 14. Park visitation increased from 2003 through 2005, and then slightly decreased in 2006. Visitation has continued to decrease from 2007 through 2009. Visitation at Anacostia Park has accounted for approximately 32 to 42 percent of the total visitation within the National Capitol Park-East system (NPS 2009e). As expected, visitation is higher during the warmer months and lower in the cooler months. In 2009, visitation was highest in March due to a large special event with over 60,000 people; however, visitation was high in July, August, and September with more than 40,000 visitors each month. Visitation was lowest in February when less than 23,000 people visited the park. The Kenilworth Aquatic Gardens had the highest attendance in July and August when more than 13,000 people toured the gardens. Less than 1,000 people per month visited the gardens in January, February, and December (NPS 2009e). Visitation begins to increase in both the gardens and park in April and May. Visitation to the Aquatic Resource Education Center declined in 2006 and 2007. In 2007, a total of 807 students visited the center, this was nearly half of the students in 2006 (1,958 students) (Whitworth 2008).

The athletic fields within the park are used for baseball, soccer, rugby, football, and tennis games. In 2009, over 21,000 spectators visited Anacostia Park to watch the various sporting events. Rugby and soccer are the most popular sports to watch at the park. A total of 121 soccer games were played in 2009, bringing over 8,800 spectators to the park and 310 rugby games brought over 5,200 spectators. In addition to the sporting events, 817 concerts were held at Anacostia Park in 2009 with over 10,000 attendees. Approximately 68,700 visitors attended one of the 426 special event picnics at the Anacostia Park Pavilion. Sporting events, concerts, and picnics are becoming more popular at the park each year. The number of events at Anacostia Park has increased by 56 percent since 2003.

TABLE 14: ANNUAL VISITATION IN THE NATIONAL CAPITOL PARKS-EAST AND ANACOSTIA PARK 2003–2009

Year	National Capitol Parks-East Visitation	Anacostia Park Visitation	Percent Change at Anacostia Park from Previous Year
2003	1,372,109	348,619	--
2004	1,575,276	443,810	+ 9.1 %
2005	1,390,442	565,480	+ 16.8 %
2006	1,310,320	501,080	- 11.3 %
2007	1,311,088	514,148	+ 2.6 %
2008	1,296,990	481,842	-6.3 %
2009	1,272,212	463,335	-3.8%

Source: NPS 2009e

RECREATION AND VISITOR ACTIVITIES

Anacostia Park encompasses the largest area within the District available for recreational opportunities to residents of Southeast Washington and its visitors. It provides valuable open space in an urban setting, contributing to the park system of the national capital. Numerous parks and recreational facilities are located within Anacostia and offer both passive and active recreation opportunities:

- **Kenilworth Park and Kenilworth Marsh**—This 180-acre site is located in the northeastern portion of the park. The area was once used as a landfill, but historic and recent restoration efforts have allowed this site to be used as a multi-purpose recreational area.
- **Kenilworth Aquatic Gardens**—This site is located on the east bank of the Anacostia River. The area houses 14 acres of aquatic plants and 11 acres of ponds which provide habitat to a diversity of wildlife, including insects, reptiles, and amphibians. The mud flats at the tidal marsh during low tide are feeding grounds to many wading birds. The gardens are the only unit in the NPS dedicated to the propagation of aquatic plants. The Aquatic Garden’s annual Waterlily Festival in

July attracts thousands of visitors at the peak blooming season. Ranger-lead programs include a ½ mile guided tour of the ponds and gardens. A boardwalk hiking trail from the garden ponds leads visitors to the Kenilworth tidal marsh. Additionally, visitors may use the river trail that begins at the lily ponds and circles around pass the Kenilworth Marsh. In addition to viewing wildlife and the gardens, visitors have the opportunity to use the ball fields and picnic areas.

- **Langston Legacy Golf Course—**This 18-hole historic golf course is located on the west bank of the Anacostia River north of Benning Road. The golf course is open year round and green fees are $15 for weekdays and $19 on weekends. The facility includes a snack shop and pro shop.
- **Poplar Point**—This 60-acre site is located along the east side of the Anacostia River, just north of the South Capitol Street Bridge adjacent to the historic Anacostia District. The Poplar Point site was formerly used by the Architect of the Capitol and by the District's Lanham Tree Nursery. The wetlands, meadows, and scrub-shrub areas provide important habitat for a diversity of plants and wildlife. The area can be used for wildlife viewing and picnicking by park visitors.
- **Boating facilities**—Marinas and boat ramps located along the river provide public easy access to the water for boating, sailing, canoeing, and jet skiing. Three public marinas including the Anacostia Community Boathouse, Buzzard Point Marina, James Creek Marina; and a public boat ramp are located within the park. Additional private marinas include the Eastern Power Boat Club, the District Yacht Club, and Seafarers Yacht Club. The upper Anacostia is favored for canoeing and kayaking through natural areas, while the lower Anacostia is favored by sculling and rowing crews for its broad, flat water.
- **Anacostia Park Pavilion**—This 3,300 square foot area is located east of the Anacostia River and north of Pennsylvania Avenue. The pavilion includes a roller skating rink and an area to host special events.
- **Urban Tree House**—This community-based environmental education center is located next to the Anacostia Park Pavilion and is made of wood planks in the shape of the United States. The Urban Tree House provides opportunities for the District urban youth to learn about and experience nature in their own backyards.
- **Aquatic Resource and Education Center**—This aquatic education center is located next to the Anacostia Park Pavilion. The education center offers a variety of live exhibits of fish and other aquatic organisms from the local river. The center also includes a fisheries hatchery for shad and herring species. Visitors may watch a presentation or receive a tour of the facility from local fisheries biologists.
- **Playing fields and courts**—Numerous playing fields and courts are scattered throughout the park. The open fields are often used by visitors for picnicking, dog walking, and sport playing, including soccer, rugby, and football. Tennis courts are located close to the Pennsylvania Avenue entrance to the park and basketball courts are located just south of Benning Road. The District Kenilworth Park immediately adjacent to the Kenilworth Aquatic Gardens offers baseball fields, a track, tennis courts, basketball courts, and swimming pools. This area is not within the Anacostia Park boundary and is not maintained by the park.
- **Playgrounds—**Two playgrounds are located throughout the park. These areas are located next to the roller skating rink and the picnic area south of the Pennsylvania Avenue entrance. These areas offer children the chance to climb, slide, and swing through ropes, tires, slides, bridges, and tires. These areas are most popular during the summer months.
- **Picnic and other passive recreation areas—**The remaining areas of Anacostia Park are used for picnicking and other activities such as hiking, biking, and wildlife viewing. Designated picnic areas are located next to the tennis courts, the Anacostia Park Pavilion, and the main building

complex of the Kenilworth Aquatic Gardens, although picnicking is acceptable in any open area throughout the park. Many visitors often walk, jog, or bike along the roadway adjacent to the river.

- **Kingman and Heritage Islands**—These islands/marsh areas are located in the upper Anacostia River adjacent to RFK stadium. These areas are outside of the park boundary and are currently being redeveloped as educational and passive, low-impact recreation sites.
- **Fishing**—Recreational fishing opportunities are available along the east and west banks of the Anacostia River or by boat. A fishing permit from the District Fisheries and Wildlife department is required.

Many visitors enjoy looking at the geese in Anacostia Park, as they think of them as wildlife and value their contribution to the overall aesthetics of the park. However, the NPS has received numerous complaints concerning the large amounts of goose feces throughout the Langston Legacy Golf Course and playing fields (NPS 2004b). Visitors have also complained of the high volume of trash and floatable debris in the Anacostia River. According to MWCOG, approximately 20,000 tons of trash and debris enter the river annually (AWRP and MWCOG 2007). The majority of this trash problem is from people littering and performing illegal dumping.

Due to the poor water quality and degraded fish habitat, fishing is limited in the tidal Anacostia River. Because of the PCBs and other chemical contaminants that have continued to be found in certain fish species caught in the river, the DOH has placed restrictions on fish consumption from the Anacostia River. Water contact recreation such as swimming is also restricted because of the poor water quality and associated potential health risks.

SOUNDSCAPES

Natural soundscapes exist in the absence of human-caused sound. Some natural sounds are part of the biological or physical resources of Anacostia Park. Examples of such natural sounds at the park include:

- Sounds produced by birds, frogs, or insects to define territories or attract mates, and
- Sounds produced by physical processes such as wind in the trees, flowing water, or claps of thunder.

Natural soundscapes can be experienced in the undeveloped portions of the park such as the marsh areas, although there are few areas within the project area that are free of human-created noise. Areas along the Anacostia River have been left as unmowed meadow, and there are other established no mow areas to encourage ground nesting birds. Bald eagles and osprey hunt along the Anacostia River.

At Anacostia Park, human-caused sounds are most noticeable in areas such as the golf course, pavilion, ball fields, and playgrounds. Examples of human induced noise includes the use of automobiles throughout the park especially crossing over bridges, golf carts, children playing, boats along the river, commercial and military aircraft, trains along the CSX railroad, and sirens from nearby emergency vehicles.

AESTHETICS AND URBAN QUALITY

Prior to the late 17th century, the Anacostia watershed was a thriving natural ecosystem of dense forests, streams, and a river filled with wildlife. Eventually the Anacostia watershed was transformed into a highly urbanized metropolitan area. Anacostia Park was created to preserve forests and natural scenery in and about the District. The park provides valuable open space in an otherwise urban setting and contributes to the natural beauty of the nation’s capital. The parkland includes the Anacostia River, forests, wetlands, aquatic gardens, and landscaped or turfed areas. Man-made features including playing fields, boat docks, visitor centers, and recreational centers are available for the public.

The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline. The amount of trash within the watershed increases after a storm event. Trash includes metal, plastic bottles, tires, drums, paper products, Styrofoam containers, toys, and other materials. The AWS has collected approximately 600 tons of trash and over 7,500 tires from the river between 1998 and 2004 (AWRP and MWCOG 2007). In 2004, the AWS and 1,100 volunteers collected 43 tons of trash and over 200 tires during the Earth Day clean-up event. Volunteer trash cleanup opportunities are often posted on the bulletin boards throughout the park. To help guide the efforts to reduce the amount of trash entering the Anacostia River and its tributaries, the Anacostia Watershed Restoration Partnership, with funding from NOAA and led by MWCOG, has developed a strategy that focuses on six objectives to make major reductions of trash in both the Anacostia and Potomac watersheds by 2013. The six objectives include the following:

- Increase funding for trash reduction programs.
- Create and enhance regional partnerships and coordination among businesses, environmental groups, individual citizens, and government at all levels and in all jurisdictions.
- Improve people’s awareness, knowledge, and behavior relating to littering and illegal dumping.
- Promote the greater introduction and use of effective trash reduction technologies and approaches.
- Improve the enactment and enforcement of laws to reduce trash.
- Increase trash monitoring-related data collection, generation, and dissemination efforts (AWRP and MWCOG 2007).

In addition to trash at the park, fecal droppings from resident Canada geese can also degrade the aesthetic quality of the 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 (Bates 2010b). The majority of the Anacostia Park population of geese has been located at the Kingman Marsh/Langston Golf Course sites where there is open water for waddling and the open golf course for browsing (NPS 2009a; Bates 2010a). This area provides habitat that is safer from predators during the bird’s flightless period. In June 2010, a mean of 371 geese were counted at the Kingman Marsh/ Langston Golf Course site (Bates 2010a). Studies have shown that a well-fed, healthy adult Canada goose can produce up to 1.5 pounds of fecal matter per day (French 2001). Goose feces can reduce the aesthetic appeal of areas such as Langston Golf Course and could ultimately reduce public use (USFWS 2005). Visitor using other public areas at Anacostia Park in addition to Langston Golf Course are also affected by the geese, including visitors utilizing open playing fields. For example, it has been documented that public areas littered with accumulated goose feces have been closed due to the contamination or the threat of personal injury resulting from falls as people lose footing on the slippery material (French 2001). Specifically, Anacostia Park has received complaints from the unpleasant experience of goose fecal matter on golfer's shoes and from park visitors falling and/or rolling in goose fecal matter while playing ballgames (NPS 2010b).

Chapter 4: Environmental Consequences

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

The "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this *Final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS*. This chapter also includes a summary of laws and policies relevant to each impact topic, definitions of impact thresholds, methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by the CEQ regulations implementing NEPA, a summary of the environmental consequences is provided in table 5, which can be found in "Chapter 2: Alternatives." The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in "Chapter 3: Affected Environment."

SUMMARY OF LAWS AND POLICIES

Three overarching environmental protection laws and their implementing regulations and policies guide the actions of the NPS in the management of the parks and their resources – the *Organic Act of 1916*, NEPA and its implementing regulations, and the NPS *Omnibus Management Act*. These guiding laws, regulations, and policies were described in detail in chapter 1 of this plan/EIS. Collectively, these guiding laws, regulations, and policies provide a framework and process for evaluating the impacts of the alternatives proposed in this plan/EIS.

GENERAL METHODOLOGY FOR ESTABLISHING IMPACT THRESHOLDS AND MEASURING IMPACTS BY RESOURCE

The general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category includes the following elements:

- general analysis methods as described in guiding regulations
- basic assumptions used to formulate the specific methods used in this analysis
- thresholds used to define the level of impact resulting from each alternative
- methods used to evaluate the cumulative effects of each alternative in combination with unrelated factors or actions affecting Anacostia Park resources

These elements are described in the following sections.

GENERAL ANALYSIS METHODS

The analysis of impacts follows guidelines from CEQ regulations and Director's Order #12 (NPS 2011) and its accompanying handbook (NPS 2001). Procedures presented in this plan/EIS are based on the underlying goal of supporting the restoration, conservation, and maintenance of the wetlands throughout Anacostia Park. The analysis incorporates the best available scientific literature applicable to the region and setting, the species and areas being evaluated, and the actions being considered in the alternatives. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions and impact intensity thresholds.

ASSUMPTIONS

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

Analysis Period

Goals, objectives, and specific implementation actions needed to manage the wetlands and resident Canada geese at Anacostia Park are established for the next 15 years. Therefore, the analysis period for assessing impacts is up to 15 years. The impact analysis for each alternative is based on the principles of adaptive management, which would allow the NPS to change management actions as new information emerges from monitoring the results of management actions and ongoing research throughout the life of the plan.

Commitment of Techniques

The park has committed to implement specific techniques within each alternative, while other techniques would be used on an as-needed basis as presented in tables 1 and 2, chapter 2. The following impact analysis for all alternatives and resources, describes the impacts associated with the wetland and resident Canada goose management techniques proposed in this plan/EIS regardless of when or if the techniques are implemented.

Geographic Area Evaluated for Impacts

The geographic study area for this plan includes Anacostia Park in its entirety. The area of analysis may extend beyond the park's boundaries for some resources and for the cumulative impact assessment. The specific area of analysis for each impact topic is defined at the beginning of each topic discussion.

Duration and Type of Impacts

The following definitions are used for all impact topics unless otherwise noted:

- **Short-term Impacts**—Impacts would last up to six months following a management action.
- **Long-term Impacts**—Impacts would last longer than six months up to the life of the plan (approximately 15 years).
- **Beneficial Impacts**—A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- **Adverse Impacts**—A change that moves the resource away from a desired condition or detracts from its appearance or condition.
- **Direct Impacts**—Impacts that would occur as a direct result of wetland and resident Canada goose management actions.
- **Indirect Impacts**—Impacts that would occur from wetland and resident Canada goose management actions and indirectly alter a resource or condition later in time or farther in distance from the action.

Future Trends

Visitor use and demand are anticipated to follow trends similar to recent years. The number of yearly visitors to Anacostia Park has averaged approximately 1.4 million visitors per year in the last 5 years (NPS 2008c). In the absence of notable anticipated changes in facilities or access, the average visitation is expected to continue and be reflected across user groups.

Impact Thresholds

Determining impact thresholds is a key component in applying *NPS Management Policies 2006* and the Director's Order #12 Handbook. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the impact to a relevant standard from state or federal regulations, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. The following intensity definitions are used throughout this analysis: negligible, minor, moderate, and major. Impact thresholds are discussed for adverse impacts only, the intensity of beneficial impacts is not defined.

CUMULATIVE IMPACT ANALYSIS METHOD

The CEQ regulations that implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, "Considering Cumulative Effects" (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including alternative A, the no action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present and reasonably foreseeable future actions. Therefore, it is necessary to identify other ongoing or reasonably foreseeable future projects and plans at Anacostia Park and if applicable, the surrounding area.

Past Actions within and Around Anacostia Park

Anacostia Wetland Mitigation Project—NOAA, Maryland State Highway Administration (SHA), the M-NCPPC, Prince George's County, Federal Highway Administration (FHA), and the USEPA are working together to create a functional tidal wetland along the Anacostia River to provide habitat for fish and wildlife, satisfy tidal wetland mitigation requirements of the Woodrow Wilson Bridge project, and provide future educational and recreational opportunities. The mitigation project is located on M-NCPPC property near Bladensburg, Maryland. The site covers approximately 54 acres along the eastern shore of the Anacostia River, just upstream of the District border. The project began in May 2007 and is scheduled for completion in the fall of 2009 (NOAA 2007b).

Kenilworth Marsh—Kenilworth marsh is a restored freshwater tidal marsh on the Anacostia that is adjacent to the Kenilworth Aquatic Gardens. Thirty-two acres of emergent wetland were created by the USACE in 1993 in cooperation with the USEPA and NPS.

Kingman Marsh (Lake)—Kingman Marsh is a site of 2 recent large-scale restoration efforts, completed in 2000. This project was support by USEPA, USACE, NPS, and the District and Prince George's County governments. The site restored totaled 40 acres. In 2005, the Heritage Island Ecosystem Restoration added an additional 6 acres of restored emergent wetland to the site.

Anacostia Riverwalk Trail—The Anacostia Riverwalk is a planned 16-mile multi-use trail along the east and west banks of the Anacostia River in the Washington, DC. It is a priority for the District Department of Transportation (DOT), which has taken the lead in planning and constructing the Riverwalk as a recreational amenity and transportation alternative for Washington residents. When completed, it will connect sixteen waterfront neighborhoods to the Anacostia National Park and the Anacostia River. Washington residents and visitors will be able to walk and bike on the Riverwalk to several popular destinations, including the Fish Wharf, the new baseball stadium, Poplar Point, the Navy Yard, historic Anacostia, RFK stadium, Kingman Marsh, Kenilworth Aquatic Gardens and National Arboretum. The trail connects the National Mall at the Tidal Basin to the Bladensburg Marina Park in Prince George’s County, MD (DCDOT 2006b). The East Bank Trail incorporated a 2-mile section of trail that realigns and rebuilds Anacostia Drive, which was completed in 2012 (more or less). The West Bank Trail incorporated a 2.5-mile trail that connects the Benning Road Bridge in the north to the Navy Yard promenade in the south which was completed in 2007 (DCDOT 2006a).The Riverwalk and its loops provide interconnected greenway trails, pedestrian-friendly river crossings, and cycling lanes on streets connecting waterfront recreational areas with neighborhoods and cultural sites along the Anacostia River (DCOP 2009). Other phases are scheduled for completion by 2012 (DCDOT 2006b).

Anacostia Skating Pavilion—NPS replaced major features of the skating pavilion roof. Emergency repairs and stabilization secured the roof until a more permanent replacement is constructed. The skating pavilion reopened during the spring 2008.

Camp Simms—This project is located at 1500 Alabama Avenue SE and includes a $30 million mixed-use project with 100,000+ square feet of retail space with anchoring grocery store and 75 units of housing. This project was completed in spring 2008 (Poplar Point 2007).

Current Actions within and Adjacent to Anacostia Park

Woodrow Wilson Bridge Project—As part of the larger Woodrow Wilson Memorial Bridge reconstruction project, the southern terminus of I-295 is being re-built. Several new connections are being constructed to link the beltway (I-495) and MD-210 to I-295 with the new National Harbor site being built on shore of the Potomac River. The interchange is being re-built to accommodate future ramps for proposed HOV lanes to the beltway. The project is due to be completed in stages from 2008 to 2011.

Anacostia Gateway Government Center—This project is located at the intersection of Martin Luther King, Jr. Avenue and Good Hope Road SE and includes a $75 million project to serve as District Department of Transportation Headquarters Building with 320 square feet of office space and storefront functions. The project designs are currently underway. Demolition of the current facility is expected in the summer of 2009 with new construction for the center to follow in the future (Poplar Point 2007).

Riverfront on the Anacostia—The District Zoning Commission gave preliminary approval on March 20, 2008 to design a 1.1 million-square-foot, four building, mixed-use project on the site between Nationals Park, the Anacostia River, the Frederick Douglass Memorial Bridge, and the proposed Diamond Teague Park. The developers need to submit more detailed drawings of the plans for the South Capitol Street facades. Zoning approvals were received in 2008 and construction is proposed to begin in 2010 (Dupree 2008).

Anacostia Waterfront Initiative (AWI) - Includes approximately 900 acres of land characterized as susceptible to change for redevelopment along the 8-mile long Anacostia waterfront and Washington

Channel, including the Southwest, the Southeast, Poplar Point, Hill East Waterfront, RFK Stadium Area, South Capitol Street Corridor, and Anacostia Park/Arboretum Area. Portions of the project have been completed, other phases are underway, and additional phases are proposed for the future. The AWI was a partnership between the federal and District governments to revitalize the Anacostia River waterfront. The District Office of Planning produced the Framework Plan in collaboration with a steering committee of federal and District agencies and an advisory group of community leaders. The targeted land is 90 percent publicly owned and would offer increased public access to the waterfront, would build new parks, and would create mixed-use and mixed-income waterfront neighborhoods.

2004 Consent Decree - As a result of a consent decree that the USEPA signed with the District WASA in 2004 to improve water quality in the Anacostia and Potomac Rivers and Rock Creek, a 20-year Long-Term CSO Control Plan has been drafted and would have a beneficial, cumulative impact on water quality in the Anacostia River. This plan includes three underground storage tunnels, including side tunnels to reduce flooding rehabilitation of existing pumping stations, and the elimination of 14 overflow outfalls, four of which are located in the Anacostia Watershed (DCWASA 2008). When the project is fully implemented, CSO discharge would be reduced by a projected 98 percent on the Anacostia River (DCWASA 2010).

11th Street Bridge Replacement Project—A major project is currently underway to rebuild the interchange between I-295, DC 295, and the 11th Street Bridges. Due to the cancellation of both the remainder of the Southeast Freeway and the newer Barney Circle Freeway, there are no through connections between the 11th Street Bridges and DC 295, leading to severe congestion and major traffic routing problems. This project would construct the missing movements at this interchange, allowing direct freeway-grade access to and from DC 295 at the 11th Street Bridges, as well as provide a through grade-separated north-south route within DC.

Poplar Point—In 2006, Federal legislation was enacted authorizing transfer of the 110-acre Poplar Point Site to the District, but the transfer has not yet taken effect. In order for the transfer to occur, the District is required to complete a land use plan for Poplar Point that meets specified requirements and to locate replacement facilities for NPS. In 2009, the District of Columbia and NPS entered into an agreement to conduct a Remedial Investigation and Feasibility Study to clean up the Poplar Point Site. The District has also initiated the compliance process, writing a draft EIS for the future land use of the site. Once contamination at the site has been cleaned up, redevelopment plans can be implemented (Ferguson 2012).

Southeast Federal Center—This project includes a 5.5 million square foot, 44-acre site development, which would include 2,800 housing units, 1.8 million square feet of office space, 200,000—400,000 square feet of retail/cultural, new parks and a marina. This project is to be completed along the waterfront of the Anacostia River (Poplar Point 2007).

Waterfront Redevelopment—Several development projects are proposed along the Anacostia River's western edge. These projects include the southwest waterfront redevelopment that includes a mix of public plazas, boulevards, cultural venues, restaurants, shops, and residences; waterside mall; and arena stage (Poplar Point 2007).

PHYSICAL RESOURCES

This section discusses impacts to the soils in the study area.

SOILS

NPS Management Policies 2006

NPS *Management Policies 2006* require the NPS "to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources." "Management action will be taken by superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soil" (NPS 2006a). Therefore, NPS is required to protect geologic features from the unacceptable impacts of human activity while allowing natural processes to continue (NPS 2006a).

Assumptions and Methodologies

Potential impacts to soils are assessed based on the extent of disturbance to natural undisturbed soils, the potential for soil erosion resulting from disturbance, and limitations associated with the soils. Soils could be affected by erosion resulting from the loss of vegetation due to goose browsing. Impacts to soils were analyzed qualitatively.

Primary steps for assessing impacts to soils include identifying:

- potential changes in soils from the presence of resident Canada geese;
- if soil resources are in areas likely affected by wetland and resident Canada goose management practices;
- potential changes to soil productivity or erosion rates due to the implementation of management practices; and,
- disturbance potential of proposed restoration efforts.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on soil resources:

Negligible: Soils would not be impacted or the impact would be below or at the lower levels of detection. There would be no discernible effect on the rate of soil erosion or the ability of soils to support native vegetation.

Adverse: *Minor*: Impacts to soils would be detectable, but impacts would be small. There would be localized, detectable effects on the rate of soil erosion and the ability of soils to support native vegetation.

Moderate: Impacts to soils would be readily apparent and would result in a change of soil character over a relatively wide area within the park. There would be widespread and detectable effects on the rate of soil erosion and the ability of soils to support native vegetation.

Major: Impacts to soils would be readily apparent and would result in a substantial change in character over a large area in the park. The actions would have a substantial, highly noticeable influence on the rate of erosion and the ability of soils to support native vegetation.

Soils Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing aerial coverage of wetland vegetation. This reduces wetland vegetation rootmass (which normally stabilizes the soil) and allows erosion to occur, as well as surface soil runoff to the Anacostia River. In some areas within the park, vegetative buffers along the Anacostia River are either extremely narrow or nonexistent, resulting in high soil erosion rates due to lack of vegetation. Grazing of shoreline areas that currently support vegetation by geese would continue and result in the further removal and loss of turf, terrestrial vegetation, and/or wetland vegetation (which holds soil) and would result in erosion during excessive rain events. In addition, it is expected that over the life of this plan/EIS, the riverine wetlands would continue to erode (NPS 2010d; Curtis 2010), resulting in a further loss of wetland vegetation that would also result in erosion during rain events as mentioned above (Curtis 2010). Removing sheet piling along the Anacostia River Fringe Wetlands (which would require additional NEPA compliance) would also impact soils due to erosion that would occur following this process. After removal of the sheet piling from the Anacostia River Fringe Wetlands, the substrate may be reworked as a result of frequent flows, especially on the wetland margins (NPS 2008a). The impacts to soils would be readily apparent and would result in a change of soil character over a relatively wide area within the park. There would be widespread and detectable effects on the rate of soil erosion and the ability of soils to support native vegetation. Overall, continued long-term moderate adverse impacts to soil are anticipated as a result of the no action alternative.

Cumulative Impacts—Projects and actions in and near Anacostia Park were considered for the cumulative impacts analysis. The following is a discussion of projects that have had, are currently having, or have the potential to have effects on soils at or in the vicinity of this site.

Numerous redevelopment projects are proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11th Street Bridge Replacement Project. Most construction projects excavate soils, which can adversely affect soil through increased erosion. However, these development and construction projects would require compliance with the District DOH Watershed Protection Division, Sediment and Storm Water Technical Services Branch, District WQS for Surface Water (21 DCMR Ch.11), District DOE, District Water Management Plan per the Water Pollution Control Act of 1984 (DC Law 5- 188), and Section 402 of the Clean Water Act, also referred to as National Pollutant Discharge Elimination System (NPDES) to minimize impacts to soils and offset the adverse impacts. Additionally, the District DOT and FHA have committed to applying soil amendments and providing plantings in select areas of the park where impacts from the 11th Street Bridge Replacement Project are anticipated. Both USEPA and NOAA (2009) have stated that BMPs such as low impact development (LID) techniques, wetland restoration, and stream bank stabilization serve a vital function in reducing erosion, and intercepting runoff of urban contaminants, thus preventing the reintroduction of contaminants. Other projects that include wetland restoration and streambank stabilization projects in the vicinity of the project area could reduce erosion in the Anacostia River Watershed. Overall, the projects and actions in and near Anacostia Park that were considered for the cumulative impacts analysis provide beneficial impacts to soils.

The long-term moderate adverse impacts on soils in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would be beneficial to soils, this would reduce the adverse effects of alternative A, resulting in a long-term minor adverse cumulative impact on soils.

Conclusion—Alternative A would result in long-term moderate adverse impacts on soils because the impact to soils would be readily apparent and result in a change or impacts to soil, erosion, and the ability of soils to support native vegetation in a large area of the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Soil Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Anacostia River Fringe Wetlands, and installing new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. With the exception of installing new rain gardens and the removal of sheet piling along Anacostia River Fringe Wetlands (both which would require additional NEPA compliance), the techniques described above for all action alternatives if implemented would have a negligible impacts on soils because there would be no discernible effect on the rate of soil erosion or the ability of soils to support native vegetation. Removing sheet piling along the Anacostia River Fringe Wetlands would have a short-term, minor adverse effect on soils due to erosion that would occur following this process. After removal of the sheet piling from the Anacostia River Fringe Wetland, the substrate may be reworked as a result frequent flows, especially on the wetland margins (NPS 2008a). It was concluded by NPS (2008b) in a Hydraulic Evaluation of the Anacostia River Fringe Wetland that when the sheet pile is removed, erosion may occur but even high magnitude flows would not necessarily result in substantial or even moderate erosion of the Anacostia River Fringe Wetland. It is very likely that some portion of the Anacostia River Fringe Wetland would be reworked and eroded by the river, but it is also quite likely that a sizable portion of the wetland would remain similar to its present configuration (NPS 2008a). Installing new rain gardens may disturb soil during construction in the short-term but also decrease soil erosion rates in the long-term and help reduce the amount of impervious area in the park; however, these areas may be too small and localized in nature to create a detectable impact on soils. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. Overall, the techniques that are common to all action alternatives would result in negligible impacts to soil because the impacts would be at the lower levels of detection and because of the limited and localized nature of the proposed techniques.

Alternative B –High Wetland, High Resident Canada Goose Management—Alternative B combines the most aggressive wetlands management techniques with intensive resident Canada goose management techniques (lethal control combined with other techniques). Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River, which would increase wetland vegetation and rootmass, thus stabilizing soils adjacent to the river. Stabilization would benefit soils through reducing actual soil loss during rain events. Vegetation techniques proposed, such as mechanical seedbank regeneration and high density planting efforts would increase the width of the existing vegetative buffer along the Anacostia River and reduce bare areas where soil erosion currently occurs which would also reduce soil loss during rain events. Improvements to soils would result from increased plantings. These techniques would have a beneficial impact on soils.

Techniques considered in resident Canada goose management are proposed to reduce goose herbivory and improve wetland vegetation. The resident Canada goose population would be intensively reduced as part of this alternative, which would result in indirect improvements to wetland vegetation as well as terrestrial vegetation. Reduced grazing of shoreline areas would decrease erosion through decreased loss of turf, terrestrial vegetation, and/or wetland vegetation, which hold soil along the shorelines of the Anacostia River through rootmass. A decrease in the amount of herbivory would increase wetland/terrestrial vegetation and rootmass, thus stabilizing soils adjacent to the river. Habitat modification techniques proposed would plant new buffers (25 to 50 feet) along shorelines throughout the park and increase the width of the existing vegetative buffer along the Anacostia River. These actions would reduce bare areas where soil erosion currently occurs.

The implementation of erosion control techniques proposed as part of alternative B along the shorelines of the Anacostia River would reduce surface soil runoff and erosion, thus benefiting soils through reducing actual soil loss during rain events. Overall, these techniques would have a beneficial impact on soils. Techniques proposed may include the installation of coir fiber logs, flow deflectors, bog mats, and/or shoreline steepness reduction, which may require land disturbance activities that would negatively affect soils. For example, soil would be affected as a result of the proposed techniques during land disturbance activities to restore hydrology such as the re-grading of sites or construction activities associated with hydrology techniques, vegetation techniques, and wetland restoration techniques. These techniques would have a short-term adverse impact on soils and would range from negligible to minor impacts, depending on the area of soil disturbed. However, soil disturbance impacts would be minimized by appropriate best management plans (BMPs) and may include erosion and sediment (E&S) plans, a revegetation plans, NPDES permits or other required documents in the District, depending on the total area of soil disturbed. The NPS is committed to meeting requirements set forth by the District DOE for soil disturbance. Many of the more intensive techniques included in wetland management for alternative B, such as the erosion control techniques, creating tidal guts, mechanical seedbank regeneration, daylighting, energy dissipation modifications, seawall breaks, constructing new boardwalks, and reducing impervious areas would also affect soils through land disturbance and would require additional NEPA analysis for future projects prior to construction or implementation of these projects (see table 1 in chapter 2).

Alternative B would have a short-term adverse impact on soils and would range from negligible to minor impacts, depending on the area of soil disturbed due to land disturbance activities. Overall, alternative B would result in beneficial impacts to soil that would offset the short-term adverse impacts as a result of improved wetlands along the Anacostia River through very high wetland management and high resident Canada goose management.

Cumulative Impacts—The beneficial impacts on soils as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to soils, there would be beneficial cumulative impacts on soils when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on soils because of improvements in wetlands, reduced herbivory, and erosion control. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, and least invasive stream/stormwater outfall modifications. Alternative C would not include creating tidal guts, consider stream daylighting, seawall breaks, and planting efforts would be at a lower density than alternative B. However, overall impacts to soil for alternative C would be the same as alternative B: beneficial because the wetland management and resident Canada goose management techniques would decrease soil loss through plantings and reduced goose herbivory of vegetation. Land disturbance would still occur during construction activities, and would have a negligible impact on soils because less total area would be disturbed under alternative C compared to alternative B. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to the soils at the park. An overall, beneficial impact for alternative C is appropriate because improvements to soils would be detectable, but these beneficial impacts would be small and localized.

Cumulative Impacts—The beneficial impacts on soils as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to soils, there would be beneficial cumulative impacts on soils when added to the beneficial impacts from alternative C.

Conclusion—Alternative C would result in overall beneficial impacts on soils because of improvements in from vegetation plantings and a reduction of herbivory. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed and a one-time lethal reduction. No new wetland restoration techniques are proposed to increase wetland vegetative cover and stabilize the soil. A one-time population reduction of resident Canada geese using resident Canada goose management techniques would be performed during the life of this plan/EIS for alternative D. This one-time population reduction would have a negligible impact on soils because temporarily reducing herbivory may not necessarily cause a measurable increase in soil stabilization and a reduction in erosion; reducing the population one time would not have a long-term effect on improving soils. Overall, alternative D results in long-term minor adverse impacts to soil because of the limited wetland management proposed; adverse impacts would be detectable but small and localized.

Cumulative Impacts—The long-term minor adverse impacts on soils as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to soils, there would be negligible cumulative impacts on soils when added to the long-term minor adverse impacts from alternative D. The beneficial effects of the other projects should reduce some of the adverse impacts to soils from implementation of this alternative resulting in a negligible cumulative impact on soils.

Conclusion—Alternative D would result in overall long-term minor adverse impacts on soils, erosion, and the ability of soils to support native vegetation because the effects would be detectable, but would be small and localized. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B but the resident Canada goose management techniques proposed do not include lethal population reduction activities. Vegetative buffers along the shoreline would make upland areas less attractive to geese and would reduce soil erosion through plantings. New wetland restoration techniques are proposed which would increase wetland vegetative cover. Land disturbance would still occur during construction activities, and would have a negligible impact on soils. However, since no lethal control for resident Canada geese is proposed, herbivory of vegetation by geese is expected to continue. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose lethal population reduction may completely offset or take longer to realize. Because there would be no discernible effect on soils, the overall impacts to soils as a result of alternative E would be negligible.

Cumulative Impacts—The negligible impacts on soils as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to soils, there would still be beneficial cumulative impacts on soils when added to the negligible impacts from alternative E.

Conclusion—Alternative E would result in overall negligible impacts on soils, erosion, and the ability of soils to support native vegetation because soils would not be impacted, or the effects on soils would be undetectable. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

WATER RESOURCES

This section discusses the plan impacts to the water resources in the study area, including hydrology and water quality.

HYDROLOGY

Guiding Regulations and Policies

NPS *Management Policies* 2006 state that the NPS would "take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations" (NPS 2006a).

Assumptions and Methodologies

Potential impacts to water resources are assessed based on the extent of disturbance to hydrology. Hydrology refers to the water-related processes, such as stream and channel flow as well as overland or sheet flow. The high amount of impervious surface associated with a developed area such as the District reduces the total amount of rainfall, which infiltrates into the ground. The impacts of reduced infiltration are lowered groundwater levels and diminished base flows in perennial streams (USACE 1994). Impacts from the proposed alternatives to hydrology were assessed qualitatively.

To understand the effects of wetland and resident Canada goose management on the water resources throughout the park, park resources inventories, scientific literature and research, and published technical data were consulted to identify the information contained in this analysis.

Primary steps for assessing impacts to the water resources include identifying:

- surface waters in areas likely to be affected by the proposed management activities,
- potential changes in hydrology from current and future management activities.

The geographic study area for water resources includes areas within the park as well as adjacent areas within the Anacostia River and the greater Anacostia Watershed that could be impacted by wetland and resident Canada goose management activities.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on hydrology and water quality:

Negligible: Changes in hydrologic conditions would not be detectable and would not have an appreciable effect or the effects would be at low levels of detection.

Adverse: *Minor*: Changes in hydrologic conditions would be detectable but would not be large enough to cause substantial local changes.

Moderate: Changes in hydrologic conditions would be readily apparent and they would result in substantial, noticeable effects to hydrology on a local scale.

Major: Changes in hydrologic conditions would be detectable beyond the immediate management area and would be readily measurable across large areas of the park.

Hydrology Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland vegetation in the watershed. This reduces the potential for wetland areas to trap pollutants and filter runoff, so improvements to hydrology in the watershed would not occur. The resident Canada goose population would not be intensively reduced as part of the no action alternative. Removal of sheet piling along Anacostia River Fringe Wetlands (which would require additional NEPA compliance) would result in beneficial impacts to hydrology and in hydrologic communication between the Anacostia River Fringe Wetland and the mainstem of the river (NPS 2008a); therefore, causing a beneficial impact to hydrology through reconnection of the river with the wetland in this immediate and local area. However, these beneficial impacts would be offset by the lack of any other wetland management techniques in this alternative that could improve hydrology in the watershed. In addition, it is expected that over the life of this plan/EIS for the no action alternative, that the riverine wetland acreage within the Anacostia River in Anacostia Park would continue to erode based upon the NCR Hydrologist observations (Curtis 2010), resulting in a further loss of wetlands and aquatic habitat within the Anacostia River. This vegetation effectively protects wetland soils from eroding thus preventing further degradation of the wetlands in the river particularly during storm events (Curtis 2010).

As noted in the “Hydrology and the Role of Climate Change” section of chapter 3, changes in mean sea level rise (estimated to rise at Anacostia Park approximately 2 inches during the 15-year life of this plan), coastal flooding, drought, and the increase in extreme weather events such as intense precipitation and storm events would continue to occur under alternative A. When considering the effects of climate change on hydrology, it is possible that the base flow of the Anacostia River and associated tributaries could change as well as the depth and hydroperiod, which could influence the distribution of wetland areas (Erwin 2009). Because the floodplain is already disconnected from the Anacostia River in most areas, even a small reduction in base flow that results in a water quantity change could affect the distribution of sensitive shoreline wetlands along the Anacostia River. Wetland systems are vulnerable and particularly susceptible to changes in quantity of water supply and it is expected that climate change would have a pronounced effect on wetlands through alterations in hydrological regimes (Erwin 2009). Increased flooding and increased flood runoff are also predicted to occur (Erwin 2009). This may cause increased erosion, especially if established wetland areas do not exist or are not created along shoreline of the Anacostia River. Landward or channelward migration of wetlands is another predicted effect of climate change. Therefore, identifying setback areas along the Anacostia River could be effective at establishing zones for natural coastal migration based on projected sea level rise. Some of the predicted impacts of sea level rise can be reduced by the removal of blockages along the River. Under alternative A, the sheet piling is proposed for removal, but this would not necessarily result in the inland migration of wetlands since the seawall would still be intact. Removing the sheet piling (which would require additional NEPA compliance) would allow an increased connection to the River, but could cause increased erosion of shoreline vegetation, especially under storm conditions, which are predicted to increase in severity and frequency as a result of climate change. Therefore, alternative A does not include techniques or actions that would counteract or reduce the potential pressures of climate change.

Continued, long-term minor adverse impacts to hydrology in the Anacostia River Watershed are anticipated as a result of the no action alternative because changes in hydrologic conditions would be detectable but would not be large enough to cause substantial local changes.

Cumulative Impacts—The 11th Street Bridge Replacement Project would result in permanent, adverse impacts to the Anacostia River, including adverse impacts resulting from the footprints of the pier extensions in the water and increased impervious surface. The placement of the extensions of the existing piers would have an impact on the existing riverbed, by replacing the existing habitat with a structure. However, the current and proposed wetland restoration projects along the Anacostia River such as the Anacostia Wetland Mitigation Project (ANA-11) should offset the adverse impacts described above and provide cumulative beneficial effects to hydrology of the Anacostia River Watershed. In addition to the NPS, the District Department of Transportation and projects associated with the AWI include implementing LID methods to treat stormwater and may include vegetated drainage swales, rain gardens, and/or treatment wetlands. A beneficial cumulative effect on hydrology should result from the combination of the projects that incorporate innovative stormwater management techniques.

The long-term minor adverse impacts on hydrology in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would be beneficial to hydrology, this would reduce the adverse effects of alternative A, resulting in a negligible cumulative impacts on hydrology.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on hydrology because chemical or biological changes to hydrologic conditions would be detectable, but not large enough to cause local changes in hydrology. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Hydrology Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. Considering new rain gardens and the removal of sheet piling along Anacostia River Fringe wetlands (which would both require additional NEPA compliance) would result in beneficial impacts to hydrology. Removing the sheet piling would result in hydrologic communication between the Anacostia

River Fringe Wetland and the mainstem of the river (NPS 2008a); therefore, causing a beneficial impact to hydrology through reconnection of the river with the wetland in this immediate and local area.

As noted in the “Hydrology and the Role of Climate Change” section of chapter 3, changes in mean sea level rise, increased upland runoff and invasive species colonization, changes to water level, and wetland migration are expected as a result of climate change. All action alternatives would include addressing upland runoff, including with one technique that includes filling rills to direct concentrated flow into wetlands. Upland runoff is expected to increase due to increased flooding events, and reducing upland runoff would help counteract the impacts of climate change. Tidal wetlands along the Anacostia River have water level changes of approximately 3 feet twice daily as well as occasional extreme water level changes of greater than 3 feet, which may affect vegetation establishment. Under all action alternatives, NPS could monitor the non-tidal wetlands within the park to determine if the establishment of wetland vegetation is being impacted by extreme water level changes. NPS could propose remedial actions to address the particular cause(s) of the problems. Monitoring would likely incorporate water level variations as a result of climate change. This would aid in understanding the nature of climatic changes that are likely to occur regionally in order to properly design wetland management and restoration at the park.

It has been suggested that the impacts of sea level rise can be ameliorated through the acquisition of inland buffer zones, which could provide an opportunity for habitats and wildlife to migrate inland (Erwin 2009). Although the park already owns the buffer zone along the Anacostia River, much of this zone is mowed/maintained grass immediately along the shoreline. All action alternatives would include, to some degree, planting new buffers along the shoreline and/or increasing the width of existing vegetative buffers. Although these vegetative buffers would be planted to act as barriers to the geese, planting the buffer zone with riparian vegetation would also ameliorate some of the effects of climate change for all action alternatives. As previously stated above for alternative 1, the removal of sheet piling at the Anacostia River Fringe Wetlands along the Anacostia River (which would require additional NEPA compliance) would not necessarily result in the inland migration of wetlands since the seawall would still be intact. Both adaptive management and wetland monitoring are key elements in each of the action alternatives. Monitoring is well known to be an essential element of wetland management, since it would allow detection of long-term change, specifically changes in the distribution of wetland areas at Anacostia Park that may result from climate change. Monitoring and adaptive management would provide insights to the potential consequences of climate change and help determine how future management practices should be implemented.

Other techniques such as installing new rain gardens would benefit hydrology since infiltrating stormwater into soils mimics natural drainage processes and reduces the volume of stormwater runoff that enters the Anacostia River during rain events; however, these areas may be too small and localized in nature to create a detectable impact on hydrologic conditions. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this technique (see table 1 in chapter 2). Overall, the techniques common to all action alternatives would result in negligible impacts to hydrology because the impacts would be at the lower levels of detection and because of the limited and localized nature of the proposed techniques.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland vegetation in the watershed. This alternative includes a suite of potential techniques to improve the hydrology of the watershed, including erosion control techniques, removing/modifying structures that negatively affect the marsh, creating tidal guts, potential enforcement of no wake zones along the River, investigating the effects of extreme water level change, and considering altering water elevations. Revegetating and stabilizing areas along the river and proposed wetland restoration techniques would also benefit hydrology in the watershed. Hydrology would benefit as a result of alternative B because the riverine wetland acreage within the Anacostia River in Anacostia Park would not continue to erode and wetlands and aquatic habitat within the Anacostia River would be preserved. This vegetation effectively protects wetland soils from eroding thus preventing further degradation of the wetlands in the river particularly during storm events (Curtis 2010). As a result of climate change, increased flooding and increased flood runoff could occur, which may allow for increased erosion if wetland areas are not established along shorelines (Erwin 2009). Alternative B includes techniques to control shoreline erosion, primarily focusing on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. These erosion control techniques would aid in offsetting potential pressures of climate change in addition to the techniques described above that are common to all action alternatives. The combination of removing sheet piling (which would require additional NEPA compliance) and seawall breaks at the Anacostia River Fringe Wetlands along the River would allow the inland migration of wetlands (which is currently blocked) that would occur as a result of sea level rise. This action would also aid in counteracting potential pressures of climate change by allowing the inland and channelward migration of wetlands along the River. Alternative B incorporates the most techniques to offset the predicted effects to hydrology that would result from climate change.

Additional wetland management techniques such as reducing impervious areas would also benefit hydrology. The combination of techniques described above would benefit hydrology since infiltrating stormwater into soils mimics natural drainage processes and reduces the volume of stormwater runoff that enters the Anacostia River during rain events; stream and channel flow would also be improved by removing and/or modifying structures that impede flow, thus benefiting hydrology as well. Therefore, alternative B would result in beneficial impacts to hydrology that would be detectable but localized in the watershed as a result of improved wetlands along the Anacostia River through wetland management and resident Canada goose management techniques.

Cumulative Impacts—The beneficial impacts on hydrology as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to hydrology, there would be beneficial cumulative impacts on hydrology when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on hydrology from wetland restoration, erosion control, and a reduction in herbivory. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general this alternative uses less intensive techniques. Compared to alternative B, alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and options for removal of structures that result in erosion and clogging the marsh would be more limited than alternative B. Overall, impacts to hydrology for alternative C would be the same as alternative B: beneficial because the wetland management and resident Canada goose management techniques would locally improve hydrology through stormwater infiltration that would reduce the volume of runoff that enters the Anacostia River during rain events and improved stream and channel flow. Similar to the discussion for alternative B above, increased flooding and increased flood runoff could occur as a result of climate change, which may allow for increased erosion if wetland areas are not established along shorelines (Erwin 2009). Alternative C includes techniques to control shoreline erosion, primarily focusing on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. These erosion control techniques would aid in offsetting potential pressures of climate change in addition to the techniques described above that are common to all action alternatives. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to the hydrology at the park. An overall, beneficial impact for alternative C is appropriate because improvements to hydrology would be detectable, but these beneficial impacts would be small and localized.

Cumulative Impacts—The beneficial impacts on hydrology as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to hydrology, there would be beneficial cumulative impacts on hydrology when added to the beneficial impacts from alternative C.

Conclusion—Alternative C would result in overall beneficial impacts on hydrology from an improvement to the soil from vegetation planting and herbivory reduction. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed and no initial lethal reduction activities. The one-time population reduction would not have a short-term or long-term effect on hydrology and goose herbivory of vegetation would continue. Additionally, alternative D does not include wetland management techniques such as reduction in impervious surface, or addressing upland runoff. Only the techniques described above that are common to all action alternatives would aid in offsetting potential pressures of climate change under alternative D. No erosion control techniques are proposed to improve hydrology and no new wetland restoration techniques are included as part of alternative D. Therefore, alternative D results in negligible impacts to hydrology because no changes to hydrologic conditions are expected.

Cumulative Impacts—The negligible impacts on soils as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to hydrology, there would be beneficial cumulative impacts on hydrology when added to the negligible impacts from alternative D.

Conclusion—Alternative D would result in overall negligible impacts on hydrology because chemical or biological changes to hydrologic conditions would not be detectable or the effects would be at low levels of detection. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B but the resident Canada goose management techniques proposed do not include lethal population reduction activities. New wetland restoration techniques are proposed, which would trap pollutants such as sediment through plantings and increased vegetative cover. However, no lethal control for resident Canada geese is proposed, and therefore goose herbivory of vegetation would continue. Similar to the discussion for alternative B, increased flooding and increased flood runoff could occur as a result of climate change, which may allow for increased erosion. Alternative E includes techniques to control shoreline erosion, primarily focusing on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. These erosion control techniques would aid in offsetting potential pressures of climate change in addition to the techniques described above that are common to all action alternatives. The combination of removing sheet piling (which would require additional NEPA compliance) and seawall breaks at the Anacostia River Fringe Wetlands along the River would allow migration of wetlands (which is currently blocked) that would occur as a result of sea level rise. This action would also aid in counteracting potential pressures of climate change by allowing the inland and channelward migration of wetlands along the River. Alternative E, like alternative B, incorporates the most techniques to offset the predicted effects to hydrology that would result from climate change.

Alternative E would result in negligible impacts to hydrology because no changes to hydrologic conditions are expected.

Cumulative Impacts—The negligible impacts on soils as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to hydrology, there would be beneficial cumulative impacts on hydrology when added to the negligible impacts from alternative E.

Conclusion—Alternative E would result in overall negligible impacts on hydrology because chemical or biological changes to hydrologic conditions would not be detectable, or the effects would be at low levels of detection. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

WATER QUALITY

Guiding Regulations and Policies

NPS *Management Policies* 2006 state that the NPS would "take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations" (NPS 2006a). The NPS has also established general goals for water quality, and in accordance with these goals, the NPS works cooperatively with the state to protect and enhance the quality of water in national park units. The Clean Water Act (33 USC 1251 et seq.) protects and restores the quality of natural waters through the establishment of nationally recommended water quality standards. Under the oversight of the USEPA, states administer provisions of the Clean Water Act by establishing water quality standards and managing water quality. According to USEPA regulations, water quality standards must:

- designate uses of the water,
- set minimum narrative or numeric criteria sufficient to protect the uses, and
- prevent degradation of water quality through antidegradation provisions.

In accordance with the Clean Water Act, the current use of the Anacostia River as defined by the District WQS is Class B Water (Secondary Contact Recreation).

Assumptions and Methodologies

Potential impacts to water resources are assessed based on the extent of disturbance to water quality. Water quality impacts were determined based on the sustainability of surface water for wildlife and human contact. Other considerations in assessing the magnitude of water quality impacts are the effect of those resources dependent on a certain quality or condition of water. In general and applicable to this document, turbidity is caused by suspended matter or impurities (including clay and silt) that interfere with the clarity of the water; therefore, turbidity can be correlated to sediment transport and can affect water quality. Wetlands can minimize or reduce sediment transport off-site because particles can settle in the wetlands. Generally, if turbidity is decreased through reduced sediment transport, water clarity and thus water quality can be improved.

To understand the effects of wetland and resident Canada goose management on the water resources throughout the park, park resources inventories, scientific literature and research, and published technical data were consulted to identify the information contained in this analysis.

Primary steps for assessing impacts to the water resources include identifying:

- surface waters in areas likely to be affected by the proposed management activities,
- potential changes in hydrology from current and future management activities.

The geographic study area for water resources includes areas within the park as well as adjacent areas within the Anacostia River and the greater Anacostia Watershed that could be impacted by wetland and resident Canada goose management activities.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on hydrology and water quality:

Negligible: Chemical or biological changes to water quality would not be detectable and would not have an appreciable effect or the effects would be at low levels of detection.

Adverse: *Minor*: Chemical or biological changes to water quality would be detectable but would not be large enough to cause substantial local changes. Specifically, resulting changes in soil erosion rates and stormwater flows would cause localized alterations to turbidity that could affect water quality.

Moderate: Chemical or biological changes to water quality would be readily apparent and they would result in substantial, noticeable effects to water quality, ground water, and hydrology on a local scale. Specifically, resulting changes in soil erosion rates and stormwater flows would cause widespread but intermittent alterations to turbidity that would affect water quality.

Major: Chemical or biological changes to water quality would be detectable beyond the immediate management area and would be readily measurable across large areas of the park. Specifically, resulting changes in soil erosion rates and stormwater flows would cause frequent alterations to turbidity over an extensive area and would affect water quality and could result in modifications to the natural stream channel and instream flow characteristics.

Water Quality Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing areal coverage of wetland vegetation. This reduces the potential for wetland areas to trap sediment (and associated pollutants binding to sediment), and creates bare areas in the wetlands so improvements to water quality in the Anacostia River would not occur. Additionally, no wetland management techniques are being proposed to improve water quality and the no action alternative includes continuing only limited trash removal (trash is a pollutant causing impairment in the Anacostia River as defined by DCDE [2008]). Because no new wetland restoration techniques and no lethal population reduction strategies for the resident Canada goose are proposed as part of the no action alternative, bare areas in the wetlands (due to herbivory) and thus sediment scouring would continue to occur and affect the water quality of the Anacostia River in the vicinity of the park. Removing sheet piling along the Anacostia River Fringe wetlands (which would require additional NEPA compliance) would have a short-term, minor adverse effect on water quality due to erosion that would occur and the detectable but localized chemical changes that would follow this process. Erosion of soil into waterways can cause an increase in turbidity and result in reduced water clarity and water quality.

The USFWS (2005) has stated that degradation of water quality by either fecal contamination or erosion of sediments from areas denuded by goose grazing or trampling does occur, although this impact has not been quantified at the park. However, it has been estimated that with 500 or so geese during the summer and possibly 700 in the winter in the park, it is clear that the resident Canada geese do add to the contamination of the river, but this percentage is unknown and could be anywhere from one percent to 15 percent of the total (Bates 2010b). Specific effects to water quality as a result of fecal contamination by resident Canada geese have not been studied at Anacostia Park. It is unknown whether the water quality in the Anacostia River is measurably affected by fecal droppings from the resident Canada goose population in the park due to the large size of the Anacostia River. However, the combination of potential impacts to water quality from goose fecal contamination (which has not been proven at the park) and the increased erosion from excessive grazing, would negatively impact water quality.

Overall, continued long-term minor adverse impacts to water quality are anticipated as a result of the no action alternative. These adverse impacts to water quality would occur during storm events due to exposed and eroding banks where vegetation does not currently exist along the Anacostia River, erosion of soil into waterways that can cause an increase in turbidity, a decrease in water clarity, and reduced water quality.

Cumulative Impacts—The Anacostia River has heavy siltation, accumulated toxins in sediments, and sewage overflows, which all contribute to poor water quality in this section of the river (NPS 2004a). Specifically, the Anacostia River and Kingman Marsh continue to receive nonpoint discharges derived from adjacent, impervious areas as well as impacts from CSOs along the river. Due to the numerous redevelopment projects proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11th Street Bridge Replacement Project, these projects would have an adverse impact on water quality. Erosion of soil from construction sites into waterways can cause an increase in turbidity and reduced water quality. As stated above in the soils section, these development and construction projects would require compliance with the District DOH Watershed Protection Division, Sediment and Storm Water Technical Services Branch, District WQS for Surface Water (21 DCMR Ch.11), District DOE, DC Water Management Plan per the Water Pollution Control Act of 1984 (DC Law 5- 188), and Section 402 of the Clean Water Act, also referred to as NPDES to minimize impacts to water quality. However, the changes to water quality as a result of the current and proposed projects listed above are still small when considered in relation to the ongoing dredging program of the lower Anacostia by the USACE for contaminated sediment removal. The current and future projects discussed above would have a long-term moderate adverse impact on water quality in the Anacostia River.

Fecal matter from resident Canada geese generally influences water quality in situations where the waterbodies are characterized as stagnant or standing water (USFWS 1999; Rutgers 2004). Canada goose fecal matter can also lead to eutrophication (excessive richness of nutrients in a body of water) of small water bodies, especially those that have restricted circulation and flow-through, which in turn may stimulate algae and weed growth (French 2001). Although the Anacostia River does have backwater conditions that could be considered stagnant during certain tidal cycles, fecal matter from geese and its impact on water quality and human health has not been studied at Anacostia Park. Fecal matter is described as a contributing factor to water quality in combination with other factors such as effects of goose herbivory. It is known and stated that resident Canada goose herbivory reduces areal coverage of wetland vegetation. This reduces the potential for wetland areas to trap sediment (and associated pollutants binding to sediment), and creates bare areas in the wetlands.

The water quality of the Anacostia River is being affected by increased erosion occurring from excessive grazing that affects water quality and causes increased sediments introduced from runoff and eroded soils in the Anacostia River as well as resident Canada geese fecal droppings. However, these impacts are small in comparison to the water quality issues in the District, including issues associated with CSOs and the effluent from Blue Plains Advanced Wastewater Treatment Plant, located less than one mile downstream from Anacostia Park. As a result of a consent decree that the USEPA signed with District WASA in 2004, CSO discharge would be reduced by a projected 98 percent in the Anacostia River when the project is fully implemented (DCWASA 2010). This would result in a beneficial, impact to water quality in the Anacostia River (DCWASA 2008).

Although many current and future projects are proposed along the Anacostia River, many of these projects aim to improve the water quality of the river, thus providing an overall beneficial cumulative impact that would offset the projects with adverse impacts listed above. Specifically, the AWI proposes to substantially improve water quality in the Anacostia River through the implementation of a combined sewer containment plan, wetland restoration, tributary stream daylighting, and environmental guidelines governing future development along the Anacostia watershed. Environmental programs associated with the Woodrow Wilson Project have included non-tidal wetland creation to provide water quality treatment for uncontrolled stormwater runoff. The required implementation of stormwater treatment methods for proposed projects such as the 11th Street Bridge Replacement Project should minimize the cumulative impacts to water quality, with potential for a net improvement. All current and proposed wetland restoration projects along the Anacostia River such as the Anacostia Wetland Mitigation Project (ANA-11), which restored a 54-acre tidal wetland should provide cumulative beneficial effects to water quality in the Anacostia River. The ANA-11 project specifically incorporated goals identified in the Anacostia Watershed Toxics Alliance 2002 Management Plan related to wetland functions of improving water quality by serving as a filter for overland run-off and attenuating sediments and nutrients. In addition to the NPS, the District DOT and projects associated with the AWI include implementing LID methods to treat stormwater and may include vegetated drainage swales, rain gardens, and/or treatment wetlands. The addition of these treatment methods, where none currently exist or to mitigate proposed development should have a beneficial impact on the quality of stormwater runoff discharging to the river. Some of the area projects may also provide opportunities for separation of some stormwater from the combined sewer, which would translate to a proportionately lower volume of discharge from CSOs to the river.

The long-term minor adverse impacts on water quality in the Anacostia River in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would be beneficial to water quality this would reduce the adverse effects of alternative A resulting in a negligible cumulative impact on water quality.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on water quality because chemical or biological changes to the water quality would be detectable but not large enough to cause local changes in water quality. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Water Quality Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing the sheet piling along the Anacostia River Fringe Wetlands and installing rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. The Anacostia River has heavy siltation, accumulated toxins in sediments, and sewage overflows, which all contribute to poor water quality in this section of the river (NPS 2004a). The resident Canada goose management techniques described above for all action alternatives would have a negligible impacts on water quality because there would be no chemical or biological changes to water quality as a result of these techniques, thus supporting a negligible impact. Removing sheet piling along the Anacostia River Fringe Wetlands would have a short-term minor adverse effect on water quality due to erosion that would occur and the detectable but localized chemical changes that would follow this process. Erosion of soil into waterways can cause an increase in turbidity and result in reduced water clarity and water quality. It was concluded by NPS (2008b) in a hydraulic evaluation of the Anacostia River Fringe Wetland that when the sheet pile is removed, erosion may occur but even high magnitude flows would not necessarily result in substantial or even moderate erosion of the Anacostia River Fringe Wetland. It is very likely that some portion of the Anacostia River Fringe Wetland would be reworked and eroded by the river, but it is also quite likely that a sizable portion of the wetland would remain similar to its present configuration (NPS 2008a).

Installing new rain gardens may adversely affect water quality during construction in the short-term but also benefit water quality in the long-term by trapping pollutants (nutrients, sediment, and pathogens) carried by runoff and reducing the amount of impervious area in the park. Addressing upland runoff may also trap pollutants that would otherwise enter the Anacostia River as described above for rain gardens. However, the areas proposed for rain gardens and addressing upland runoff may be too small and localized in nature to create a detectable impact on water quality and thus a negligible impact to water quality would occur. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). Overall, the techniques common to all action alternatives would result in negligible impacts to water quality because the impacts would be at the lower levels of detection and because of the limited and localized nature of all the proposed techniques.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland vegetation. Erosion and sedimentation in wetlands are integral functions of the ecosystem, and can affect both vegetation and water quality, including serving as depositional environments and preventing the downstream passage of excess nutrients or harmful chemicals (Drake and Paulin 2003). Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River. Wetlands can serve as a trap for nutrients and sediment (and associated pollutants and pathogens binding to sediment) carried by runoff from surrounding uplands or contiguous wetlands. Wetlands have the ability to process these nutrients into other forms and trap pollutants as well as sediment by capturing and settling particles, thus decreasing turbidity, improving water clarity, and improving water quality in the Anacostia River. Wetlands also function to prevent the adverse effects associated with excess nutrients entering surface waters, such as the Anacostia River. During the time when newly planted vegetation in wetland areas is being established, a short-term minor adverse impact to water quality would occur. Some erosion of soil into the Anacostia River would occur and would cause an increase in turbidity, a decrease in water clarity and water quality in localized areas.

Other wetland management park operations techniques (trash management, reduction of impervious areas, new rain gardens) as well as hydrology techniques (erosion control techniques, removing/modifying structures, and addressing upland runoff) would improve water quality as part of alternative B by reducing urban runoff and associated pollutants that enter the Anacostia River. Water quality would also be improved through a reduced resident Canada goose population. Reducing the population would decrease the number of fecal droppings and decrease the amount of erosion from excessive grazing, thus improving water quality through decreased pathogens and decreased sediments introduced from runoff and eroded soils. The combination of techniques included as part of alternative B may cause a discernible improvement in water quality in the vicinity of the park. Therefore, alternative B would result in beneficial impacts to water quality because improvements would be detectable but would not cause substantial local changes. Some hydrology techniques (removing or modifying structures that result in erosion and clogging of marsh and creating tidal guts) would also have a short-term, adverse impact on water quality during construction from land disturbance activities that cause erosion and would range from negligible to minor impacts, depending on the area disturbed. However, water quality impacts would be minimized by appropriate BMPs and may include E&S plans, revegetation plans, NPDES permits, or other required documents in the District, depending on the total area disturbed.

Because the 2008 list of *Impaired District Waters and Pollutants* within and adjacent to Anacostia Park includes for the first time trash as a pollutant causing impairment (as defined by DCDE [2008]), alternative B includes trash management as a technique under park operations and management. Since the main source of trash in the Anacostia River is litter and illegal dumping (AWRP and MWCOG 2007), trash management would have a beneficial impact on water quality by reducing the amount of litter and dumping that occurs in the Anacostia River.

Techniques considered in resident Canada goose management are proposed to reduce goose herbivory and improve wetland vegetation. As stated above in alternative A, specific effects to water quality as a result of fecal matter by resident Canada geese within the park has not been studied. Generally, improvements to water quality should occur as a result of alternative B due to a reduced resident Canada goose population, which should not only decrease the amount of fecal droppings but also reduce erosion and decrease sediments introduced from runoff and eroded soils that is occurring through herbivory of vegetation along the shoreline.

As a result of alternative B, improvements to water quality would be detectable, but these beneficial impacts would be small and localized. Alternative B would also have a short-term adverse impact on water quality and would range from negligible to minor, depending on the area disturbed due to land disturbance activities and during storm events while the newly planted vegetation is being established. Overall, alternative B would result in beneficial impacts to water quality as a result of improved wetlands along the Anacostia River through very high wetland management and high resident Canada goose management because improvements would be detectable but would not cause substantial local changes.

Cumulative Impacts—The beneficial impacts on water quality as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to water quality, there would be beneficial cumulative impacts on water quality when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on water quality from wetland improvements, erosion control, and a reduction in herbivory. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general this alternative uses less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, and the least invasive stream/stormwater outfall modifications. Alternative C would not include creating tidal guts, consider stream daylighting, seawall breaks, and planting efforts would be at a lower density than alternative B. Overall, impacts to water quality as a result of alternative C would be the same as alternative B: beneficial because the wetland management and resident Canada goose management techniques would improve water quality by reducing urban runoff and associated pollutants, decreasing soil loss through plantings and reduced goose herbivory of vegetation, and reducing fecal matter from geese. Alternative C would also have a short-term, adverse impact on water quality and would range from negligible to minor, depending on the area disturbed due to land disturbance activities and during storm events while the newly planted vegetation is being established. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to water quality at the park. An overall, beneficial impact for alternative C is appropriate because improvements to water quality would be detectable, but these beneficial impacts would not cause substantial local changes.

Cumulative Impacts—The beneficial impacts on water quality as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to water quality, there would be beneficial cumulative impacts to water quality when added to the beneficial impacts from alternative C.

Conclusion—Alternative C would result in overall beneficial impacts on water quality from a reduction in urban runoff, erosion control, and a reduction in herbivory. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed and no initial lethal reduction activities. The one-time population reduction would have a short-term effect on water quality through reduced resident Canada goose numbers and herbivory, but a long-term improvement to water quality would not occur. Additionally, alternative D does not include wetland management techniques such as reduction in impervious surface or addressing upland runoff. No erosion control techniques to improve hydrology and no new wetland restoration techniques are proposed as part of alternative D. Therefore, alternative D results in long-term minor adverse impacts to water quality.

Cumulative Impacts—The long-term minor adverse impacts on water quality as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to water quality. This should reduce some of the adverse impacts to water quality from implementation of this alternative resulting in a negligible cumulative impact on water quality.

Conclusion—Alternative D would result in overall long-term minor adverse impacts on water quality because chemical or biological changes to the water quality would be detectable but not large enough to cause local changes in water quality. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B but the resident Canada goose management techniques proposed do not include lethal population reduction activities. New wetland restoration techniques are proposed, which would trap pollutants such as sediment through plantings and increased vegetative cover. Alternative E would have a short-term minor adverse impact on water quality during storm events while the newly planted vegetation is being established. Because no lethal control for resident Canada geese is proposed, goose herbivory of vegetation would continue in the long-term. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose lethal population reduction may be either completely offset or take longer to realize. Because there would be no discernible effect on water quality, the overall impacts to water quality as a result of alternative E would be negligible.

Cumulative Impacts—The negligible impacts on water quality as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to water quality, there would be beneficial cumulative impacts on water quality when added to the negligible impacts from alternative E.

Conclusion—Alternative E would result in overall negligible impacts on water quality because chemical or biological changes to water quality would not be detectable, or the effects would be at low levels of detection. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

FLOODPLAINS

NPS *Management Policies 2006* state that the park would manage for the preservation of floodplain values; minimize potentially hazardous conditions associated with flooding; and comply with the NPS Organic Act and all other federal laws and executive orders related to the management of activities in flood-prone areas (NPS 2006a). Specifically the NPS would:

- protect, preserve, and restore natural resources and functions to floodplains;
- avoid the long- and short-term environmental effects associated with the occupancy and modification of floodplains; and
- avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks (NPS 2006a).

Executive Order 11988, "Floodplain Management" directs all federal agencies to avoid both long- and short-term adverse effects associated with occupancy, modification, and development within the 100-year floodplain, when possible. All federal agencies are required to avoid building in a 100-year floodplain unless no other practicable alternative Exists.

Assumptions and Methodologies

Impacts from the proposed alternatives to the 100-year floodplain were assessed qualitatively. Primary steps for assessing impacts to the 100-year floodplain include identifying:

- 100-year floodplains in areas likely to be affected by the proposed management activities.

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.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on the 100-year floodplain:

Negligible: The impact on the 100-year floodplain would not be measurable. Any effects on functionality of the 100-year floodplain would be slight.

Adverse: *Minor*: Impacts would be measurable or perceptible but would be localized within a relatively small area. The overall functionality of the 100-year floodplain would not be affected.

Moderate: An action would result in a change in quantity or alteration of the 100-year floodplain and overall functionality of the floodplain. Impacts would cause a change in the 100-year floodplain; however, the impact would remain localized.

Major: An action would result in a change in the 100-year floodplain that would be substantial, highly noticeable, and permanent. Impacts would affect overall floodplain functionality in a relatively large area. Significant floodplain processes would be altered, and landscape-level changes would be expected.

Floodplains Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland vegetation in the watershed. The resident Canada goose population would not be intensively reduced as part of the no action alternative. Removing sheet piling along the Anacostia River Fringe Wetlands (which would require additional NEPA compliance) would have a short-term minor adverse effect on floodplains due to erosion that would occur within the floodplains but a beneficial impact would occur because the functionality of the floodplain would be improved by removing structures in the floodplain. However, this beneficial impact from removing sheet piling would be offset by the lack of other wetland management techniques in this alternative that are not being proposed to improve floodplains in the watershed. It is estimated that over the life of this plan/EIS, the riverine wetlands would continue to erode (NPS 2010d, Curtis 2010), resulting in a further loss of the floodplain. It is also expected that the number of resident Canada geese would continue to increase and graze within the floodplain, resulting in a decrease of vegetation that protects the soil from potential erosion (Curtis 2010). Overall, the floodplain is disconnected from the Anacostia River and from draining the historic wetlands, which causes a measurable, but localized impact within the park. Continued, long-term minor adverse impacts to floodplains along the Anacostia River Watershed are anticipated as a result of the no action alternative.

Cumulative Impacts—A large portion of Anacostia Park was created by filling the historic river channel, which created floodplain, but disconnected it from the Anacostia River and reduced floodplain functionality. Projects associated with the AWI, including Poplar Point could affect the floodplain through development along the Anacostia River. The 11th Street Bridge Replacement Project would span the floodplain except for the piers in the river and would impact up to 2.4 acres of floodplains along the Anacostia River. The impact to the floodplain from these projects may not measurably alter flood elevations but may reduce floodplain storage along the Anacostia River. Therefore, these projects would provide a cumulative negligible impact to the floodplain in and near Anacostia Park.

The long-term minor adverse impacts on the floodplain in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have a negligible impact to floodplains, there would be long-term minor adverse cumulative impacts under the no action alternative. The negligible impacts from the projects listed above are not expected to add to the long-term minor adverse impacts of alternative A.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on floodplains because the impacts would be measurable or perceptible, but would be localized and would not affect the overall functionality of the 100-year floodplain. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Floodplain Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Anacostia River Fringe Wetlands, and installing new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. With the exception of installing new rain gardens and the removal of sheet piling along Anacostia River Fringe Wetlands (both which would require additional NEPA compliance), the techniques described above for all action alternatives would have a negligible impact on floodplains because there would be no change in the functionality of the floodplain due to the limited and localized nature of all the techniques.

Removing sheet piling along the Anacostia River Fringe Wetlands would have a short-term minor adverse effect on floodplains due to erosion that would occur within the floodplains but a beneficial impact would occur because the functionality of the floodplain would be improved by removing structures in the floodplain. The planned removal of the sheet piling would result in hydrologic communication between the Anacostia River Fringe Wetland and the mainstem of the river, therefore, causing a beneficial impact to floodplains through reconnection of the river with the wetland. Installing new rain gardens may disturb portions of the floodplain during construction in the short-term but may also increase flood attenuation in the long-term and help reduce the amount of impervious area in the park; however, these areas may be too small and localized in nature to create a detectable impact on floodplains. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the floodplain and not affecting the floodplain, NPS would prepare and approve a SOF for activities in a floodplain. Overall, the techniques common to all action alternatives would result in negligible impacts to floodplains due to the limited and localized nature of the proposed techniques.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland vegetation in the floodplain. This alternative includes a suite of potential techniques to improve the floodplains along the river, including erosion control techniques, removing/modifying structures that negatively affect the marsh, creating tidal guts, addressing upland runoff, potential enforcement of no wake zones along the river, investigating the effects of extreme water level change, and considering altering water elevations. Additional wetland management techniques included in park operations and management would improve the floodplains: reduction of impervious areas and installation of new rain garden areas. Some wetland restoration techniques would improve the floodplains through reconnection with the Anacostia River and include possible daylighting of storm sewers and the removal of portions of the seawall. The flood protection levee (composed of both earthen berm and concrete) as well as the seawall along the shoreline have disconnected portions of the floodplain with the Anacostia River in the park. Reconnection of the floodplain with the Anacostia River as a result of techniques included in alternative B would restore the functionality of the floodplain. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the floodplain and not affecting the floodplain, NPS would prepare and approve a SOF for activities in a floodplain. Negligible impacts to the floodplains would result from alternative B due to soil disturbance and/or construction in the floodplains for wetland restoration techniques. However, alternative B would result in overall beneficial impacts to floodplains along the Anacostia River through wetland management and resident Canada goose management because floodplain function would improve in localized areas of the park. The majority of beneficial effects would be through improvements to wetlands, additional vegetative buffer plantings along the river, and the removal of impervious surface in the watershed as well as potential flood attenuation through wetland restoration techniques. Flood attenuation and/or alteration enables a wetland to reduce flood damage from prolonged periods of precipitation by storing and desynchronizing (i.e., gradually releasing at lower heights/velocities) floodwaters. A secondary benefit of flood attenuation is the economic value of flood protection through reduced property damage.

Cumulative Impacts—The beneficial impacts on the floodplain as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have negligible impacts to floodplains, there would be beneficial cumulative impacts on floodplains when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on the floodplain from the reconnection of wetlands with the river, and wetland restoration. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures and least invasive stream/stormwater outfall modifications. No seawall breaks and no daylighting are proposed for alternative C to reconnect the floodplain with the Anacostia River. Therefore, impacts to floodplains as a result of alternative C would be negligible because floodplain function would only be slightly affected or improved and these impacts would not be measurable. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate a project outside of a floodplain and not affecting the floodplain, the NPS would prepare and approve a SOF for activities in a floodplain.

Cumulative Impacts—The negligible impacts on floodplains as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have negligible impacts to floodplains, there would negligible cumulative impacts on floodplains when added to the negligible impacts from alternative C.

Conclusion—Alternative C would result in overall negligible impacts on the floodplain because there would be no measureable impact on the 100-year floodplain, and any impacts on the floodplain functionality would be slight. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed and no initial lethal reduction activities. No sea wall breaks and no daylighting are proposed for alternative D to reconnect the floodplain with the Anacostia River. Therefore, due to the limited wetland management techniques, alternative D results in long-term minor adverse impacts to floodplains because localized and perceptible adverse impacts to the floodplain would occur because the floodplain would not be reconnected to the Anacostia River but the overall functionality of the floodplain would not be affected.

Cumulative Impacts—The long-term minor adverse impacts on the floodplain in and near Anacostia Park under alternative D were considered together with the effects of the projects mentioned above. Since the projects listed previously from other past, present, and reasonably foreseeable future actions would have a negligible impact to floodplains, there would be a long-term minor adverse cumulative impact on floodplains when added to the long-term minor adverse impacts from alternative D.

Conclusion—Alternative D would result in overall long-term minor adverse impacts on floodplains because the impacts would be measurable or perceptible, but would be localized and would not affect the overall functionality of the 100-year floodplain. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B but the resident Canada goose management techniques proposed do not include lethal population reduction activities. Sea wall breaks and daylighting are proposed for alternative E to reconnect the floodplain with the Anacostia River, which would help restore the functionality of the floodplain. However, the floodplain benefits from a full suite of wetland management techniques proposed without a resident Canada goose population (lethal) reduction may be either completely offset or take longer to realize. Therefore, alternative E would result in an overall range of negligible to beneficial impacts to floodplains along the Anacostia River. When it is not practicable to locate or relocate development to a site outside of the floodplain and not affecting the floodplain, NPS would prepare and approve a SOF.

Cumulative Impacts—The range of negligible to beneficial impacts on floodplains as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have negligible impacts to floodplains, there would negligible cumulative impacts on floodplains when added to the negligible to beneficial impacts from alternative E.

Conclusion—Alternative E would result in overall negligible to beneficial impacts on the floodplain because there would be no measure impact on the 100-year floodplain, and any impacts on its functionality would be slight. Additionally, the reconnection of the wetland with the river would improve the floodplain function. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

WETLANDS

This topic includes tidal and non-tidal wetland resources.

Guiding Regulations and Policies

The NPS would 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*.

NPS *Management Policies 2006* state that the park would provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; preserve and enhance the natural beneficial values of wetlands; and avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands. The NPS would implement a “no net loss of wetlands” policy (NPS 2006a). In addition, the park would strive to achieve a long-term goal of a net gain of wetlands through restoration of previously degraded or destroyed wetlands.

Section 4.4.4 of the NPS *Management Policies 2006* (Management of Exotic Species) states that exotic species would not be allowed to displace native species. All exotic plant and animal species that do not meet an identified park purpose would be managed. This section is applicable to this plan/EIS due to the presence of exotic plant species, including wetland plant species at the park. Specifically, Section 4.4.4.2 of the NPS *Management Policies 2006 (*Removal of Exotic Species Already Present) states that all exotic plant and animal species that are not maintained to meet an identified park purpose would be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species:

- interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or
- disrupts the genetic integrity of native species, or disrupts the accurate presentation of a cultural landscape, or
- damages cultural resources, or significantly hampers the management of park or adjacent lands, or
- poses a public health hazard as advised by the U.S. Public Health Service (which includes the Centers for Disease Control and the NPS public health program), or
- creates a hazard to public safety.

Executive Order 11990, “Protection of Wetlands” directs all federal agencies to avoid both long- and short-term adverse impacts associated with the destruction or modifications of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a possible alternative. Each agency is required to provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The purpose of Director’s Order #77-1: *Wetland Protection* is to establish NPS policies, requirements, and standards for implementing EO 11990.

Section 404 of the Clean Water Act established a program to regulate the discharge of dredged or fill material into water of the United States. The Rivers and Harbors Act of 1899 defined navigable waters of the United States as “those waters that are subject to the ebb and flow of the tides.” The Clean Water Act built on this definition and defined the waters of the United States to include tributaries to navigable waters and wetlands adjacent to other water of the United States. The Clean Water Act does not allow for the filling of wetlands if there is another practicable alternative that would be less damaging to aquatic resources or if significant degradation would occur. Permits for work within wetlands are issued by the USACE and state agencies. The USACE encourages agencies to avoid and/or minimize impacts to wetlands, and requires mitigation if unavoidable impacts to wetlands occur. A SOF describing wetlands and impacts according to the NPS definition is normally required for impacts to wetlands as a result of a proposed project. However, as described in Section 4.2 of Director’s Order #77-1, some NPS requirements (SOF and wetland compensation) may be waived for certain excepted actions (NPS 2008b). Some of the techniques in this plan/EIS may be considered an excepted action if wetland impacts stay under certain acreage as described in Section 4.2.1h (actions designed for the purpose of restoring degraded aquatic habitats or ecological processes) because the purpose of the project is to restore wetlands along the Anacostia River. Under this excepted action, up to 0.25 acres of new long-term adverse impacts on wetlands are allowed if directly associated with and necessary for the restoration (NPS 2008b). However, the techniques included in this plan/EIS that would require additional NEPA compliance may also require a SOF for activities proposed in wetlands. NPS would acquire all necessary permits and prepare an SOF for any associated impacts to wetlands under future work that would require additional NEPA compliance.

Assumptions and Methodologies

The evaluation of impacts to wetlands was based on a qualitative assessment of how management actions would affect wetland functions. Impacts were determined based on the functionality of the wetland to support vegetation and wildlife. In addition, the impacts were based upon the quality of the wetland, specifically, hydrology of the area, water quality, and plant species.

The geographic study area for wetlands includes all tidal and non-tidal wetland areas at Anacostia Park.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on wetlands:

Negligible: There would be no observable or measureable change to the wetlands within the park or their ability to support vegetation or wildlife. A reduction in the abundance and diversity of native wetland vegetation may occur, but any change would be so small that it would not be measurable.

Adverse: *Minor*: Impacts to wetlands and their ability to support wetland vegetation and wildlife would be detectable at the park. Impacts would be detectable only in or adjacent to wetland areas that have been mapped at the park. The overall functionality of the wetland would not be affected. A reduction in the abundance and diversity of wetland vegetation would occur and would be measurable but, would be limited and of little consequence to the functionality of the native plant communities.

Moderate: Impacts to wetlands and their ability to support wetland vegetation and wildlife would be detectable at the park. Impacts would be detectable in areas outside of wetland areas that have been mapped at the park. Some reduction in the abundance and diversity of native wetland vegetation would occur, and it would be measurable but would result in a small-scale consequence to the functionality of the native plant communities in Anacostia Park.

Major: Impacts to wetlands and their ability to support wetland vegetation and wildlife would be detectable at the park. Impacts would be detectable outside of wetland areas that have been mapped at the park. A noticeable reduction in the abundance and diversity of native wetland vegetation would occur. The change would be measurable and of widespread consequence to the functionality of the native plant communities within Anacostia Park.

Wetland Impacts Alternatives Evaluation

Alternative A – No Action Alternative—Under alternative A, no change from current management techniques and/or current conditions would occur. Park staff would continue resident Canada goose management activities at the same level as current with no lethal control, including (since 2004) maintaining current goose exclusion fencing and yearly egg oiling. In June 2010, the goose counts were conducted for five days spanning two weeks during the flightless period. The mean for 2010 within these five days at four sectors (Kenilworth, Kingman, Heritage Island, and Anacostia East locations) was 564 geese, with a range of 94 to 619 total geese per day for all sectors (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. The 2010 goose count numbers exhibit fluctuations in the resident Canada goose population within Anacostia Park since 2004, when current resident Canada goose management techniques were first applied. Therefore, the resident Canada goose population would be expected to continue to fluctuate within the park and would expand in the future as a result of alternative A.

As described in “Chapter 3: Affected Environment”, the wetlands that have been restored within Anacostia Park, are being damaged in part by resident Canada geese that are overgrazing the wetland plants; the 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. Additional wetland restoration issues have been observed at Anacostia Park, including planting at incorrect hydrologic regimes. Removing sheet piling along the Anacostia River Fringe Wetlands (which would require additional NEPA compliance) would have a short-term minor adverse effect on wetlands due to erosion that would occur and water quality impacts that would follow this process but a beneficial impact would occur because wetlands would be improved by removing structures in the wetlands. However, these beneficial impacts would be offset because alternative A does not include initiating new wetland restoration efforts, but provides wetland management techniques that incorporate continuation of the current management of invasive plant species. In addition, it is expected that over the life of this plan/EIS, the riverine wetlands in Anacostia Park would continue to erode (NPS 2010a), resulting in a further loss of wetland vegetation that would also result in erosion during rain events as mentioned above (Curtis 2010). Alternative A would result in continued loss of wetlands, degradation and herbivory by the resident Canada goose population, the introduction of invasive plant species, and degradation of water quality due to sediments introduced from runoff and eroded soils. In addition, the overall functionality of the wetlands at Anacostia Park is being affected by many factors (including goose herbivory, water quality, and invasive species) that would not be addressed by alternative A.

The USGS Patuxent Wildlife Research Center has participated in a five-year monitoring project that measured the progress of a reconstructed marsh (Kingman Marsh) towards becoming a functioning, viable freshwater tidal wetland (USGS 2006b). Results derived over the course of the study substantiated major losses of wetland vegetative cover, species richness, and diversity at Kingman Marsh (USGS 2006b). 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 wetland cover along with severe reduction in palatable plant species (USGS 2007). The wetland vegetation impacts at Kingman Marsh could therefore be attributed to herbivory by resident Canada geese (Hammerschlag et al. 2001) coupled with effectively lowered sediment elevations following reconstruction (USGS 2006b). A goose exclusion study by Haramis and Kearns at the nearby Patuxent River in Maryland (2006) showed that fenced areas of marshland were able to support a lush, healthy population of wild rice (wetland vegetation), whereas in unfenced areas survival of wetland vegetation was extremely low due to grazing by resident Canada geese (Haramis and Kearns 2006). Although current goose exclusion fencing would be maintained, no new fencing is proposed.

When considering the effects of climate change on wetlands, increased flooding and increased flood runoff are also predicted to occur (Erwin 2009). This may cause increased erosion, especially if established wetland areas do not exist or are not created along shoreline of the Anacostia River. Landward or channelward migration of wetlands is another predicted effect of climate change. Therefore, identifying setback areas along the Anacostia River could be effective at establishing zones for natural coastal migration based on projected sea level rise. Some of the predicted impacts of sea level rise can be reduced by the removal of blockages along the River. Under alternative A, the sheet piling is proposed for removal, but this would not necessarily result in the inland migration of wetlands since the seawall would still be intact. Removing the sheet piling (which would require additional NEPA compliance) would allow an increased connection to the River, but could cause increased erosion of shoreline vegetation, especially under storm conditions, which are expected to increase in severity and frequency as a result of climate change. Invasive species would not be managed at a level to offset the effects of climate change on wetlands, and buffer zone plantings are not considered under alternative A. Alternative A does not include adaptive management or wetland monitoring, which are predicted to provide insights to the potential consequences of climate change and help determine how future management practices should be implemented. Therefore, alternative A does not include techniques or actions that would counteract or reduce the potential pressures of climate change. Overall, alternative A would have a long-term moderate adverse impact on wetland vegetation 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, which further supports a conclusion of long-term moderate adverse impact.

Cumulative Impacts—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. 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. 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. The restoration, creation, and enhancement of wetlands in the Anacostia Watershed as well as within the park, have had a cumulative beneficial impact on wetlands. Many of these projects have already been completed, some are currently underway, and numerous others are scheduled for the future. These projects have been and continue to be undertaken by a diversity of government programs, agencies, groups, and community organizations.

One of the six restoration goals of the Anacostia Watershed is to increase wetland acreage, and many wetland restoration projects have already been completed or are scheduled for completion (MWCOG 2007). Past wetland restoration projects that have already been completed include the Anacostia Wetland Mitigation Project (ANA-11 created 54 acres of wetlands), Kenilworth Marsh (restored 77 acres of wetlands), Kingman Marsh (Lake) (restored a total of 86 acres of wetlands), Anacostia River Fringe Wetlands (restored 16 acres of wetlands), and Heritage Island Wetlands (restored 6 acres of wetlands). Other wetland restoration projects completed include the lower Anacostia Park Enhancements-Pope Branch Restoration, Hickey Run Restoration, and the Watts Branch Restoration. In addition to wetland efforts being initiated by the NPS, the District DOH, EHA is the lead agency implementing many wetland and watershed restoration projects throughout the Anacostia watershed. Key partners for these restoration projects include the USACE-Baltimore District, NPS, USDA-NRCS, USEPA, the USGS Patuxent

Wildlife Research Center, District DOE, and USFWS. The wetland restoration projects mentioned above have beneficial impacts to wetlands in and near Anacostia Park.

Numerous other efforts by various federal, local, and community organizations have been completed and are either currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. Environmental programs associated with the Woodrow Wilson Project have included tidal wetland creation comprised of multiple native species (ANA-11 as mentioned above), restoration of tidal wetlands upon removal of landfill material, and wetland creation and enhancement of non-tidal wetlands dominated by common reed grass. Wetland Mitigation/Enhancement projects completed by SHA within the Anacostia River Watershed include Tuxedo Road (1.70 acres), Bladensburg Waterfront Park (1.30 acres), Anacostia East (23 acres), and many other small projects totaling over 30 acres (SHA 2006). Future SHA projects scheduled as a result of Intercounty Connector (ICC) Environmental Stewardship or ICC mitigation include over 20 acres of wetland mitigation/enhancement in the Anacostia River Watershed (SHA 2006). Other future wetland restoration or creation projects are proposed as a result of projects associated with the AWI. AWI projects that incorporate wetland restoration components include Poplar Point. The wetland restoration projects mentioned above have beneficial impacts to wetlands in and near Anacostia Park.

Projects that contribute to cumulative negative effects of wetlands through removal include the 11th Street Bridge Replacement Project, the Anacostia Riverwalk project, the Washington Gas hazardous waste cleanup, and the Poplar Point project. The 11th Street Bridges project has affected approximately 0.07 acre of wetlands. Anacostia Riverwalk would affect less than 0.1 acre of wetland. The Washington Gas hazardous waste cleanup would remove vegetation and soil from the 1 acre of wetland, thus destroying the wetland. Together these projects constitute a cumulative impact to 1.17 acres of wetlands. The Poplar Point development could impact up to 11 acres of wetlands, although the EIS for this project is currently in the planning stages (NPS 2008d). It is expected that any adverse impacts to wetlands as a result of the projects described in this paragraph would be offset by mitigation and that the projects in and near Anacostia Park previously described would have an overall beneficial impact to wetlands.

The long-term moderate adverse impacts on wetlands in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above. Since the projects listed above would be beneficial to wetlands this would reduce the adverse effects of alternative A resulting in a long-term minor adverse cumulative impact on wetlands.

Conclusion—Alternative A would result in long-term moderate adverse impacts on wetlands because the impact to wetlands and their ability to support wetland vegetation and wildlife would be detectable. Some reduction in the abundance and diversity of native wetland vegetation would be measurable, but would only result in a small-scale consequence to the functionality of the native plant communities in Anacostia Park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Wetland Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Anacostia River Fringe Wetlands, and installing new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. With the exception of considering new rain gardens (which would require additional NEPA compliance) and the removal of sheet piling along the Anacostia Fringe Wetlands, the techniques described above for all action alternatives would have a negligible impacts on wetlands because there would be no observable or measurable change to the wetlands within the park due to the limited and localized nature of all the techniques. Installing/maintaining goose exclusion fencing is not expected to benefit wetlands when this technique is not combined with other resident Canada goose management techniques (such as other habitat modification techniques discussed below in the alternatives analysis).

Removing sheet piling along the Anacostia River Fringe wetlands would have a short-term, minor adverse effect on wetlands due to erosion that would occur and water quality impacts that would follow this process but a beneficial impact would occur because wetlands would be improved by removing structures in the wetlands. Vegetation surveys over the last five years by the USGS indicate that the wetland vegetation is well established in the Anacostia River Fringe Wetland with over 95 percent cover (Krafft et al. 2009). Reconnection of the floodplain with the Anacostia River would restore the functionality of the floodplain, restore hydrology, and benefit wetlands as well. Additionally, any adverse impacts to wetlands would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

Changes in mean sea level rise, invasive species colonization, changes to water level, and wetland migration are expected as a result of climate change. Climate change would increase opportunities for invasive plant species such as common reed to spread because of this species' adaptability to disturbance and efficiency to colonize (Erwin 2009). Therefore, invasive plant species control efforts would be essential, including extensive monitoring and targeted control. All action alternatives would include managing invasive plant species at the park at a level beyond the current efforts of the NCR-EPMT. This action would aid in counteracting potential pressures of climate change on wetland vegetation by removing a key stressor (invasive plant species) on these ecosystems. It has also been suggested that the impacts of sea level rise can be ameliorated through the acquisition of inland buffer zones, which could provide an opportunity for habitats and wildlife to migrate inland (Erwin 2009). Although the park already owns the buffer zone along the Anacostia River, much of this zone is mowed/maintained grass immediately along the shoreline. All action alternatives would include, to some degree, planting new buffers along the shoreline and/or increasing the width of existing vegetative buffers. Although these vegetative buffers would be planted to act as barriers to the geese, planting the buffer zone with riparian vegetation would ameliorate some of the effects of climate change for all action alternatives. As previously stated above for alternative 1, the removal of sheet piling at the Anacostia River Fringe Wetlands along the River (which would require additional NEPA compliance) would not necessarily result in the inland migration of wetlands since the seawall would still be intact. Both adaptive management and wetland monitoring are key elements in each of the action alternatives. Monitoring is well known to be an essential element of wetland management, since it would allow detection of long-term change, specifically changes in the distribution of wetland areas at Anacostia Park that may result from climate change. Monitoring and adaptive management would provide insights to the potential consequences of climate change and help determine how future management practices should be implemented.

It is expected that new rain gardens would not be designed within wetlands but may include wetland plantings in previously upland areas. However, these areas may be too small and localized in nature to create a detectable beneficial impact on wetlands or an improvement to the functionality of the wetland. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of a wetland and not affecting a wetland, NPS would prepare and approve a SOF for activities in a wetland. Overall, the techniques common to all action alternatives would result in a range of long-term, short-term, minor, and adverse to beneficial impacts to wetlands due to the limited and localized nature of the proposed techniques and due to potential measurable and perceptible improvements to the functionality of wetlands.

Alternative B – High Wetland, High Resident Canada Goose Management—Under alternative B the most aggressive wetlands management techniques are combined with intensive resident Canada goose population reduction techniques (lethal control combined with other techniques). This alternative considers new wetland restoration techniques as well. Under this alternative, it is estimated that approximately 40 to 60 percent of the current resident Canada goose population would be removed during the first year of the plan/EIS as the first step in meeting the initial goal of 54 resident Canada geese within the park. This goal may be adjusted through adaptive management to meet management goals based on the results of vegetation and resident Canada goose population monitoring. Resident Canada goose monitoring would occur for the life of this plan/EIS (15 years as stated in chapter 2) and adaptive management would be used to maintain the resident Canada goose population using methods described in this section on a regular basis. Techniques used to lethally reduce the population would include round-up, capture, and euthanasia, and lethal removal by shooting. The population would be monitored annually through the life of the plan. Resident Canada goose counts and vegetation monitoring would determine if the population needed to be maintained by using lethal methods. In subsequent years, the percent of the population to be removed would be dependent upon results of the vegetative monitoring, and if the resident Canada goose population goal within the park was achieved. Both lethal actions (shooting as well as round-up, capture, and euthanasia) would have the same beneficial effect on wetland vegetation within the park.

The primary impact to wetland vegetation within the park would be the result of immediate lethal actions taken to control the resident Canada goose population. It is expected that with rapidly reduced goose browsing pressure, the herbivory previously observed in wetland vegetation would start to reverse, as was found in exclosure studies conducted in the nearby Patuxent River (Haramis and Kearns 2006). Immediately reducing and controlling the growth of the resident Canada goose population would result in beneficial impacts to wetland vegetation, which could recover from current herbivory through decreased goose browsing. Decreased browsing may not only increase the areal coverage of the wetland areas but could also increase diversity through natural recruitment, if supported by current hydrology. The closer the resident Canada goose density would get to the initial goal of 54 resident Canada geese within the park, the higher the chance of achieving successful wetland restoration (NPS 2009b). This conclusion is supported by previous studies documenting goose herbivory of wetland areas within the park and comparison of open plot data with exclosure data for wetland vegetation. Observations drawn from exclosure experiments, as well as exclosed, fenced plantings at Kingman Marsh, clearly demonstrated the ability of marsh vegetation to grow at suitable sediment elevations when protected from herbivory (USGS 2006b). Similarly, a goose exclusion study by Haramis and Kearns at the nearby Patuxent River in Maryland (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 addition to lethal means of reducing the resident Canada goose population, alternative B also includes an intensive scare/harassment program as well as the following reproductive control techniques: increased egg oiling, egg addling, egg replacement if population increases after initial reduction, and application of goose hatch material if population increases greater than 20 percent in one year. It is assumed that these techniques would also reduce the resident Canada goose population and would improve existing and proposed wetlands within Anacostia Park.

The beneficial impact to wetland vegetation would occur immediately following resident Canada goose reduction activities, if these activities occur during the growing season of the wetland vegetation (typically March through November along the Anacostia River). Specifically, goose round-ups have been planned to occur during the summer months, when adult geese are molting and flightless (starting June 15 in Mid-Atlantic) and before juveniles are able to fly. These population reduction activities would allow the wetland vegetation at least half a growing season to actively recover from goose herbivory activities. Resident Canada geese exert a higher degree of grazing pressure on wetlands over migratory geese, because they typically feed year round on seedlings, plants, propagules, and roots (Coluccy 2009). Therefore, a recovery period for wetland vegetation that immediately follows resident Canada goose removal, may allow the vegetation to become more resilient (through increased rootmass and propagules) to goose herbivory the following spring.

Resident Canada geese exhibit a high propensity to return to their previous nesting areas. Nest construction and egg laying begins in late March or early April, depending upon latitude, and hatching occurs from late April through mid-May (Gosser et al. 1997). They pair for life and often use the same nest site year after year. It is known that resident Canada geese stay within a 5 to 10 mile radius during non-breeding and a 0.25 to 0.5 mile radius during breeding season, which begins in the spring (NPS 2010b; Seamans et al. 2009). During spring and summer, the geese selectively graze on plants, or parts of plants, that are high in protein, such as grass shoots, seed heads, and aquatic vegetation (Gosser et al. 1997). These data suggest that, if a portion of the resident Canada goose population is removed from a certain area, a lag time may occur where no geese are in the area; this lag time may allow for a recovery period for the wetland vegetation. However, in time, it is likely that, due to the nature of urban-dwelling geese, other geese would capitalize on the newly void habitat (area where resident Canada geese were removed). Relocating or removing resident Canada geese has been described by Gosser et al. (1997) as a stop-gap effort because the site must be modified to make it less attractive to resident Canada geese, or the removed geese could be replaced with new ones. Additionally, Dr. Allan (1999) states that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). Because this plan/EIS integrates both wetland management and resident Canada goose management techniques along with adaptive management, a suite of techniques, including population reduction through lethal control in combination with other techniques, are proposed as part of alternative B and are described in more detail in the following paragraphs.

Besides grazing pressures from resident Canada geese, other wetland restoration issues that have been observed at Anacostia Park include incorrect hydrologic regimes (too much inundation to vegetation or too little submersion of vegetation); planting methods, including species selection and existing seed bank; insects and disease; engineered marsh soils; removal of invasive plant species; and sediment quality. The NPS has identified a number of potential restoration projects within Anacostia Park that could be implemented in the future that could take into consideration these wetland restoration issues. Therefore, alternative B includes a suite of potential techniques that would enhance existing wetland areas at the park and restore or create new wetland areas.

Hydrology techniques are proposed to manage wetlands at the park, including erosion control techniques, removing/modifying structures that negatively affect the marsh, creating tidal guts, potential enforcement of no wake zones along the river, investigating the effects of extreme water level change, and considering altering water elevations. It has been demonstrated during previous studies at Kingman Marsh, that sediment processes indicated the propensity for accretion but this could be negated locally by erosion, especially where vegetation was missing, and by subsidence including sediment consolidation of both the placed material and unconsolidated pre-existing substrate (USGS 2006b). Therefore, these hydrology techniques would take into consideration site-specific conditions that may preclude either wetland restoration or wetland recovery as a result of resident Canada goose herbivory.

Wetland restoration techniques would have an overall improvement on the wetlands within the park and include possible daylighting of storm sewers, stream/stormwater outfall energy dissipation modifications, and the removal of portions of the seawall. These particular techniques would be designed to either create new wetland areas or reconnect the floodplain with the waterbodies (including the Anacostia River, Pope Branch, and Fort Dupont Creek) to potentially create additional or enhanced wetland areas. The construction of these techniques would cause a negligible effect on existing wetland areas if they are present in the study areas. However, these techniques would require additional NEPA analysis because site-specific designs would be necessary to make these improvements. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the wetland and not affecting the wetland, NPS would prepare and approve a SOF for activities in a wetland. For new restoration projects, planted wetland vegetation within fenced areas would benefit from this level of protection over the long term; however, such benefits would be limited to these small areas within the park where restoration is proposed. Some wetland management elements such as cultural/education that include techniques like constructing new boardwalks and trails would have a negligible effect on wetlands within the park. The construction and physical placement of piers for boardwalks could affect small wetland areas.

Under alternative B, invasive plant species would be managed at a higher level compared to alternative A, focusing on common reed and purple loosestrife beyond what the NCR-EPMT is currently managing. Non-native or invasive species such as common reed and purple loosestrife are playing increasing roles at Kingman Marsh where elevations permit, since they also are not palatable (USGS 2006b). Previously, the NPS did successfully reduce common reed using an herbicide at Kenilworth, where monitoring showed successful rebound of desirable marsh vegetation following treatments (USGS 2006b). Therefore, the removal of invasive plant species in wetland areas as part of alternative B would improve wetland vegetation at the park. Monitoring vegetation plots and maintaining fenced areas would result in negligible trampling of limited wetland vegetation as staff travel to and around the fenced areas. However, such impacts would be temporary, as these activities would only be scheduled to occur a few days per year. Therefore, the impact of these activities would be negligible.

As a result of climate change, increased flooding and increased flood runoff could occur, which may allow for increased erosion if wetland areas are not established along shorelines (Erwin 2009). Alternative B includes techniques to control shoreline erosion, primarily focusing on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. These erosion control techniques would aid in offsetting potential pressures of climate change in addition to the techniques previously described that are common to all action alternatives. The combination of removing sheet piling (which would require additional NEPA compliance) and seawall breaks at the Anacostia River Fringe Wetlands along the River would allow the inland migration of wetlands (which is currently blocked) that would occur as a result of sea level rise. This action would allow the inland and channelward migration of wetlands along the River. As discussed above in common to all action alternatives, invasive plant species removal is a technique included in alternative B that would remove a key stressor from climate change (invasive plant species) on wetland ecosystems. Alternative B incorporates the most techniques to offset the predicted effects to wetlands that would result from climate change.

Overall, alternative B would have a beneficial impact on wetlands at the park because abundance, diversity, and functionality of wetlands would improve and would be measurable. It is expected that the high wetland management techniques in combination with the high resident Canada goose management techniques would protect and slow the current erosion rate of the riverine wetlands in Anacostia Park, resulting in less wetland loss and erosion during rain events. Additionally, negligible impacts to the wetlands would result from elements of alternative B that propose soil disturbance and/or construction for some wetland management techniques. However, these impacts would only occur during active construction of wetland restoration projects and the beneficial impact on wetlands would far outweigh the negligible impacts. Additionally, these impacts would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

Cumulative Impacts—The beneficial impacts on wetlands as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to wetlands, there would be beneficial cumulative impacts on wetlands when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on wetlands from a reduction in herbivory, wetland restoration, and erosion control, which would improve wetland functionality. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Under alternative C, aggressive wetlands management options are combined with a moderate level of lethal and non-lethal resident Canada goose management techniques. Alternative C has similar wetland management techniques proposed as alternative B, but includes decreased wetland restoration techniques such as no sea wall breaks and no daylighting. Alternative C proposes a less intensive population reduction for the resident Canada goose within the park, but proposes to conduct resident Canada goose population monitoring for the life of the plan. This alternative assumes that more intensive wetland management would be required to counteract the resident Canada goose population that would remain in the area, due to the proposed moderate resident Canada goose management. Alternative C includes a suite of potential techniques that would enhance existing wetland areas at the park and restore or create new wetland areas.

For this alternative, the current resident Canada goose population would be reduced by killing 40 to 60 percent within the first year of the management plan. The technique used to reduce the population would include round-up, capture, and euthanasia, but no shooting of resident Canada geese would be included as part of alternative C (see “Chapter 2: Alternatives”). Although monitoring would be conducted yearly, lethal control of 40 to 60 percent of the resident Canada goose population would only be used up to five times throughout the life of this plan/EIS following the initial reduction, and only if the population exceeds the initial goal of 54 resident Canada geese within the park or if vegetation monitoring and adaptive management indicate a different goose population goal is appropriate.

As part of alternative C, immediately reducing and controlling the growth of the resident Canada goose population would result in beneficial impacts to wetland vegetation, which could recover from current herbivory through decreased goose browsing. Decreased browsing may not only increase the aerial coverage of the wetland areas but could also increase diversity through natural recruitment, if supported by current hydrology. The closer the resident Canada goose density would get to the initial goal of 54 resident Canada geese within the park, the higher the chance of achieving successful wetland restoration (NPS 2009b). Although alternative C only allows for the lethal reduction of the resident Canada goose population one time in the first year of the plan/EIS and a maximum of five total times throughout the plan to meet the initial population goal, a reduction of resident Canada geese in the park should still provide a beneficial impact to wetland vegetation, similar to described above for alternative B, but to a lesser scale. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to wetlands at the park. That said, it has been demonstrated that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other resident Canada goose management techniques proposed as part of alternative C such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) would work in combination with the population reduction techniques.

Even though alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B, the remaining wetland management techniques proposed as part of alternative C are the same as those included in alternative B. Some techniques included in alternative C would require additional NEPA analysis because site-specific designs would be necessary to make these improvements. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the wetland and not affecting the wetland, NPS would prepare and approve a SOF for activities in a wetland. The high wetland management techniques proposed as part of this alternative in combination with moderate resident Canada goose management should provide an overall beneficial impact to wetland vegetation, similar to described above for alternative B and these techniques would protect and slow the current erosion rate of the riverine wetlands in Anacostia Park, resulting in less wetland loss and erosion during rain events. Similar to the discussion for alternative B above, increased flooding and increased flood runoff could occur as a result of climate change, which may also allow for increased erosion if wetland areas are not established along shorelines (Erwin 2009). Alternative C includes techniques to control shoreline erosion, primarily focusing on areas of the marsh at low elevations and near the surface where vegetation/mud flat and water interface. As discussed above in common to all action alternatives, invasive plant species removal is a technique included in alternative C that would remove a key stressor that would result from climate change (invasive plant species) on wetland ecosystems. The combination of these techniques would aid in offsetting potential pressures of climate change in addition to the techniques described above that are common to all action alternatives.

Additionally, negligible impacts to the wetlands would result from elements of alternative C that propose soil disturbance and/or construction for some wetland management techniques. However, these impacts would only occur during active construction of wetland restoration projects and the beneficial impact on wetlands would far outweigh the negligible impacts. Additionally, these impacts would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

Cumulative Impacts—The beneficial impacts on wetlands as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to wetlands, there would be beneficial cumulative impacts on wetlands when added to the beneficial impacts from alternative C.

Conclusion—Alternative C would result in overall beneficial impacts on wetlands from a reduction in herbivory and some wetland management techniques, which would improve wetland function. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D combines less aggressive wetlands management options with primarily non-lethal resident Canada goose management options. This alternative offers the lowest management effort for both wetlands and resident geese. Under wetland management techniques for alternative D, there are no erosion control techniques proposed, no planting efforts proposed, and no new wetland restoration efforts proposed. Under alternative D, there would be no initial lethal resident Canada goose population reduction activities, but the resident Canada goose population would be monitored annually. Other resident Canada goose management techniques are proposed (including planting buffers, applying goose repellents, a less intensive scare/harassment program, and egg oiling) as part of alternative D as discussed in chapter 2. If the other resident Canada goose management techniques discussed do not keep the resident Canada goose population at the resident Canada goose population goal, a onetime population reduction using lethal controls of 40 to 60 percent of the resident Canada goose population would be performed during the life of the management plan but only if needed. The lethal control technique during the one-time population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. However, in time, it is likely that, due to the nature of urban-dwelling geese, other geese would capitalize on the newly void habitat. Relocating or removing resident Canada geese has been described by Gosser et al. (1997) as a stop-gap effort because the site must be modified to make it less attractive to resident Canada geese, or the removed geese would be replaced with new ones. Additionally, Dr. Allan (1999) states that a cull (gathering and removing) of breeding resident Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). Future population reduction strategies beyond the one-time reduction are not proposed as part of alternative D.

Although alternative D only allows for the one-time lethal reduction (no shooting) of the resident Canada goose population during the lifetime of the plan/EIS, a reduction of resident Canada geese in the park would still provide a beneficial impact to wetland vegetation immediately following population reduction and to a lesser scale than as described above for alternative B. That said, it has been demonstrated that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other resident Canada goose management techniques proposed as part of alternative D such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) should work in combination with the one-time population reduction. However, wetland planting efforts and wetland restoration efforts are not proposed as part of alternative D; it is unlikely, given current conditions and previous lessons learned, that wetlands would re-establish naturally along the Anacostia River. In addition, it is expected that the low wetland management techniques in combination with the low resident Canada goose management techniques over the life of this plan/EIS would allow the riverine wetlands in Anacostia Park to continue to erode (NPS 2010d, Curtis 2010). This erosion would not occur as quickly as in alternative A but would result in a further loss of wetland vegetation and erosion during rain events (Curtis 2010). To address climate change, only the techniques described previously that are common to all action alternatives would aid in offsetting potential pressures of climate change under alternative D. Therefore, the low wetland management techniques proposed as part of this alternative in combination with low resident Canada goose management would provide an overall, beneficial impact (following goose reduction activities) but a long-term minor adverse impact to wetland vegetation because a reduction in the abundance, diversity, and functionality of wetlands at the park would occur**.**

Cumulative Impacts—The long-term minor adverse impacts on wetlands as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to wetlands, there would be negligible cumulative impacts on wetlands when added to the long-term minor adverse impacts from alternative D. The beneficial effects of the other projects should reduce some of the adverse impacts to wetlands resulting from implementation of this alternative resulting in a negligible cumulative impact on wetlands.

Conclusion—Alternative D would result in overall, beneficial impact (following goose reduction activities) but a long-term minor adverse impact. The one-time population reduction of resident Canada geese would provide an immediate benefit to wetland vegetation, but without wetland planting and restoration as a part of the plan, it is likely that in the long term there would be a reduction in the abundance, diversity, and functionality of wetlands in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—This alternative combines aggressive wetland management techniques with intensive resident Canada goose management activities; however, there is no lethal control for resident Canada geese. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose population reduction may be either completely offset or take longer to realize. Under this alternative, no resident Canada geese would be removed, but the population would be monitored during the life of the plan/EIS. Although an initial goal of 54 resident Canada geese within the park was determined by the science team, this goal would likely not be met since a population reduction would not occur as part of alternative E. Some of the techniques included as part of alternative E would require additional NEPA analysis because site-specific designs would be necessary to make these improvements. For projects that would require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the wetland and not affecting the wetland, NPS would prepare and approve a SOF for activities in a wetland.

However, the full suite of wetland management techniques as proposed in alternative E would provide an improvement to wetland vegetation, even though these benefits would most likely be offset by the size of the resident Canada goose population. At a minimum, the resident Canada goose population would remain similar to existing conditions, but could possibly increase in size with time. It has been demonstrated that a combination of techniques are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other resident Canada goose management techniques proposed as part of alternative E such as habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material) would work in combination with the other techniques.

Similar to the discussion for alternative B, increased flooding and increased flood runoff could occur as a result of climate change, which may allow for increased erosion. Alternative E includes techniques to control shoreline erosion that would aid in offsetting potential pressures of climate change in addition to the techniques previously described that are common to all action alternatives. The combination of removing sheet piling (which would require additional NEPA compliance) and seawall breaks at the Anacostia River Fringe Wetlands along the River would allow the inland migration of wetlands (which is currently blocked) that would occur as a result of sea level rise. As discussed above in common to all action alternatives, invasive plant species removal is a technique included in alternative E that would remove a key stressor that would result from climate change (invasive plant species) on wetland ecosystems. Alternative E, like alternative B, incorporates the most techniques to offset the predicted effects to hydrology that would result from climate change.

The high wetland management and moderate resident Canada goose management techniques proposed as part of this alternative would protect and reduce the erosion of the riverine wetlands in Anacostia Park, but some loss of wetland vegetation and erosion during rain events would still occur as a result of alternative E, although the loss would not be as pronounced as either alternatives A or D. Therefore, the high wetland management techniques proposed as part of this alternative in combination with moderate resident Canada goose management (but a lack of lethal control) would provide an overall long-term minor adverse impact to wetland vegetation.

Cumulative Impacts—The long-term minor adverse impacts on wetlands as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to wetlands, there would be negligible cumulative impacts on wetlands when added to the long-term minor adverse impacts from alternative E. The beneficial effects of the other projects should reduce some of the adverse impacts to wetlands resulting from implementation of this alternative resulting in a negligible cumulative impact on wetlands.

Conclusion—Alternative E would result in overall long-term minor adverse impacts on wetlands because impacts to wetlands and wetland vegetation and wildlife would be detectable, but the overall functionality of the wetland would not be affected. A reduction in the abundance and diversity of wetland vegetation would be measurable, but would be limited and would not have much consequence on the native plant communities and their functionality. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

NATURAL RESOURCES

This section discusses the plan impacts to the natural resources in the study area, including aquatic and terrestrial resources.

AQUATIC RESOURCES

This topic includes benthic invertebrates, finfish, and shellfish.

Guiding Regulations and Policies

NPS regulations and policies, including the *Organic Act of 1916*, *Management Policies 2006*, and *Reference Manual 77:* Natural Resource Management directs the park to manage and preserve physical and biological processes, as well as individual species, features, and plant and animal communities. The NPS would ensure that the environmental costs and benefits of proposed operations, development, and resource management are fully and openly evaluated before taking actions that may impact the natural resources of the park (NPS 2006a). These policies require the NPS to manage natural resources to maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic systems. The NPS seeks to:

- eliminate human-induced impacts on aquatic habitats,
- limit effects and mitigate damage if impacts are unavoidable,
- maintain and restore aquatic habitats to protect their ecological and aesthetic character and dependent plant and animal communities.

Assumptions and Methodologies

The evaluation of aquatic species was based on a qualitative assessment of how management activities would impact aquatic species and their habitat. Potential impacts to aquatic resources were assessed based on the extent of disturbance to the aquatic resource habitats and the individual species.

The geographic study area for aquatic resources includes all waterbodies at Anacostia Park.

Impact Threshold Definitions

The following thresholds were used to determine the magnitude of impacts on aquatic resources:

Negligible: There would be no observable or measureable impacts on aquatic species, their habitats, or the natural processes sustaining them at the park. Impacts would be similar to natural fluctuations.

Adverse: *Minor*: Impacts to aquatic species, their habitats, or the natural processes sustaining them would be detectable at the park. Occasional responses to disturbance from management practices could be expected, but would not interfere with foraging or reproduction. Harassment, injury, or mortality of aquatic species is not expected. The overall viability of the species would not be affected.

Moderate: Impacts to aquatic species, their habitats, or the natural processes sustaining them would be detectable at the park. Frequent responses to disturbance from some individuals could be expected and may interfere with foraging or reproduction. Some impacts may occur during critical periods of reproduction or in key habitats and may result in harassment, injury, or mortality to one or more individuals. Detectable changes to the availability of functional habitat or key components of habitat would occur, however the viability of the species would not be affected.

Major: Impacts to aquatic species, their habitats, or the natural processes sustaining them would be obvious at the park. Frequent responses to disturbance by several or most individuals would be expected with impacts on foraging or reproduction. Impacts would occur during critical periods of reproduction or in key habitats and would result in direct mortality or loss of habitat that may affect the viability of the species.

Aquatic Resources Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland vegetation in the watershed and creating open areas in the marsh, susceptible to sediment scouring and no wetland restoration techniques are proposed as part of the no action alternative. In addition, it is expected that the riverine wetlands along the Anacostia River in the park would continue to erode during the life of this plan/EIS based upon park observations and personal communications, resulting in a further loss of wetlands and an already limited aquatic habitat within the Anacostia River (NPS 2010b). As a result of herbivory and wetland loss, the open, bare areas of the marsh have less potential to support benthic macroinvertebrates and therefore, would support fewer finfish species dependent upon this food source. These open, bare areas of the marsh are susceptible to sediment scouring which causes turbidity and can degrade water quality; water quality influences the presence of shellfish such as mussels. Recent surveys in the Anacostia River have indicated the presence of pollution-tolerant benthic macroinvertebrates and finfish species, indicating environmental stressors such as the lack of cover in unvegetated areas, disturbance, and likely polluted sediments (USGS 2006a). The abundance and diversity of finfish species in the river remains below its potential due to poor water quality (excess sediment and bacteria and low DO). It has been concluded that the loss of vegetation and the subsequent erosional substrate at wetlands in Anacostia Park are due to wildlife grazing (primarily resident Canada geese) which has affected the macroinvertebrate community development (USGS 2006a). Removing sheet piling along the Anacostia River Fringe Wetlands (which would require additional NEPA compliance) would result in a short-term minor adverse impact on benthic macroinvertebrates and on finfish during construction due to erosion that would occur and water quality impacts that would follow this process. However, a beneficial impact to benthic macroinvertebrates and finfish would occur following removal of the sheet piling because a physical barrier between the bottom of the Anacostia River and the wetlands would be removed and the historic reconnection would occur. However, the resident Canada goose population would not be intensively reduced as part of the No Action Alternative. Additionally, wetland restoration techniques and improvements to water quality as a result of the no action alternative would not indirectly benefit benthic macroinvertebrates, finfish species, or shellfish. It is estimated that over the life of this plan/EIS, the riverine wetlands would continue to erode (NPS 2010d, Curtis 2010), resulting in a further loss of wetlands and aquatic habitat within the Anacostia River (Curtis 2010). Therefore, overall and continued, long-term moderate adverse impacts to aquatic resources in the park are anticipated as a result of the no action alternative Because a loss of habitat and changes to the natural processes sustaining them would be detectable at the park such as the availability of functional habitats or key components of supporting habitat.

Cumulative Impacts—The benthic communities in the Anacostia River are characterized by low diversity, low abundance, and dominance by pollution-tolerant worms, as described in the "Benthic Invertebrates" section of chapter 3. These conditions were likely caused by a combination of chronic exposure to pollutants and low dissolved oxygen levels. The Anacostia River substrate is dominated by mud and the area generally has degraded benthic communities as well as few instream structures for fish habitat. Proposed projects such as the 11th Street Bridge Replacement Project would not cumulatively affect finfish; the replacement structures would cause no greater blockages to passage of migratory fish to upper watershed spawning sites than the existing bridges. Some fish kills were reported as a result of the Woodrow Wilson Bridge project, particularly related to the explosives demolition of the earlier bridge; explosives would not be used to demolish the 11th Street Bridge (DCDOT and FHWA 2007). As mitigation, the Woodrow Wilson Project environmental programs includes the following which may benefit fish species: Removal of fish blockages to open historical anadromous fish habitat, five years of fish hatchery restocking in tributary streams where fish passage restorations are implemented, riffle grade controls, and construction of a rock chute. Barriers to fish movement throughout the Anacostia watershed are a problem for both migratory and resident fish. Unimpeded fish passage is especially important for anadromous fish, which live much of their lives in tidal waters, but must move into non-tidal rivers and streams to spawn. Within the Anacostia Watershed, the Woodrow Wilson Mitigation Project removed or modified a total of 14 fish barriers (NOAA 2007c). Tidal freshwater wetland restoration in Kenilworth Marsh and Kingman Marsh have already added critical rearing habitat for juvenile anadromous fish species (NOAA 2007c). Restored emergent tidal wetlands and off-channel habitat can provide similar habitat to natural wetlands and can increases food availability and shelter over degraded sites (NOAA 2007c). Surveys in the Anacostia River have indicated the presence of two shellfish species, the Eastern floater mussel (appendix D) and the tidewater mucket mussel. It is unlikely that any of the techniques described above for all action alternatives would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park. Given the normal turbidity of the river, any temporary adverse impacts as a result of proposed projects such as the 11th Street Bridge Replacement Project would not cumulatively affect aquatic resources.

Overall, the numerous proposed wetland restoration and creation projects would have a beneficial effect on aquatic resources in and near Anacostia Park. The long-term moderate adverse impacts on aquatic resources in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would be beneficial to aquatic resources this would reduce the adverse effects of alternative A resulting in a long-term minor adverse cumulative impact on aquatic resources.

Conclusion—Alternative A would result in long-term moderate adverse impacts on aquatic species and their habitat. Impacts would be detectable in the park, and may occur in key reproduction periods and habitats resulting in harassment, injury, or mortality to individuals. Some individuals may frequently be disturbed, which could interfere with foraging and reproduction. Detectable changes to the availability of functional habitat and habitat components would occur, but would not impact species viability. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Impacts to Aquatic Resources Common to All Action Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would both require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. Removing sheet piling along the Anacostia River Fringe Wetlands would result in a short-term, minor adverse impact on benthic macroinvertebrates and on finfish during construction due to erosion and water quality impacts that would follow this process. However, a beneficial impact to benthic macroinvertebrates and finfish would occur following removal of the sheet piling because a physical barrier between the bottom of the Anacostia River and the wetlands would be removed and the historic reconnection would occur. Surveys in the Anacostia River have indicated the presence of two shellfish species, the Eastern floater mussel (appendix D) and the tidewater mucket mussel. It is unlikely that any of the techniques described above for all action alternatives would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

Because wetlands provide both aquatic diversity and habitat for benthic macroinvertebrates and finfish in the Anacostia River, and wetland plants serve as a food source (detritus) both directly and indirectly, improvements to wetlands would have a an overall beneficial impact on aquatic resources: A result of the management techniques detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. Beneficial impacts would occur because wetlands (and therefore the benthic and finfish communities) would be improved in a limited and localized area by removing structures in the wetlands.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland vegetation. This alternative also includes a suite of potential techniques to improve wetlands in the park, including erosion control techniques to improve wetlands and creating tidal guts.

Revegetating and stabilizing areas along the river and wetland restoration techniques would improve the benthic macroinvertebrate population as well as the finfish within the park. Because wetlands provide both aquatic diversity and habitat for benthic macroinvertebrates and finfish in the Anacostia River, and wetland plants serve as a food source (detritus) both directly and indirectly, improvements to wetlands would have a beneficial impact on aquatic resources because detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. Beneficial impacts would occur because wetlands (and therefore the benthic and finfish communities) would be improved in a limited and localized area by removing structures in the wetlands. Wetland vegetation improvements and creating tidal guts vegetated with wetland plants would provide additional detritus and create a more complex habitat to support benthic macroinvertebrates and finfish species**.** Additionally, because water quality influences the presence of mussels, improvements to wetlands and water quality as a result of the management alternatives would indirectly benefit shellfish in the Anacostia River, although this change would not necessarily be perceptible or measurable. Namely, hydrology techniques that include removing or modifying structures that result in erosion and clogging of marsh and creation of tidal guts would have a similar overall beneficial impact on water quality and thus fisheries. Additionally, habitat modification as part of resident Canada goose management includes planting 25- to 50-foot buffers along the shorelines of the river throughout the park and increasing the width of existing vegetated buffers. Additional and/or enhancing buffers along the shoreline would benefit finfish species by shading the river and reducing the water temperature in surface waters located immediately adjacent to the buffer zone. The District WAP has identified four fish within Anacostia Park that are considered species of greatest conservation need and include alewife, American eel, American shad, and blueback herring. NPS makes every reasonable effort to conduct its actions consistent with relevant state laws and regulations and these species are given equal consideration for analysis in this plan/EIS compared to federally and state listed species. Impacts to the four finfish species listed by the District WAP and observed at Anacostia Park would also be beneficial because detectable improvements to food sources and habitat quality would occur as part of alternative B.

As part of alternative B, any submerged land disturbance may directly affect and displace benthic macroinvertebrates and indirectly affect finfish during construction activities. These activities would result in a short-term minor adverse impact during construction due to direct disturbance and as a result of erosion and water quality impacts that would follow this process. Although benthic invertebrates have limited mobility, most fish species are mobile and would be able to temporarily avoid submerged areas under construction. Overall impacts to aquatic resources (benthic macroinvertebrates and finfish) as a result of alternative B would be beneficial and would offset the short-term minor adverse impacts because detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. It is unlikely that any of the techniques described above for alternative B would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

Cumulative Impacts—The beneficial impacts on aquatic resources as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to aquatic resources, there would be beneficial cumulative impacts on aquatic resources when added to the beneficial impacts from alternative B.

Conclusion—Alternative B would result in overall beneficial impacts on aquatic resources because revegetation, stabilization, and changes to hydrology would improve habitat and food sources for aquatic species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C would include only limited removal of structures, both mechanical and passive seedbank regeneration, and least invasive stream/stormwater outfall modifications. Alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Overall impacts to aquatic resources (benthic macroinvertebrates and finfish) as a result of alternative C would be the same as alternative B: beneficial because detectable improvements to food sources and habitat quality would occur as a result of improvements to wetlands and vegetative buffers along the shoreline. Submerged land disturbance would still occur during construction activities, and would have a short-term minor adverse impact on aquatic resources, but this impact would be offset by the overall beneficial impact of alternative C. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to finfish at the park. An overall, beneficial impact for alternative C is appropriate because impacts to finfish habitat and food sources would be detectable as a result of improvements to wetlands and water quality in the park. It is unlikely that any of the techniques described above for alternative C would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

Cumulative Impacts—The beneficial impacts on aquatic resources as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to aquatic resources, there would be beneficial cumulative impacts on aquatic resources when added to the beneficial impacts from alternative C.

Conclusion—Alternative C would result in overall beneficial impacts on aquatic resources because wetland improvements would have detectable improvements on food sources and aquatic habitats. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed and no initial lethal reduction activities. No wetland planting efforts or new wetland restoration techniques are proposed to increase wetland vegetative cover. Therefore, food sources and habitat would not be improved or created for aquatic resources. Open, bare areas of the marsh would have less potential to support benthic macroinvertebrates, and therefore, would support fewer finfish species dependent upon this food source. The low wetland management techniques proposed as part of this alternative in combination with low resident Canada goose management would provide an overall, negligible impact to aquatic resources (benthic macroinvertebrates, finfish, and shellfish) because there would be no measurable change in habitat or natural processes sustaining aquatic resources; impacts would be similar to natural fluctuations**.**

Cumulative Impacts—The negligible impacts on aquatic resources as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to aquatic resources, there would be beneficial cumulative impacts on aquatic resources when added to the negligible impacts from alternative D.

Conclusion—Alternative D would result in overall negligible impacts on aquatic resources because there would be no measurable impacts on aquatic species, their habitats, or natural processes within the park that sustain aquatic species. Impacts would be similar to natural fluctuations. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B but the resident Canada goose management techniques proposed do not include lethal population reduction activities. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose population reduction may be either completely offset or take longer to realize. Therefore, alternative E results in negligible impacts to aquatic resources (benthic macroinvertebrates, finfish, and shellfish) because there would be no detectable or measureable improvements to food sources and habitat quality for aquatic resources.

Cumulative Impacts—The negligible impacts on aquatic resources as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to aquatic resources, there would be beneficial cumulative impacts on aquatic resources when added to the negligible impacts from alternative E.

Conclusion—Alternative E would result in overall negligible impacts on aquatic resources because there would be no measurable impacts on aquatic species, their habitats, or natural processes within the park that sustain aquatic species. Impacts would be similar to natural fluctuations. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

VEGETATION AND WILDLIFE

This topic includes terrestrial vegetation and wildlife. Since the resident Canada goose is the focus of this plan/EIS, this species is presented in a separate section that follows the wildlife impacts analysis.

Vegetation

Guiding Regulations and Policies

NPS *Management Policies 2006* state that the fundamental purpose of the national park system begins with a mandate to conserve park resources and values and provide for the public enjoyment of the park's resources and values to the extent that the resources would be left unimpaired for future generations. Native vegetation is identified as a park resource (NPS 2006a). NPS *Management Policies 2006* provides general principles for the maintenance of vegetation in the park by:

- Preserving and restoring the natural abundance, diversities, dynamics, distributions, habitats, behaviors of native plant populations and communities and ecosystems in which they occur.
- Restoring native plant populations in parks when they have been extirpated by past human-caused actions.
- Minimizing human impacts on native plants, communities, and ecosystems, and the processes that sustain them.

Assumptions and Methodologies

The geographic study area for vegetation would include all upland areas throughout Anacostia Park; impacts would be measured qualitatively. It is also important to note that b*eneficial* impacts would result if the general coverage of invasive plant species decreases.

Impact Threshold Definitions

The following thresholds were used to determine impacts to vegetation:

Negligible: A reduction in the abundance and diversity of vegetation may occur, but any change would be so small that it would not be measurable. The general coverage of invasive plant species would remain the same.

Adverse: *Minor*: A reduction in the abundance and diversity of vegetation would occur (invasive plant species coverage may increase) and would be measurable but would be limited and of little consequence to the greater functionality of the plant populations in Anacostia Park.

Moderate: Some reduction in the abundance and diversity of native vegetation would occur (invasive plant species coverage may increase), and it would be measurable but would result in a small-scale consequence to the greater functionality of the plant populations in Anacostia Park.

Major: A noticeable reduction in the abundance and diversity of native vegetation would occur (invasive plant species coverage may increase). The change would be measurable and of widespread consequence to the viability of the native plant populations within Anacostia Park.

Vegetation Alternatives Evaluation

Alternative A – No Action Alternative—As detailed in the previous "Wetlands" section of this chapter, the resident Canada goose population would remain in excess of the recommended initial goal for successful wetland restoration projects and would increase over time, adversely impacting wetland vegetation as well as terrestrial vegetation. No new native plantings would occur and existing buffers would not be enhanced as a result of the no action alternative. Currently, resident Canada goose herbivory is occurring at turf feeding areas; breaks in the vegetative buffers along the shorelines of the Anacostia River are allowing geese to access these areas and other areas that support terrestrial vegetation. The limited, current management of invasive plant species would be continued with the no action alternative, which would increase the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially reduce native vegetation. Removal of the sheet piling (which would require additional NEPA compliance) would have a negligible impact on vegetation because the abundance and diversity of terrestrial vegetation is not expected to change. An overall reduction in the abundance and diversity of vegetation would occur (including invasive plant species increase in coverage) under alternative A that would be measurable but would not necessarily affect the overall functionality of the plant communities in Anacostia Park. Overall, continued, long-term minor adverse impacts to terrestrial vegetation are anticipated as a result of the no action alternative.

Cumulative Impacts—Due to the numerous redevelopment projects proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11th Street Bridge Replacement Project, impacts to terrestrial vegetation are anticipated. Most construction projects excavate soils, which would require existing vegetation to be removed. The greatest potential for impact to terrestrial habitats would come from the redevelopment project at Poplar Point, which is a large tract of natural habitat types within and adjacent to Anacostia Park. Other projects in the area are redevelopments of urbanized areas that contribute little to the naturalized habitat of the area. The Poplar Point project could potentially impact from 30 to 100 acres, but impacted habitat types are unknown at the time. The 11th Street Bridge Replacement Project would directly affect about 8 acres of woodland and scrub habitats. Although AWI projects and the 11th Street Bridge Replacement Project would affect terrestrial vegetation, planting vegetation and trees in the area is proposed as mitigation. The District DOT and FHA have committed to providing plantings in select areas of the park where impacts from the 11th Street Bridge Replacement Project are anticipated (DCDOT and FHWA 2007) and a goal of the AWI is to restore riparian function in the watershed in both urban and natural environments (DCOP 2009). As a result of the many redevelopment projects described above, a long-term minor adverse impact to terrestrial vegetation would occur.

In addition to this plan/EIS, which would manage invasive plant species, other projects are also reducing areal coverage of invasive plant species along the Anacostia River. The Woodrow Wilson Project's environmental programs have included wetland restoration in areas dominated by common reed grass, a top ten NCR-EPMT target species. Also, the Anacostia Wetland Mitigation Project (ANA-11) eliminated invasive non-native species. Therefore, beneficial effects are expected through reduced areal coverage of invasive plant species. However, these beneficial impacts would most likely be cancelled out by the long-term minor adverse impacts to terrestrial vegetation as described above, resulting in negligible impacts.

The long-term minor adverse impacts on terrestrial vegetation in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term minor adverse impacts to terrestrial vegetation, the adverse effects of alternative A added to this would result in a long-term moderate adverse cumulative impact on terrestrial vegetation.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on vegetation because there would be a measurable minor but limited reduction in vegetation diversity and abundance, which would be of little consequence to the functionality of the plant communities in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Vegetation Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, additional NEPA compliance would be necessary for removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. With the exception of installing new rain gardens (which would require additional NEPA compliance), the techniques described above for all action alternatives would have a negligible impact on vegetation because the abundance and diversity of terrestrial vegetation is not expected to change. Installing new rain gardens may disturb soil and associated vegetation during construction in the short-term but may include upland plantings and help reduce the amount of impervious area in the park in the long-term; however, these areas may be too small and localized in nature to create a detectable change in vegetation diversity and abundance. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). Overall, the techniques that are common to all action alternatives would result in negligible impacts to vegetation because the impacts would be at the lower levels of detection and because of the limited and localized nature of the proposed techniques.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would benefit vegetation currently being grazed along the existing shoreline buffer as well as terrestrial vegetation located further inland, such as current turf feeding areas. Wetland management techniques such as the installation of coir fiber logs, flow deflectors, bog mats, and/or shoreline steepness reduction would help establish and benefit terrestrial vegetation.

Habitat modification techniques are also proposed as part of alternative B for resident Canada goose management that would have a beneficial impact on vegetation. These techniques include planting 25- to 50-foot buffers along the shorelines of the River throughout the park and increasing the width of existing vegetated buffers. It has been demonstrated by Gosser et al. (1997) that restricting a goose's ability to move between water and land deters geese from an area, especially during the molt. Therefore, physical barriers (such as vegetation) along the water's edge would restrict the movements of geese between the water and shore and would provide a beneficial impact on vegetative areas currently being grazed that have no shoreline buffers. Access from water to land would be restricted by planting thick shrubs or trees, along the shoreline of the Anacostia River to enhance existing buffers. Additionally, the new plantings would include species that are considered less desirable to geese and goose repellents would be applied to turf feeding areas yearly to protect the vegetation in these areas. Other vegetation techniques that are part of wetland management are proposed to improve terrestrial vegetation include managing invasive plant species (reducing areal coverage). By improving wetland vegetation with native species, there is less likelihood that invasive vegetative species would encroach and persist in these locations. Also, high-density plantings using persistent, native species with high root mats and variable height are also included as part of alternative B.

Vegetation may be temporarily affected during land disturbance activities such as the re-grading of sites or construction activities associated with hydrology techniques, vegetation techniques, and wetland restoration techniques. These techniques would have a negligible to minor, adverse impact on vegetation, depending on the area disturbed. However, vegetation disturbance impacts would be minimized as much as possible and the areas would be revegetated immediately following site preparation. Mitigation may include appropriate BMPs such as vegetation buffers, a revegetation plan, or other required documents in the District, depending on the total area disturbed. Even through some wetland management techniques may require land disturbance activities, alternative B would result in overall beneficial impacts to terrestrial vegetation as a result of wetland management and resident Canada goose management techniques because native vegetation coverage would increase and invasive vegetation coverage would decrease at the park.

Cumulative Impacts—The beneficial impacts on terrestrial vegetation as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on terrestrial vegetation, these adverse effects would be offset when added to the beneficial impacts from alternative B, resulting in a negligible cumulative impact to terrestrial vegetation.

Conclusion—Alternative B would result in overall beneficial impacts on vegetation due to wetland management practices, new plantings, and a reduction in herbivory, which would improve native vegetation communities. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, least invasive stream/stormwater outfall modifications, would not include creating tidal guts, would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Like alternative B, alternative C would also manage invasive vegetation species, the 25- to 50-foot buffers along the shorelines of the River throughout the park would be planted, and the width of existing vegetated buffers would be increased. A reduced resident Canada goose population would decrease the amount of grazing of shoreline areas so less turf and terrestrial vegetation would be lost from grazing. Land disturbance would still occur during construction activities, and would have a negligible impact on vegetation. Overall impacts to vegetation as a result of alternative C would be the same as alternative B: beneficial because the wetland management and resident Canada goose management techniques would increase native vegetation coverage and would decrease invasive vegetation coverage at the park. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to the vegetation at the park.

Cumulative Impacts—The beneficial impacts on terrestrial vegetation as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on terrestrial vegetation, these adverse effects would be offset when added to the beneficial impacts from alternative C, resulting in a negligible cumulative impact to terrestrial vegetation.

Conclusion—Alternative C would result in overall beneficial impacts on vegetation due to wetland management practices, invasive plant species management, and a reduction in herbivory, which would improve native vegetation communities. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed, including no initial lethal reduction activities and a minor level of invasive plant species management (similar to current program). Alternative D includes new and increased vegetative buffers proposed along the shoreline, but the low resident Canada goose management would allow turf and terrestrial vegetation to be lost as a result of grazing. The limited, current management of invasive plant species would be continued with alternative D, which would increase the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially reduce native vegetation. A reduction in the abundance and diversity of vegetation would occur (including invasive plant species increase in coverage) that would be measurable but would not necessarily affect the overall functionality of the plant communities in Anacostia Park. Therefore, alternative D results in long-term minor adverse impacts to vegetation because invasive vegetation coverage at the park may increase and a reduction in the abundance and diversity of vegetation may occur due to goose herbivory.

Cumulative Impacts—The long-term minor adverse impacts on terrestrial vegetation in and near Anacostia Park under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since these projects would have long-term minor adverse impacts to terrestrial vegetation, the added adverse effects of alternative D would result in a long-term moderate adverse cumulative impact on terrestrial vegetation.

Conclusion—Alternative D would result in overall long-term minor adverse impacts on vegetation because there would be a measurable minor but limited reduction in vegetation diversity and abundance, which would be of little consequence to the functionality of the plant communities in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate adverse.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has numerous wetland management and resident Canada goose management techniques proposed, including an invasive plant species management program and new and increased vegetative buffers, but no lethal reduction activities. Invasive plant species would be managed under alternative D the same as under alternative B, which would decrease the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially increase native vegetation. However, alternative D results in overall negligible impacts to vegetation because native species coverage would be increased through buffer plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change in vegetation at the park.

Cumulative Impacts—The negligible impacts on terrestrial vegetation in and near Anacostia Park under alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since these projects would have long-term minor adverse impacts to terrestrial vegetation, the negligible effects of alternative E would result in a long-term minor adverse cumulative impact on terrestrial vegetation.

Conclusion—Alternative E would result in overall negligible impacts on vegetation because a reduction in vegetation diversity and abundance may occur, but this change would not be measurable, and the cover of invasive plant species would remain the same. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Wildlife (Not including Resident Canada Geese)

Guiding Regulations and Policies

NPS regulations and policies, including the NPS *Organic Act of 1916*, NPS *Management Policies 2006*, and NPS Reference Manual 77: *Natural Resource Management* directs the park to provide for the protection of park resources. The *Organic Act* directs national parks to conserve wildlife unimpaired for future generations and is interpreted to mean that native animal life are to be protected and perpetuated as part of the park's natural ecosystem. Parks rely on natural processes to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities.

NPS *Management Policies 2006* make restoration of native species a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006a). The NPS would seek to protect native animal populations against destruction or harm through human actions.

The *Migratory Bird Treaty Act of 1918*, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit (50 CFR 21.11). Additionally, the act authorizes and directs the Secretary of the Interior to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take. "Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

Assumptions and Methodologies

The evaluation of wildlife (other than resident Canada geese) was based on a qualitative assessment of how expected changes to wetlands and the resident Canada goose population would affect the habitat of other wildlife. The park's wildlife is directly affected by the natural abundance, biodiversity, and the ecological integrity of their habitat. Wildlife groups analyzed in this section include birds; mammals; reptiles, amphibians, and invertebrates, and invasive wildlife species.

Available information on known wildlife was compiled and analyzed in relation to the proposed management actions. The geographic study area for wildlife would include all upland and wetland habitats within the park boundaries.

The District WAP has identified 15 birds, five mammals, 13 reptiles, 13 amphibians, and nine invertebrates within Anacostia Park that are considered species of greatest conservation as described in table 10 of chapter 3. NPS makes every reasonable effort to conduct its actions consistent with relevant state laws and regulations. Due to the additional wildlife included on lists produced by the District WAP, impacts to these species are analyzed in this section; these species are still given equal consideration for analysis in this plan/EIS compared to federally and state listed species.

Impact Threshold Definitions

The following thresholds were used to determine impacts to wildlife:

Negligible: There would be no observable or measurable impacts on species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

Adverse: *Minor*: Impacts would be detectable but would not be outside the natural range of variability. Small changes to population numbers, population structure, genetic variability, and other demographic factors might occur. Occasional responses to disturbance by some individuals could be expected but without interference to factors affecting population levels. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.

Moderate: Impacts to native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Changes to population numbers, population structure, genetic variability, and other demographic factors would occur, but species would remain stable and viable. Frequent responses to disturbance by some individuals could be expected, with some negative impacts on factors affecting population levels. Sufficient habitat would remain functional to maintain the viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat.

Major: Impacts to native species, their habitats, or the natural processes sustaining them would be detectable, outside the natural range of variability, and extensive. Population numbers, population structure, genetic variability, and other demographic factors might experience large declines. Frequent responses to disturbance by some individuals would be expected, with negative impacts on factors resulting in a decrease in population levels. Loss of habitat might affect the viability of at least some native species.

Wildlife Alternatives Evaluation

Alternative A – No Action Alternative—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland habitat in the watershed, but the resident Canada goose population would not be intensively reduced as part of the no action alternative. Additionally, no wetland restoration techniques or habitat modifications such as buffers or new plantings are proposed as part of the no action alternative. The existing habitat to support wildlife species is not diverse due to reduced or degraded wetland areas. In addition, it is expected that over the life of this plan/EIS, the riverine wetlands would continue to erode (NPS 2010d, Curtis 2010), resulting in a further loss of wetland vegetation that would also affect wildlife species utilizing this habitat. The limited, current management of invasive plant species would be continued with the no action alternative. Additionally, the loss of vegetation and the subsequent erosional substrate at wetlands within Anacostia Park due to wildlife grazing (primarily resident Canada geese) negatively affects aquatic-dependent wildlife species in the park that utilize these areas such as other waterfowl and migratory Canada geese. Removal of the sheet piling (which would require additional NEPA compliance) would have a negligible impact on wildlife species since the impact on vegetation is negligible since the abundance and diversity of terrestrial vegetation is not expected to change.

The USFWS (1999) has stated that the presence of large numbers of resident Canada geese conflict with management of the wild, migratory Atlantic Population (AP) of Canada geese. Other migratory waterfowl such as ducks can also be affected by large concentrations of resident Canada geese. Food and habitat for AP geese become food and habitat for resident Canada geese, making it more difficult to manage for migrant populations as a result of the growing resident Canada goose population, which quickly degrades and decimates these resources that are important for the health and survival of wild geese (USFWS 1999). If left unchecked and uncontrolled, the resident Canada goose population could adversely affect other wildlife species diversity and abundance (USFWS 1999). In addition, the USFWS (2005) and McCoy (2000) state that concentrated resident Canada geese populations may threaten the health of other wildlife, especially waterfowl and state that influenza A viruses and avian tuberculosis outbreaks are exacerbated by dense populations of waterfowl, including Canada geese (McCoy 2000). Resident Canada geese can also unintentionally serve as live decoys, attracting migratory geese to problem areas, thus exacerbating existing problems, or causing new ones, and can concentrate birds in small areas, potentially facilitating the spread of avian disease (USFWS 2005). Although resident Canada geese present the threat of spreading pathogens to bird and mammal populations, the correlation between the spread of avian diseases and the presence of resident Canada geese has not been demonstrated or studied at Anacostia Park.

It has been specifically observed by the State of Connecticut's Department of Environmental Protection (DEP) that resident Canada geese can serve as decoys, attracting migrant waterfowl, which can lead to crowded conditions and encourage the spread of diseases through the wild population (Connecticut DEP 2009). Although it has been specifically demonstrated by USFWS (1999), McCoy (2000), USFWS (2005), and Connecticut DEP (2009) that the resident Canada goose population could affect other wildlife, this correlation has not been measured at Anacostia Park. As suggested in USFWS (2005, IV-9), impacts of resident Canada geese on other migratory waterfowl could include resident Canada goose damage to habitat intended for wintering and migrating waterfowl. Because the resident Canada goose population would not be reduced under alternative A, the migratory Canada goose population within the Park would continue to compete with the resident Canada goose population at the park for resources such as food and habitat. As a result of the no action alternative, continued, long-term minor adverse impacts to wildlife are anticipated due to loss of vegetation in wetlands because impacts would be detectable but would not be outside the natural range of variability; small changes to population numbers, population structure, genetic variability, and other demographic factors might occur and occasional responses to disturbance by some individuals would be expected to wildlife.

Cumulative Impacts—Due to the numerous redevelopment projects proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11th Street Bridge Replacement Project, cumulative impacts to wildlife are anticipated. Most construction projects would require existing vegetation to be removed, which would reduce the existing habitat available to wildlife.

The greatest potential for impact to terrestrial habitats would come from the redevelopment project at Poplar Point, which is a large tract of natural habitat types within and adjacent to Anacostia Park. Other projects in the area are redevelopments of urbanized areas that contribute little to the naturalized habitat of the area. The Poplar Point project could potentially impact from 30 to 100 acres, but impacted habitat types are unknown at the time. The 11th Street Bridge Replacement Project would directly affect about 8 acres of woodland and scrub habitats. Although AWI projects and the 11th Street Bridge Replacement Project would affect terrestrial vegetation, planting vegetation and trees in the area is proposed as mitigation. It is unknown whether these plantings would be landscaped areas for aesthetic purposes that would provide little wildlife value or if they would include more natural terrestrial habitats to support wildlife. The District DOT and FHA have committed to providing plantings in select areas of the park where impacts from the 11th Street Bridge Replacement Project are anticipated (DCDOT and FHWA 2007) and a goal of the AWI is to restore riparian function in the watershed in both urban and natural environments (DCOP 2009). As a result of the many redevelopment projects described above, a long-term minor adverse impact to wildlife would occur.

The long-term minor adverse impacts on wildlife in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above. Since the projects listed above would have long-term minor adverse impacts to wildlife, the adverse effects of alternative A when added to these projects would result in a long-term moderate adverse cumulative impact on wildlife.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on wildlife because impacts would be detectable, but would remain within the range of natural variability, though there may be small changes to demographics and genetic variation, and some individuals may have responses to disturbance without impacting the population as a whole. Impacts would not occur during key reproduction periods and habitats for sensitive native species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Wildlife Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. Installing new rain gardens would disturb soil and associated vegetation during construction in the short-term but may include upland plantings to help reduce the amount of impervious area in the park in the long-term, thereby providing additional habitat to wildlife species. However, these areas may be too small and localized in nature to create a detectable change in wildlife species or populations. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. As noted above, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). Alternatives B, C, and E would include the use of visual deterrents. Visual deterrents may cause birds such as bald eagles or ospreys to temporarily avoid a particular area during the use of scare or harassment techniques, but these deterrents would be unlikely to have an effect on the overall bald eagle or osprey populations along the Anacostia River. Other wildlife such as aquatic birds (ducks, loons, grebes, coots, rails), wading birds (herons, bitterns, egrets), gulls/terns, and other permanent residents (osprey, kingfisher, double-crested cormorant), mammals (beaver, river otter, muskrat, mink, raccoon), reptiles (turtles, snakes, lizards, skinks), and amphibians (toads, frogs, salamanders) may also be temporarily affected by some of the techniques that are common to all action alternatives, such as visual deterrents. However, these wildlife species are accustomed to urban sounds and disturbances and should be able to acclimate to short-term impacts. Migratory Canada geese would not be affected by scare and harassment techniques because these actions would take place when migratory flocks have left the park. The techniques that are common to all action alternatives would result in short-term minor adverse impacts to wildlife because the impacts would be detectable but would not be outside the natural range of variability; occasional responses to disturbance by some individuals would be expected but sufficient habitat would remain functional to maintain viability of all species. Following construction activities, a negligible impact would occur to wildlife as a result of impacts common to all action alternatives because there would be no measurable impacts on wildlife species, their habitats, or the natural processes sustaining them.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would improve wetlands and provide benefits to wildlife species. Because wetlands provide habitat and the essentials necessary for a diversity of types and abundance of wildlife species typically associated with wetlands, improvements to wetlands would benefit wildlife species, including the numerous, urban-tolerant wildlife species that are found within the park. Wetland plants serve as a food source (seeds, roots, leaves) for many wildlife species. Similarly, wildlife species would also indirectly benefit through improved macroinvertebrate and finfish resources, which are also a major food source for aquatic-dependent wildlife species. Specifically, aquatic birds (ducks and migratory geese, loons, grebes, coots, rails), wading birds (herons, bitterns, egrets), gulls/terns, and other permanent residents (osprey, kingfisher, double-crested cormorant) that utilize wetlands and their fringe habitat would benefit from improved wetland areas as would mammals (beaver, river otter, muskrat, mink, raccoon), reptiles (turtles, snakes, lizards, skinks), amphibians (toads, frogs, salamanders) and numerous invertebrates such as butterflies and dragonflies. Additionally, beneficial impacts to the species listed by the District WAP (birds, reptiles, mammals, amphibians, and invertebrates) as species of greatest conservation need and observed at Anacostia Park (table 11) would also occur as a result of alternative B.

Habitat modification techniques are also proposed as part of this alternative for resident Canada goose management that would have a beneficial, impact on wildlife species. These techniques include planting 25- to 50-foot buffers along the shorelines of the river throughout the park and increasing the width of existing vegetated buffers. Vegetation techniques that are part of wetland management are proposed to improve terrestrial vegetation include managing invasive plant species. These plantings would benefit wildlife by providing additional and enhanced habitat along the river available for cover, nesting, and foraging. Also, high density plantings using persistent, native species with high root mats and variable height are also included as part of alternative B. Hydrology techniques that include removing or modifying structures that result in erosion and clogging of marsh and creating tidal guts would have an overall beneficial impact on wildlife by creating improved and additional habitat. Improved quality and quantity of habitat would indirectly benefit wildlife species as well as support food sources (seeds, roots, leaves, benthic macroinvertebrates, and finfish) for wildlife species.

Techniques considered as part of resident Canada goose management are proposed to reduce goose herbivory and improve wetland vegetation, thereby providing benefits to wildlife. There would be no indirect or direct adverse impacts to non-target species from egg addling/oiling/replacement, capture, or euthanasia (which would only take place in controlled environments). As stated in USFWS (2005, IV-3): “All capture and removal methods allow for positive identification of target species and there has been no impact observed on non-target, threatened, and endangered species.” There would also be no adverse impacts to wildlife species as a result of shooting resident Canada geese to reduce the population. Only qualified federal employees that are trained, experienced, and licensed to use a firearm would be used for this action.

Under alternative B, the resident Canada goose population in the park would be reduced but the migratory population within the park and beyond park boundaries would not be reduced. Lethal control techniques as well as scare and harassment techniques would be implemented when migratory flocks of Canada geese have left the park. A beneficial impact to wetland vegetation would occur following resident Canada goose reduction activities. The population reduction activities of resident Canada geese would allow the wetland vegetation to recover from goose herbivory activities. Resident Canada geese exert a higher degree of grazing pressure on wetlands over migratory geese, because they typically feed year round on seedlings, plants, propagules, and roots (Coluccy 2009). The combination of reducing the resident Canada goose population and the effort to help restore the freshwater tidal ecosystem would allow wetlands to reach the desired condition of predominantly self-sustaining systems (containing advanced seral-stage habitat conditions) and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. Therefore, this would have benefits for migratory Canada geese as well as other wildlife species which are all a natural part of this ecosystem. Therefore, migratory Canada geese would benefit from alternative B because less competition with resident Canada geese for nesting and foraging areas would occur due to the reduced population. Because the USFWS (1999) has stated that the presence of large numbers of resident Canada geese conflict with management of the wild, migratory AP of Canada geese, a reduced resident Canada goose population may have beneficial impacts on the migratory AP of Canada geese through reduced competition of habitat and food sources.

All wildlife, including the species described above, may be temporarily affected during land disturbance activities such as the re-grading of sites or construction activities including hydrology, vegetation, and wetland restoration techniques that increase noise. These techniques would have a negligible impact on wildlife at the area disturbed and during the period of activity. Disturbance impacts would be minimized as much as possible; the disturbed areas would be revegetated immediately following site preparation. However, the wildlife species that currently inhabit the park are accustomed to urban sounds and disturbances and should be able to acclimate to short-term construction impacts. Overall, alternative B would have a beneficial impact on wildlife because improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/structure of wildlife species in the park.

Cumulative Impacts—The beneficial impacts on wildlife as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on wildlife, these adverse effects would be offset when added to the beneficial impacts from alternative B, resulting in a negligible cumulative impact to wildlife.

Conclusion—Alternative B would result in overall beneficial impacts on wildlife because improvements to habitat and food sources would positively impact population structure and numbers in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C includes many of the same wetland management and resident Canada goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, least invasive stream/stormwater outfall modifications, would not include creating tidal guts, would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Like alternative B, alternative C would also manage invasive plant species, the

25- to 50-foot buffers along the shorelines of the River throughout the park would be planted, and the width of existing vegetated buffers would be increased. Similar to alternative B, the combination of reducing the resident Canada goose population and the effort to help restore the freshwater tidal ecosystem would allow wetlands to reach the desired condition of predominantly self-sustaining systems (containing advanced seral-stage habitat conditions) and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. This would have benefits for migratory Canada geese as well as other wildlife species, which are all a natural part of this ecosystem. Therefore, a reduced resident Canada goose population may have beneficial impacts on migratory Canada geese through reduced competition of habitat and food sources as well as other waterfowl. Overall impacts to wildlife for alternative C would be the same as alternative B: beneficial because improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/structure of wildlife species in the park, including the species listed by the District WAP. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity.

Cumulative Impacts—The beneficial impacts on wildlife as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on wildlife, these adverse effects would be offset when added to the beneficial impacts from alternative C, resulting in a negligible cumulative impact to wildlife.

Conclusion—Alternative C would result in overall beneficial impacts on wildlife because improvements to habitat and food sources would positively impact population structure and numbers in the park, including species listed by the district WAP. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques proposed, including no initial lethal reduction activities and a minor level of invasive vegetation species management (similar to current program). Alternative D includes new and increased vegetative buffers, which would create/improve habitat and food sources for wildlife species, but low resident Canada goose management. Low resident Canada goose management would still allow resident Canada geese to compete for habitat and food sources with migratory Canada geese and/or other waterfowl at the park. As suggested in USFWS (2005, IV-9), impacts of resident Canada geese on other migratory waterfowl could include resident Canada goose damage to habitat intended for wintering and migrating waterfowl. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity. Overall, alternative D results in long-term minor adverse impacts to wildlife because food sources and habitat quality would be improved through plantings, but may be offset or reduced by the lack of lethal reduction activities, resulting in detectable impacts that would not be outside the natural range of variability; small changes to population numbers, population structure, genetic variability, and other demographic factors might occur and occasional responses to disturbance by some individuals would be expected.

Cumulative Impacts—The long-term minor adverse impacts on wildlife in and near Anacostia Park under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term minor adverse impacts to wildlife, the added adverse effects of alternative D would result in a long-term moderate adverse cumulative impact on wildlife.

Conclusion—Alternative D would result in overall long-term minor adverse impacts on wildlife because impacts would be detectable, but would remain within the range of natural variability, though there may be small changes to demographics and genetic variation, and some individuals may have responses to disturbance without impacting the population as a whole. Impacts would not occur during key reproduction periods and habitats for sensitive native species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—Alternative E has the same wetland management techniques proposed as alternative B including an invasive plant species management program and high density planting efforts, but no lethal reduction activities. The lack of lethal reduction activities would still allow resident Canada geese to compete for habitat and food sources with migratory Canada geese and/or other waterfowl at the park. Overall, alternative E results in negligible impacts to wildlife because food sources and habitat quality would be improved through plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change to population numbers or structure of wildlife in the park. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity.

Cumulative Impacts—The negligible impacts on wildlife in and near Anacostia Park under alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term minor adverse impacts to wildlife, the negligible effects of alternative E would result in a long-term minor adverse cumulative impact on wildlife.

Conclusion—Alternative E would result in overall negligible impacts on wildlife because there would be no measureable impacts on species, their habitats, or natural processes that sustain them and any impacts would be within the limits of natural fluctuation. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

Resident Canada Geese

Guiding Regulations and Policies

According to NPS *Management Policies 2006*, whenever a park removes native plants or animals, manages plant or animal populations to reduce their size, or allows others to remove plants or animals for an authorized purpose, the NPS would seek to ensure that such removals would not cause unacceptable impacts on native resources, natural processes, or other park resources. If the NPS identifies a possible need for reducing the size of a park plant or animal population, the park would use scientifically valid resource information obtained through consultation with technical expert literature review, inventory, monitoring, or research to evaluate the identified need for population management. There are specific sections in NPS *Management Policies 2006* that are applicable and supportive of the management of resident Canada geese, as described in the paragraphs that follow.

The *Migratory Bird Treaty Act of 1918* implements various treaties and conventions between the United States and other countries 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).

As stated previously in chapter 1, Canada geese are federally protected by the MBTA (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the MBTA, 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). Therefore, the take of resident Canada geese by NPS in this plan/EIS would require obtaining a permit from USFWS.

Assumptions and Methodologies

The evaluation of resident Canada geese was based on an assessment of how expected management actions would affect the Anacostia Park resident Canada goose population at the park, currently estimated at 564 geese in 2010 (NPS 2009b; Bates 2010a). Available information on the population size, habitat preference, and life history were compiled and analyzed in relation to the management actions. Egg oiling is occurring at the park, which represents the existing conditions; it is unknown whether this action is reducing the resident Canada goose population within Anacostia Park. The geographic study area for the resident Canada goose includes Anacostia Park and the area beyond park boundaries used by the resident Canada geese population.

Impact Threshold Definitions

The following thresholds were used to determine impacts to the resident Canada goose population:

Negligible: There would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Statewide Maryland resident Canada goose population. Any changes to the resident Canada goose population would be similar to current conditions.

Adverse: *Minor*: Impacts to the population of resident Canada geese within the park would be detectable, but impacts to the Maryland, DC, or Atlantic Flyway resident Canada goose population would not occur.

Moderate: Impacts to the population of resident Canada geese within the park would be detectable, and these impacts would be perceptible at the Maryland and DC resident Canada goose population level, but not at the Atlantic Flyway resident Canada goose population levels.

Major: Impacts to the population of resident Canada geese would occur, and these impacts would be perceptible at both the population level within the park and would be perceptible at the Maryland, DC, and Atlantic Flyway resident Canada goose population levels.

Resident Canada Goose Alternatives Evaluation

Alternative A – No Action Alternative—Under alternative A, no change from current management techniques and/or current conditions would occur. Park staff would continue resident Canada goose management activities at the same level as current, including (since 2004) maintaining current goose exclusion fencing and yearly egg oiling. Lethal population reduction strategies and scare/harassment techniques are not included as part of alternative A. The removal of sheet piling (which would require additional NEPA compliance) would have a negligible impact on resident Canada geese because there would be no observable or measurable changes to the population of resident Canada geese within the park or beyond park boundaries as a result of this action.

The Atlantic Flyway Council's Canada Goose Committee estimates that if 95 percent of the eggs in the local population are found and destroyed each year, it would result in only a 25 percent reduction [of the local population] in the next 10 years, which would not relieve the overgrazing pressure on the wetland communities at Anacostia Park (AWS 2006). Ground-based resident Canada goose count surveys have been conducted since 2004 within Anacostia Park (includes Kenilworth, Kingman, Heritage Island, and Anacostia Park East locations). Survey data from the month of June or July have been presented in this document because most, if not all geese, are resident Canada geese during these months and because geese are flightless during this molting period (NPS 2009b). Within Anacostia Park, the mean resident Canada goose population was 664 in 2004, 617 in 2005, 499 in 2006, 783 in 2007, 696 in 2008, 492 in 2009, and 564 in 2010 (NPS 2009b; Bates 2010a).

Resident Canada goose count surveys have been conducted at the park (including Bladensburg, Kenilworth, Kingman, Heritage Island, and Anacostia Park East) since 2004. Based on the June 2010 five-day goose count conducted in the park, the average resident Canada goose population within park boundaries is approximately 564 geese (Bates 2010a). The wildlife population level is the number of individuals 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). The goose count population data were reviewed by the science team and it was determined that wetlands within Anacostia Park are being [statistically] significantly impacted when the resident Canada goose population exceeds 30.5 geese per wetland square mile and 1 goose per 15 acres of grassland habitat (NPS 2010a; NPS 2009b; Kearns personal communication 18 June 2009). Therefore, the resident Canada goose population goal for taking action to protect vegetation within Anacostia Park is 54 resident Canada geese within the park. The current population estimate of resident Canada geese within the park (564 geese from 2010 data) demonstrate that the population is well over the recommended size (54 geese) to allow for successful wetland restoration [and conservation] in Anacostia Park (NPS 2009b). With little control on the resident Canada goose population in Anacostia Park as proposed in alternative A, the population would continue to fluctuate and vary depending on other conditions; however, an increased population above the recommended size could continue.

In general, when populations are greater than the recommended size, adverse effects to the population itself can occur as a result of crowded conditions, including reduced food sources, reduced or less than desirable available habitat, the spread of disease, and the reduced opportunity for other wildlife to occupy the same space. However, the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005). It is expected that the reproductive control techniques continued as part of alternative A (yearly egg oiling) would not limit growth enough to reach the initial resident Canada goose goal (54 geese) within the life of this plan/EIS.

The biological carrying capacity is the land or habitat's limit for supporting healthy populations of wildlife without degradation to the animal's health or environment over an extended period of time (from USFWS 2005 as cited in Decker and Purdy 1988). As is presented in the FEIS for Resident Canada

Goose Management (USFWS 2005), based on known population growth curves, it was estimated that it was likely that almost all areas were well below their carrying capacity for Canada geese. Therefore, the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers. At some point in the future, the size of the Anacostia Park population of resident Canada geese may ultimately be limited by available food, water, sanctuary, or other resource needs. As noted in the "Resident Canada Geese and the Role of Climate Change" section of chapter 3, changes in mean sea level rise are expected as a result of climate change. As a result of sea level rise, the wildlife species that depend on these habitats for activities such as foraging or nesting would vary in their responses to habitat changes, depending on species-specific responses to changes in inundation, salinity, vegetation structure and composition, and other habitat characteristics (Strange et al. 2008). For example, tidal flats and other shoreline areas would be inundated as a result of sea level rise which would most likely reduce foraging and nesting areas for resident Canada geese. It is also possible that Canada geese would respond to the warming trends through earlier breeding dates and range expansions (Marra et al. 2005 as cited in NPS 2009d). If the Anacostia Park population of resident Canada geese is limited by resources such as foraging areas, nesting areas, food, water, etc., it is possible that a density-dependent (self) regulation of the population would occur and it is possible that the geese would so deplete their food and nesting resources that a population decline would begin. It is expected that more competition of nesting and foraging resources would adversely affect resident Canada geese, although it is unknown when and to what extent this would affect the population of resident Canada geese at Anacostia Park. As stated by USFWS (2005) in the *Final EIS for Canada Goose Management*, the timing, likelihood, and scale of a population decline of this nature is unpredictable. Alternative A would not include adaptive management or wetland monitoring, both of which are predicted to provide insights to the potential consequences of climate change and help determine how future management practices should be implemented. Therefore, alternative A does not include techniques or actions that would counteract or reduce the potential pressures of climate change. It is likely that the effects of climate change to resident Canada geese would be exacerbated by Alternative A. Climate change could reduce nesting areas and forage areas and cause the expected density-dependent (self) regulation of the population to occur more quickly than without the predicted effects of climate change.

It has been demonstrated that the health of resident Canada goose populations can be further complicated through the feeding of geese by the public (Connecticut DEP 2009). The Connecticut DEP (2009) states that geese fed nutritionally deficient food, such as bread, may be more susceptible to disease. Resident Canada goose management techniques continued as part of alternative A do not include installing *No Feeding* signage or enforcing the feeding wildlife CFR (through fines for violations). Therefore, the public would continue to feed resident Canada geese at Anacostia Park.

Therefore, it is expected that alternative A would continue to result in overall negligible impacts to the population of resident Canada geese in Anacostia Park because current resident Canada goose management practices (yearly egg oiling) are not limiting the growth of the goose population.

Cumulative Impacts—In 1989, the Maryland State resident Canada goose population was estimated at 25,000 (USFWS 1999). From 1990 to 2005, the population in Maryland increased from 17,000 to 83,000 and in Virginia it increased from 35,000 to 156,000 (AWS 2006). The resident Canada goose population in Maryland from spring population estimates (2001 through 2003 averages) was 69,467 geese. The USFWS (2005) states that Maryland's population objective for resident Canada geese is 30,000. Therefore, the current resident Canada goose population in Maryland is over 600 percent greater than the population objective (USFWS 2005). The Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment [20 to 30 percent of the current adult population] of goslings and new adults (Atlantic Flyway Council 1999). The District is located within the Atlantic Flyway, and the Atlantic Flyway Council as well as the USFWS, MDNR, and the District's WAP have all recommended reducing the resident Canada goose population. Because the resident Canada goose population would not be reduced in Anacostia Park as a result of alternative A, the NPS would not be following directives proposed by the agencies listed above, as well as meeting a conservation action of the District's WAP (establish a goose management plan).

Hunting for migratory Canada geese was closed across the Atlantic flyway after populations plummeted in the early 1990s; the decline was then accompanied by a dramatic increase in the number of resident Canada geese in Maryland. As a result, hunting seasons for resident Canada geese were reopened in Maryland in 1999 and resident Canada goose hunting regulations set forth by the Maryland DNR Wildlife and Heritage Service were then liberalized in 2002 (and have continued ever since) to reduce the resident population (MDNR 2009). The Maryland DNR liberalization expanded the Late Resident Canada Goose Hunt Zone in Maryland (including portions of Prince George's County), including extending the season length, and increasing the bag limit of geese in response to continued growth of the resident population of Canada geese (MDNR 2009). MDNR states that the objective of the zone expansion and liberalization of bag limits is to provide greater opportunities to harvest overabundant resident Canada geese and to reduce nuisance, depredation, public safety, and health problems caused by these birds (MDNR 2009). During the 2006 September season, hunters bagged an estimated 12,700 resident Canada geese, which was a slight increase over the 10,400 taken in 2005 (USFWS 2007). Previously, growth within the Atlantic Flyway of the residential Canada goose population occurred despite an average annual sport harvest of approximately 240,000 resident birds (1997 through 1999), the reported take of over 60,000 eggs (1995 through 1999), and the reported permit take of 7,840 adult geese (1995 through 1999) (USFWS 2005). In addition to hunting, other regional organizations are currently conducting or have conducted resident Canada goose management activities in the vicinity of Anacostia Park, including the USDA APHIS Wildlife Services and the Maryland-National Capital Park and Planning Commission, as discussed in chapter 2.

As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested or managed in Maryland, the District, and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the *Final EIS for Canada Geese* would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas, especially airports and military airfields, agricultural areas, urban/suburban areas subjected to nest and egg removal, and public health threat areas; expanded hunting opportunities inside the existing hunting frameworks and additional take outside the sport hunting frameworks would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term major adverse impact to the resident Canada geese population is already occurring as a result of other activities as specified by USFWS (2005).

The negligible impacts to the resident Canada geese population under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to the resident Canada geese population, there would be long-term, major adverse cumulative impacts on the resident Canada geese population when added to the negligible impacts from alternative A.

Conclusion—Alternative A would continue to result in overall negligible impacts to the population of resident Canada geese in Anacostia Park because current resident Canada goose management practices (yearly egg oiling) are not limiting the growth of the goose population The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

Resident Canada Goose Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. The techniques described above that are common to all action alternatives would have a negligible impact on resident Canada geese because there would be no observable or measurable changes to the population of resident Canada geese within the park or beyond park boundaries as a result of these techniques. Generally, it is the combination of numerous wetland and resident Canada goose management techniques (discussed as action alternatives below) that would be expected to create a change to the population of resident Canada geese within the park or beyond park boundaries. Tidal flats and other shoreline areas would be inundated as a result of sea level rise which would most likely reduce foraging and nesting areas for resident Canada geese. It is also possible that resident Canada geese would respond to the warming trends like other birds through earlier breeding dates and range expansions (Marra et al. 2005 as cited in NPS 2009d). If the Anacostia Park population of resident Canada geese is limited by resources such as foraging areas, nesting areas, food, water, etc., it is possible that a density-dependent (self) regulation of the population would occur, but this would be unlikely under the action alternatives, which all propose resident Canada goose management techniques to reduce the population. Also, both adaptive management and wetland monitoring are key elements in all of the action alternatives. Monitoring is well known to be an essential element of wetland management, since it would allow detection of long-term change, specifically changes in the distribution of wetland areas, nesting areas, and foraging areas at Anacostia Park that may result from climate change. Monitoring and adaptive management would provide insights to the potential consequences of climate change and help determine how future management practices should be implemented.

Alternative B – High Wetland, High Resident Canada Goose Management—Under alternative B the most aggressive wetlands management techniques are combined with intensive resident Canada goose population reduction techniques (lethal control combined with other techniques). As stated above in alternative A, the resident Canada goose population goal within Anacostia Park is 54 resident Canada geese. Current population estimates of resident Canada geese within the park demonstrate that the population of 564 resident geese is well over the recommended size (54 geese) that would allow for successful wetland restoration (and conservation) in Anacostia Park.

Under this alternative, the number of resident Canada geese to be removed by lethal control would be based upon the prior season’s spring goose count results the year this plan/EIS is implemented. The initial resident Canada goose population goal of 54 resident Canada geese may be adjusted based upon results of monitoring and adaptive management strategies. The following actions are included under alternative B regarding resident Canada goose management:

- Lethal control would begin at 40 to 60 percent removal of the resident Canada goose population in the park (based on the annual spring count) and this removal range would continue until the resident Canada goose population goal of 54 is reached or vegetation monitoring and adaptive management indicate a different resident Canada goose population goal is appropriate.
- If after 5 years of removing 40 to 60 percent of the resident Canada goose population does not result in sustainable vegetation, the lethal control would increase up to a 90 percent removal of the resident Canada goose population in the park.

- If after 2 years of removing 40 to 60 percent of the resident Canada goose population, the influx of resident Canada geese in the park causes the population level to remain within 50 percent of the population prior to implementing this plan/EIS, the lethal control would increase by up to 10 percent each year to a maximum of 90 percent.

In addition to lethal control, other options may also be used to achieve plan goals as described in more detail in the paragraphs that follow.

Under this alternative, it is estimated that 40 to 60 percent of the resident Canada goose population would be removed from Anacostia Park during the first year of the plan/EIS as the first phase towards meeting the initial goal of 54 resident Canada geese. Resident Canada goose monitoring would occur for the life of this plan/EIS (15 years as stated in chapter 1) and the resident Canada goose population would be maintained using methods described in this section on a regular basis for the life of this plan/EIS. As a result, a discrete number of resident Canada geese would be removed in subsequent years as determined by monitoring results. As stated previously, the goal of 54 resident Canada geese may be adjusted to meet management goals based on the results of vegetation and resident Canada goose population monitoring, as described in more detail in the “Adaptive Management” section of chapter 2. Techniques used to reduce the population would include round-up, capture, and euthanasia as well as lethal removal by shooting as described in more detail in chapter 2. It is important to note that although at a percentage of the resident Canada goose population would be removed from the park as a result of this plan/EIS, some Canada geese would remain in the park, including both resident and migratory geese. Although many of the impacts resulting from geese are detrimental, the birds themselves are not undesirable, and in fact, are recognized as providing a large number of public benefits, as discussed in more detail in the “Visitor Experience” and “Aesthetics” sections of this chapter. A beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative B because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005).Alternative B would have a long-term major adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers throughout the life of the plan/EIS. Resident counts and vegetation monitoring would determine if the population needs to be reduced through lethal methods after the initial resident Canada goose removal conducted during the first year of the plan/EIS. In subsequent years, the percent of the population to be removed would be dependent upon results of the vegetative monitoring, and if the initial density goal of 54 geese per square mile within the park was achieved. Resident Canada geese would be removed through round-up, capture, and euthanasia or by shooting as part of alternative B. Using the current population estimate of 592 geese as an example, it is possible that the goal of 54 resident Canada geese within Anacostia Park could be met after 3 years (following three separate 60 percent removals of a population of 592 geese). As stated previously, relocating or removing resident Canada geese has been described by Gosser et al. (1997) as a stop-gap effort because the site must be modified to make it less attractive to resident Canada geese, or the removed geese would be replaced with new geese. This plan/EIS integrates wetland management techniques along with resident Canada goose management techniques and integrates adaptive management as well. Habitat modification techniques are proposed as part of alternative B to make the sites less attractive to resident Canada geese, including planting buffers, applying goose repellents, installing and maintaining exclusion fencing, and making new plantings less desirable to geese through plant species selection. These techniques could be employed in conjunction with population reduction techniques. Additional resident Canada goose management techniques that are proposed as part of alternative B include installing *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations). As a result of climate change, tidal flats would be inundated from sea level rise, which may reduce both foraging and nesting areas for resident Canada geese. Alternative B includes numerous techniques to manage the existing wetland areas and the resident Canada goose population at the Park. These techniques would aid in offsetting potential pressures of climate change by reducing the resident Canada goose population and potentially avoiding the density-dependent (self) regulation of the population that may occur without population control. It is expected that less competition of nesting and foraging resources would benefit the resident Canada geese at Anacostia Park. As discussed above in common to all actions, Alternative B incorporates the most techniques to offset the predicted effects to resident Canada geese that would result from climate change.

Subadult and failed-nesting adult Canada geese can undergo a phenomenon known as molt migration (Luukkonen et al. 2008). Molt migrations are summer movements of Canada geese from their nesting grounds to locations where they molt their flight feathers (Dieter and Anderson 2009). Damage by Canada geese can be especially high during the molting period, when geese have a higher energy demand because of feather production (Dieter and Anderson 2009). Some state and federal agencies have used egg addling or nest destruction to cause nest failure of giant Canada geese (Smith et al. 1999). These management techniques may induce a molt migration, meaning the geese would molt at some other location, which may just move the resident Canada goose issues from one area to another (Dieter and Anderson 2009). Although molt migration is known to occur after a failed nest, it has been estimated that far fewer (less than 27%) females with failed nests in urban parks migrated compared to greater than 65% of females with failed nests in other land uses migrated (Luukkonen et al. 2008). There are several possible factors that could be contributing to low migration incidence in urban parks. Urban parks such as Anacostia Park typically have large expanses of fertilized and mowed grass near water, which is ideal brood habitat. Also, geese are generally protected in parks and are sometimes fed by park visitors. The combination of space, protection, and abundant food resources support high goose densities, may reduce molt migration tendencies in subadult and adult geese (Luukkonen et al. 2008).

Although it is known that resident Canada geese stay within a 5 to 10 mile radius during non-breeding and 0.25 to 0.5 mile radius during breeding season (NPS 2010b), as the population within Anacostia Park is reduced, other resident geese from adjoining lands and waters may be expected to fill the vacant habitat made available over time, although a lag time may occur. However, the local resident Canada goose population would remain at or near the initial goal because under alternative B, NPS proposes to conduct lethal management on a regular basis in combination with other resident Canada goose management and wetland management techniques. In addition to lethal means of reducing the resident Canada goose population, alternative B could also include an intensive scare/harassment program as well as the following reproductive control techniques: increased egg oiling, egg addling, and egg replacement (if population increases after initial reduction); apply goose hatch material (if population increases greater than 20 percent in one year). The local Anacostia Park residential Canada goose population would remain low, but stable in number if lethal management were conducted on a regular basis as proposed as part of alternative B. The resident Canada goose population beyond park boundaries or regionally may also be affected by alternative B. As stated above, alternative B would have a long-term major adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers throughout the life of this plan/EIS. Even though a long-term major adverse effect would occur to the population of resident Canada geese in the park, an overall, long-term moderate adverse impact on the resident Canada geese population would occur regionally because 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. Detectable reductions of resident Canada geese within Anacostia Park would occur over the life of this plan/EIS.

Cumulative Impacts—The same past, present, and future actions described under alternative A would also occur under alternative B. As stated above for alternative A, the current resident Canada goose population in Maryland is over 600 percent greater than the population objective described by the USFWS (2005). The USFWS has recognized that since Canada goose populations have demonstrated the ability to sustain annual harvest rates in excess of 20 percent (USFWS 1999), it is expected that alternative B, which includes proposed lethal reduction activities, would have little to no cumulative impact on the Statewide population of resident Canada geese for Maryland. Additionally, in 1999, before the Final EIS for Canada Geese was even drafted, the Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment (20 to 30 percent of the current adult population) of goslings and new adults (Atlantic Flyway Council 1999). The District is located within the Atlantic Flyway, and the Atlantic Flyway Council as well as the USFWS, MDNR, and the District's WAP have all recommended reducing the resident Canada goose population. If the resident Canada goose population is reduced in Anacostia Park, the NPS would be following directives proposed by the agencies listed above, as well as meeting a conservation action of the District's WAP (establish a goose management plan).

Population objectives for resident Canada geese have been described by both the Atlantic Flyway Council (1999) and the USFWS Final EIS for Canada Geese (2005). 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 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 Flyway, 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 drafted, the Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment (20 to 30 percent of the current adult population) of goslings and new adults (Atlantic Flyway Council 1999).

As stated above in alternative A, hunting for resident Canada geese occurs in Maryland to harvest overabundant resident Canada geese and to reduce nuisance, depredation, public safety, and health problems caused by these birds (MDNR 2009). During the 2006 September season, hunters bagged an estimated 12,700 resident Canada geese, which was a slight increase over the 10,400 taken in 2005 (USFWS 2007). Previously, growth within the Atlantic Flyway of the residential Canada goose population occurred despite an average annual sport harvest of approximately 240,000 resident birds (1997 through 1999), the reported take of over 60,000 eggs (1995 through 1999), and the reported permit take of 7,840 adult geese (1995 through 1999) (USFWS 2005). Also stated in alternative A, other regional organizations are currently conducting or have conducted Canada goose management activities in the vicinity of Anacostia Park, including the USDA APHIS Wildlife Services and the Maryland-National Capital Park and Planning Commission.

As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested or managed in Maryland, the District, and other Mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to the resident Canada geese population is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

The long-term, moderate to major, adverse impacts to the resident Canada geese population under alternative B were considered together with the effects of the projects and actions mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to the resident Canada geese population, there would be long-term major adverse cumulative impacts on resident Canada geese when added to the long-term moderate to major adverse impacts from alternative B. However, the maximum of 40 to 60 percent of the resident Canada geese proposed for removal in the first year of this plan in Anacostia Park (and removing a discrete number determined through monitoring in subsequent years) is small compared to the tens of thousands of geese removed by hunters in Maryland every year.

Conclusion—Even though a long-term major adverse effect would occur to the Anacostia Park population of resident Canada geese under alternative B, an overall long-term moderate adverse impact on resident Canada geese would occur regionally because 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. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C has similar resident Canada goose management techniques proposed as alternative B, with a few exceptions. Alternative C proposes population reduction for the resident Canada goose within the park, through removal of 40 to 60 percent of the resident Canada goose population within the first year of the plan/EIS as the first phase towards meeting the initial goal of 54 resident Canada geese. Resident Canada goose monitoring would occur for the life of this plan/EIS (15 years as stated in chapter 1). Although monitoring may be conducted yearly, lethal control of 40 to 60 percent of the resident Canada goose population would only be used up to five times throughout the life of this plan/EIS following the initial reduction, and only if the population exceeds the initial goal of 54 resident Canada geese within the park or if vegetation monitoring and adaptive management indicate a different resident Canada goose population goal is appropriate. Therefore, a discrete number of resident Canada geese may be removed up to five times in subsequent years as determined by monitoring results. Similar to alternative B, the goal of 54 resident Canada geese may be adjusted through adaptive management to meet management goals based on the results of vegetation and resident Canada goose population monitoring. For this alternative, the current resident Canada goose population may be reduced through round-up, capture, and euthanasia, but no shooting of resident Canada geese would be included as part of alternative C (see chapter 2). Using the current population estimate of 592 geese as an example, it is possible that the goal of 54 resident Canada geese within Anacostia Park could be met after 3 years (following three separate 60 percent removals of a population of 592 geese). It is important to note that although at a percentage of the resident Canada goose population would be removed from the park as a result of this plan/EIS, some Canada geese would remain in the park, including both resident and migratory geese.

Alternative C would have a long-term moderate adverse impact on the resident Canada goose population within the park because the population would be reduced at a lower level than current numbers up to five times throughout the life of this 15-year plan/EIS. Alternative C allows for the lethal reduction of the resident Canada goose population one time in the first year of the plan/EIS and a maximum of five times throughout the plan to meet the initial population goal. It has been demonstrated that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). It is possible that the resident Canada goose population may readjust following the maximum five-time population reduction. That said, it has been demonstrated that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other resident Canada goose management techniques proposed as part of alternative C such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) would work in combination with the population reduction techniques. As stated above for alternative B, it is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative C because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005). Similar to the discussion for alternative B above, tidal flats would be inundated as a result of sea level rise, which may reduce both foraging and nesting areas for resident Canada geese. Alternative C includes numerous techniques to manage the existing wetland areas and the resident Canada goose population at the Park. These techniques would aid in offsetting potential pressures of climate change by reducing the resident Canada goose population and potentially avoiding the density-dependent (self) regulation of the population that may occur without population control. It is expected that less competition of nesting and foraging resources would benefit the resident Canada geese at Anacostia Park. The combination of these techniques would aid in offsetting potential pressures of climate change in addition to the techniques described above that are common to all action alternatives. Alternative C, like alternative B, incorporates the most techniques to offset the predicted effects to resident Canada geese that would result from climate change.

As a result of alternative C, the local Anacostia Park residential Canada goose population would remain low, but could fluctuate in number if lethal management was conducted a maximum of five times as proposed as part of this alternative. The resident Canada goose population beyond park boundaries or regionally may also be affected by alternative C. As stated above, alternative C would have a long-term moderate adverse impact on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers up to five times throughout the life of this plan/EIS. Even though a long-term moderate adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall long-term minor adverse impact on the resident Canada geese population would occur regionally because 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 during the life of this plan/EIS. In contrast, detectable reductions of resident Canada geese within Anacostia Park would occur over the life of this plan/EIS.

Cumulative Impacts—The same past, present, and future actions described under alternative A would also occur under alternative C. Cumulative impacts to resident Canada geese under alternative C would be very similar to those described above for alternative B, because both alternatives B and C propose lethal controls for the population reduction of the resident Canada geese within Anacostia Park. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other Mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005).

Therefore, a long-term major adverse impact to resident Canada geese is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999). The overall long-term minor adverse impacts to resident Canada geese under alternative C were considered together with the effects of the projects mentioned above. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term major adverse cumulative impacts on resident Canada geese when added to the long-term minor to moderate adverse impacts from alternative C. However, the maximum of 40 to 60 percent of the resident Canada geese proposed for removal in the first year of this plan in Anacostia Park (and removing a discrete number determined through monitoring in subsequent years) is small compared to the tens of thousands removed by hunters in Maryland every year.

Conclusion—Alternative C would have a long-term moderate adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers up to five times throughout the life of this plan/EIS. Even though a long-term moderate adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall, long-term minor adverse impact on the resident Canada geese population would occur regionally as a result of alternative C because 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 during the life of this plan/EIS. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D proposes a primarily non-lethal, low resident Canada goose management option. Under alternative D, there would be no initial lethal resident Canada goose population reduction activities, but the resident Canada goose population would be monitored annually. Other resident Canada goose management techniques are proposed (including planting buffers, applying goose repellents, a less intensive scare/harassment program, and egg oiling) as part of alternative D as discussed in "Chapter 2: Alternatives". If these techniques do not keep the resident Canada goose population at the initial goal of 54 resident Canada geese within the park, a one-time population reduction using resident Canada goose management techniques of 40 to 60 percent of the resident Canada goose population would be performed during the life of this plan/EIS. This lethal population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. The population would be monitored annually throughout the life of the plan but the population would not be reduced in subsequent years even if the population exceeds the initial goal of 54 resident Canada geese within the park.

Alternative D would have a short-term major adverse effect on the resident Canada goose population within the park because a one-time, lethal population reduction would occur, but would not be maintained over the long-term. It is possible that, due to the nature of urban-dwelling geese, other geese would capitalize on the newly void habitat. It has been demonstrated that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). Future population reduction strategies beyond the one-time reduction are not proposed as part of alternative D. Studies have shown that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese (Gosser et al. 1997). Therefore, other resident Canada goose management techniques proposed as part of alternative D such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) may work in combination with the one-time population reduction, although these techniques are similar to current actions which have not had an overall reduction on the resident Canada goose population in Anacostia Park. Although an initial goal of 54 resident Canada geese within the park was determined by the science team, it is not likely that this goal would be met after 15 years due to the one-time, lethal population reduction proposed as part of alternative D and even considering the other resident Canada goose management techniques proposed under alternative D**.** As stated above for alternatives B and C, it is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative D because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005). Only the techniques described previously that are common to all action alternatives would aid in offsetting potential pressures of climate change under alternative D, which includes low wetland and low resident

Canada goose management. As a result, these techniques are not expected to offset potential pressures of climate change because a population reduction of resident Canada geese would occur only one time under alternative D in combination with limited foraging and nesting areas that are expected from climate change. As a result of alternative D, the local Anacostia Park residential Canada goose population could fluctuate or increase in size if lethal management was only conducted a maximum of one time as part of this alternative. The resident Canada goose population beyond park boundaries or regionally would not be affected by alternative D. As stated above, alternative D would have a short-term major adverse effect on the resident Canada goose population within the park because the population would be reduced one time at a lower level than current numbers. Even though a short-term major adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall, negligible impact on the resident Canada geese population would occur in the park and regionally if the population readjusts following the maximum one-time population reduction because over the life of this plan/EIS 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; any changes to the resident Canada goose population would be similar to current conditions.

Cumulative Impacts—The same past, present, and future actions described under alternative A would also occur under alternative D. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to resident Canada geese is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

Under alternative D, although a short-term major adverse impact would occur to the Anacostia Park population of resident Canada geese, an overall, negligible impact on the resident Canada geese population would occur in the park and regionally if the population readjusts following the maximum one-time population reduction because over the life of this plan/EIS 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; any changes to the resident Canada goose population would be similar to current conditions. The overall negligible impacts to the resident Canada geese population under alternative D were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term major adverse cumulative impacts on the resident Canada geese population when added to the negligible impacts from alternative D. However, the maximum of 40 to 60 percent of the geese proposed for a one-time removal in this plan in Anacostia Park is small compared to the tens of thousands removed by hunters in Maryland every year.

Conclusion—Alternative D would have a short-term major adverse impact on the resident Canada goose population within the park because the population would be reduced one time at a lower level than current numbers by lethal reduction. Even though a short-term major adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall negligible impact on the resident Canada geese population would occur in the park and regionally as a result of alternative D if the population readjusts following the maximum one-time population reduction. Over the 15-year life of this plan/EIS there would likely 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 as a result of alternative

D; any changes to the resident Canada goose population would be similar to current conditions. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—This alternative includes intensive resident Canada goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park, but the population would be monitored during the life of the plan/EIS. Although an initial goal of 54 resident Canada geese within the park was determined by the science team, it is not likely that this goal would be met since a population reduction would not occur as part of alternative E. Similar to the discussion for alternative B, tidal flats would be inundated as a result of sea level rise, which may reduce both foraging and nesting areas for resident Canada geese. Alternative E includes numerous techniques to manage the existing wetland areas and the resident Canada goose population at the Park, but no lethal control. As a result, these techniques are not expected to offset potential pressures of climate change because a population reduction of resident Canada geese would not occur in combination with limited foraging and nesting areas that are expected from climate change.

Alternative E would have a negligible effect on the resident Canada goose population within the park because no lethal population reduction strategies would not occur; the Maryland, DC, or Atlantic Flyway populations of resident Canada geese would not be affected by alternative E. Other resident Canada goose management techniques are proposed as part of alternative E and include habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material). These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and thus substantiate a negligible impact.

Cumulative Impacts—The same past, present, and future actions described under alternative A would also occur under alternative E. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's Final EIS for Canada Geese (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the *Final EIS for Canada Geese* would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to the resident Canada geese population is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

The overall, negligible impacts to the resident Canada geese population under alternative E were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term, major adverse cumulative impacts on resident Canada geese when added to the negligible impacts from alternative E. Other resident Canada goose management techniques are proposed as part of alternative E and are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and any geese managed under these techniques would be small compared to the tens of thousands removed by hunters in Maryland every year.

Conclusion—Alternative E would have a negligible impact on the resident Canada goose population within the park because no lethal population reduction strategies would occur; the Maryland, DC, or Atlantic Flyway populations of resident Canada geese would not be affected by alternative E. Other resident Canada goose management techniques are proposed as part of alternative E. These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and thus substantiate a negligible impact as a result of alternative E. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term, major, and adverse.

CULTURAL RESOURCES

GUIDING REGULATIONS AND POLICIES

The NPS is charged with the protection and management of cultural resources in its custody. This is furthered through the implementation of *Director's Order #28: Cultural Resources Management Guidelines* (NPS 1998), NPS *Management Policies* 2006 (NPS 2006a), and the 2008 *Servicewide Programmatic Agreement with the Advisory Council and the National Conference of State Historic Preservation Officers.* These documents charge NPS managers with avoiding, or minimizing to the greatest degree practicable, adverse impacts on park resources and values. Although the NPS has the discretion to allow certain impacts in parks, that discretion is limited by the statutory requirement that park resources and values remain unimpaired, unless a specific law directly provides otherwise.

Federal actions that have the potential to affect cultural resources are subject to a variety of laws and regulations. Generally, Section 106 of the NHPA requires all federal agencies to consider the effects of their actions on cultural resources listed and/or determined eligible for listing in the NRHP. Such resources are termed "historic properties." Agreement on mitigation of adverse effects to historic properties is reached through consultation with the SHPO; Tribal Historic Preservation Officer, if applicable; and, as required, the Advisory Council on Historic Preservation (Advisory Council). In addition, the NHPA requires that federal agencies take actions to minimize harm to historic properties that would be adversely affected by a federal undertaking. Among other things, Section 110 of the NHPA also charges federal agencies with the responsibility for establishing preservation programs for the identification, evaluation, and nomination of historic properties to the NRHP.

Other important laws and regulations designed to protect cultural resources are:

- Native American Graves Protection and Repatriation Act, 1990
- American Indian Religious Freedom Act, 1978
- National Environmental Policy Act, 1969
- Archeological Resources Protection Act, 1979
- Executive Order 11593, Protection and Enhancement of the Cultural Environment," 1971

METHODOLOGIES AND ASSUMPTIONS

The NPS categorizes cultural resources by the following categories: archeological resources, cultural landscapes, historic districts and structures, museum objects, and ethnographic resources. As noted in the "Issues and Impact Topics" section of the "Purpose and Need" chapter, only impacts to historic districts and structures and archeological resources are of potential concern for this plan. There would be no impacts to cultural landscapes, ethnographic resources, or museum objects, so these topics were dismissed from consideration. The analyses of effects on cultural resources that are presented in this section respond to the requirements of both NEPA and Section 106 of the NHPA in a general and programmatic documentation. Where NEPA analysis is suggested or required for site-specific management or techniques carried out under the guidance of this document, future analyses, including detailed Section 106 compliance would “tier to” or reference this plan/EIS. Site-specific NEPA analysis, when required, would focus on issues, alternatives, and environmental effects unique to the study area.

In accordance with the Advisory Council’s regulations implementing Section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were identified and evaluated by (1) determining the Area of Potential Effects (APE); (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP (i.e., historic properties); (3) applying the criteria of adverse effect to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the implementing regulations for Section 106, a determination of either *adverse effect* or *no adverse effect* must also be made for affected historic properties. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (for example, diminishing the integrity of the resource’s location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5). A determination of *no adverse effect* means there is either no effect or that the effect would not diminish, in any way, the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

CEQ regulations and the NPS Director’s Order #12: *Conservation Planning, Environmental Impact Analysis and Decision-Making* Handbook (NPS 2001) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

The NPS guidance for evaluating impacts (Director’s Order #12 Handbook) (NPS 2001) requires that impact assessment be scientific, accurate, and quantified to the extent possible. For cultural resources, it is seldom possible to measure impacts in quantifiable terms; therefore, impact thresholds must rely heavily on the professional judgment of resource experts.

Broadly defined, the study area coincides with the entire length of Anacostia Park, which encompasses 1,300 acres along 5 miles of the Anacostia River shoreline (see figure 1). For purposes of analysis of impacts to cultural resources, the geographic study area is limited to approximately 100 acres of restored tidal wetlands within Anacostia Park including Kenilworth Marsh, Kingman Marsh, and Anacostia River Fringe Wetlands (see figure 4).

HISTORIC STRUCTURES AND DISTRICTS

The proposed activities have the potential to impact four NRHP-listed or NRHP-eligible properties and six properties that may be NRHP-eligible but have not been formally evaluated. These properties include:

- Kenilworth Aquatic Gardens (NRHP-listed)
- Langston Golf Course Historic District (NRHP-listed)
- Anacostia Park (NRHP-eligible)

- Anacostia Shoreline Pump Station (NRHP-eligible)
- Anacostia Field House (potentially NRHP-eligible)
- Anacostia River Seawall (potentially NRHP-eligible)
- Seafarer's Boat Club (potentially NRHP-eligible)
- Water Street Quonset Huts (potentially NRHP-eligible)
- Bonus Marchers Campsite (potentially NRHP-eligible)
- Stones of the Old United States Capitol Building (potentially NRHP-eligible)

Impact Threshold Definitions

For an historic district or structure to be listed on the NRHP, it must possess significance (the meaning or value ascribed to the historic district or structure) and have integrity of those features necessary to convey its significance. For purposes of analyzing potential impacts to historic districts and structures, the thresholds of change for the intensity of an impact are defined as follows:

Beneficial: No levels of intensity for beneficial impacts are defined. Beneficial impacts can occur under the following scenarios: when character-defining features of the historic district or structure would be stabilized/preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995), to maintain its existing integrity; when the historic district or structure would be rehabilitated in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to make possible a compatible use of the property while preserving its character defining features; or when historic district or structure would be restored in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, a beneficial effect is equivalent to *no adverse effect*.

Negligible: The impact is at the lowest level of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Adverse: *Minor*: Alteration of a pattern(s) or feature(s) of a historic district or structure listed on or eligible for the NRHP would not diminish the integrity of a character-defining feature(s) or the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: The impact would alter a character-defining feature(s) of a historic district or structure and diminish the integrity of that feature(s) of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

Major: The impact would alter a character-defining feature(s) of the historic district or structure and severely diminish the integrity of that feature(s) and the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

Duration: Short-term impacts would last for the duration of construction activities associated with the proposed alternative; long-term impacts would last beyond the construction activities.

Historic District and Structures Alternatives Evaluation

Alternative A – No Action Alternative—The no action alternative would continue the existing practices for wetland management and resident Canada goose management at their current levels. The removal of sheet piling (which would require additional NEPA compliance) would have no impact on historic structures and districts. There would be no additional changes to improve the hydrological conditions or to restore wetlands under alternative A. Control of invasive plant species would continue. Resident Canada goose management strategies, which include egg oiling, population monitoring, fencing, and wetland vegetation planting, would not change. None of these activities has had any effect on historic structures and districts, nor is it expected that continued practices would result in any impacts to historic structures and districts. Therefore, alternative A would have no impacts (corresponds to *no adverse effect* for Section 106) on historic structures and districts.

Cumulative Impacts—Among the various other projects considered for assessment of potential cumulative impacts to historic districts and structures, the following previously completed and present projects within Anacostia Park have had no impacts to historic districts and structures: Kenilworth Marsh, Kingman Marsh, Anacostia Riverwalk Trail, and Anacostia Skating Pavilion.

However, some future projects would affect the historic districts and structures in the study area and include the 11th Street Bridges Project and the Poplar Point Redevelopment, and the Poplar Point Restoration Project. The NEPA compliance for the Poplar Point Redevelopment and the Poplar Point Restoration projects is not yet available, but the EIS for the 11th Street Bridges Project determined that the project would result in an *adverse effect* to Anacostia Park since 1.5 acres of open recreation area would be lost. While the project would not impact the seawalls themselves, it would impact land close to the seawalls on both sides of the Anacostia River. Thus, a finding of *adverse effect* was recommended. It was determined that the 11th Street Bridges Project would have *no adverse effect* on the Bonus Marchers Campsite. Given the magnitude of these three projects within Anacostia Park, especially the 11th Street Bridges Project, adverse impacts to historic districts and structures are expected to Anacostia Park, the Anacostia Seawalls, the Anacostia Shoreline Pump Station, and the Water Street Quonset Huts, are located within the study area. Therefore, the impact from these cumulative projects would be a long-term moderate, adverse impact (*adverse effects*) to historic districts and structures and would be dependent upon the extent of the resources' loss of integrity.

The effect determinations to historic districts and structures under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the cumulative projects listed above would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the impacts from alternative A, which are *no adverse effect*.

Conclusion—None of the current resident Canada goose and wetland management practices that would be continued under alternative A would have any impact on historic structures and districts. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

Historic District and Structures Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. These techniques would not noticeably alter the setting of Kenilworth Gardens, Langston Golf Course, or Anacostia Park and would not diminish the character-defining features or the overall integrity of these historic resources. Thus, these actions would have negligible impacts on historic districts and structures, equivalent to *no adverse effect* under Section 106.

Alternative B – High Wetland, High Resident Canada Goose Management—Alternative B represents the highest level of effort to control the resident Canada goose populations through various resident Canada goose management and wetland management techniques. A number of these techniques under alternative B would occur adjacent to National Register-listed or eligible historic structures or districts or within the boundaries of historic districts. Wetland management techniques include the management of invasive plant species, the buffering of the shoreline, and high density planting. While these techniques would somewhat alter the setting in the vicinity of Kenilworth Gardens, and in Langston Golf Course and Anacostia Park, these actions would not diminish the character-defining features or the overall integrity of these historic resources. Therefore, these activities would have negligible impacts on historic structures and districts. Future resident Canada goose management techniques under alternative B could include shoreline buffers throughout Anacostia Park, installation of goose exclusion fencing, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers. These actions would occur adjacent to Kenilworth Gardens and within the boundaries of Langston Golf Course and Anacostia Park, including the potentially eligible resources within Anacostia Park. While these actions would alter aspects of the setting, they would not diminish the integrity of character-defining features or compromise the overall integrity of these historic resources. Thus, these actions would have negligible impacts on historic districts and structures. Seawall breaks and daylighting, future wetland management techniques considered under alternative B, could have a long-term moderate adverse impact on the Anacostia River Seawall, which is potentially eligible for the NRHP. For purposes of Section 106, the impact would be *no adverse effect* or *adverse effect*, depending on the loss of integrity to any of the resources' character-defining features. Future NEPA compliance would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Assuming that the loss of integrity to the seawall was found to be of such magnitude that resulted in a finding of adverse effect under Section 106, NPS would consult with the District of Columbia State Historic Preservation Office and the Advisory Council to develop mitigation measures that would be stipulated in a formal Memorandum of Agreement. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during future Section 106 consultation.

Cumulative Impacts—The assumed finding of *adverse effect* that would result from the loss of integrity to the Anacostia River Seawall under alternative B was considered together with the effects of the projects mentioned in alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have long-term moderate adverse impacts (*adverse effect*) to historic districts and structures, there would be a long-term, moderate adverse cumulative impacts (*adverse effect*) on historic districts and structures when added to the negligible to moderate, adverse impacts from alternative B.

Conclusion—Alternative B would result in overall negligible to moderate adverse impacts on historical structures and districts. Wetland and resident Canada goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. Depending on the implementation of seawall breaks and daylighting, activities that would be assessed in future NEPA and Section 106 compliance, moderate impacts could occur to the Anacostia River Seawall, a resource that is potentially eligible for the NRHP. Seawall breaks and daylighting, future wetland management techniques would alter a character-defining feature of the Anacostia River Seawall, and may diminish the integrity of the seawall, resulting in long-term moderate adverse impact, equivalent to an *adverse effect* under Section 106. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse, corresponding to an *adverse effect* for Section 106. Since the cumulative projects listed previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the negligible to long-term moderate adverse impacts from alternative B.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C has similar wetland management techniques proposed as alternative B and a moderate level of resident Canada goose management techniques. A number of these techniques under alternative C would occur adjacent to historic structures or districts or within the boundaries of historic districts. Wetland management techniques include the management of invasive vegetation species, the buffering of the shoreline, and low density planting. While these techniques would somewhat alter the setting in the vicinity of Kenilworth Gardens, around within Langston Golf Course and Anacostia Park, these actions would not diminish the character-defining features or the overall integrity of these historic resources. Therefore, these activities would have negligible impacts on historic structures and districts, equivalent to a *no adverse effect* finding under Section 106. Future resident Canada goose management techniques under alternative C include shoreline buffers at Kingman Marsh and Anacostia River Fringe Wetlands, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers while future wetland management techniques include new rain garden areas. These actions would occur adjacent to Kenilworth Gardens and within the boundaries of Langston Golf Course and Anacostia Park and would slightly alter aspects of the setting. The impacts to historic districts and structures under alternative C would be negligible (*no adverse effect*) as none of the proposed activities would result in any loss of integrity to any of the historic districts and structures.

Cumulative Impacts—The negligible (corresponds to *no adverse effect* for Section 106) impact to historic districts and structures under alternative C was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects listed previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term, moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the no effect impacts from alternative C.

Conclusion—Alternative C would result in overall negligible impacts (corresponds to *no adverse effect* for Section 106) on historical structures and districts. Wetland and resident Canada goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques that would impact historic districts and structures. Wetland management techniques adjacent to or within the boundaries of historic districts or structures are limited to the passive seedbank regeneration adjacent to Kenilworth Gardens. This action would not diminish the character-defining features or the overall integrity of the historic resource and would have negligible impacts (*no adverse effect*) on Kenilworth Gardens, as it would take place outside the boundaries of the historic district. Future resident Canada goose management techniques under alternative D include the planting of vegetative buffers along the shorelines at Kingman Marsh and Anacostia Rive Fringe Wetlands excluding Langston Golf Course, and the increasing of the width of vegetative buffers. Future wetland management techniques under alternative D include the modification of structures that result in erosion and clogging of marsh, the addressing of upland runoff, invasive plant species management, and passive seedbank regeneration. As in the previous alternatives, these actions would take place adjacent to Kenilworth Gardens and adjacent to or within the boundaries of Langston Golf Course, Anacostia Park, including the potentially eligible resources within Anacostia Park. Since these activities would not diminish the character-defining features of the overall integrity of these historic resources, these actions would have negligible impacts (corresponds to *no adverse effect* for Section 106) on historic districts and structures.

Cumulative Impacts—The *no adverse effect* determination to historic districts and structures under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the no effect impacts from alternative D.

Conclusion—Alternative D would result in overall negligible, adverse impacts on historical structures and districts (*no adverse effect*). Wetland and resident Canada goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse, equivalent to *adverse effects* under Section 106.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—In terms of activities that could potentially impact historic districts and structures, alternative E is identical to alternative B. While resident Canada goose management techniques are proposed to take place in vicinity to Kenilworth Gardens and within Langston Golf Course and Anacostia Park, these actions would somewhat alter the setting, but would not compromise the integrity of the resources. Therefore, these actions would have negligible impacts on these resources (corresponds to *no adverse effect* under Section 106).

Future resident Canada goose management techniques under alternative E, which includes shoreline buffers, goose exclusion fencing, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers, would take place adjacent to/within the boundaries of Kenilworth Gardens, Langston Golf Course, Anacostia Park, and the potentially eligible resources within Anacostia Park. While these actions would change aspects of the setting, they would not compromise the overall integrity of these historic resources. Thus, these actions would have direct negligible impacts on these historic districts and structures, equivalent to *no adverse effect* under Section 106. Seawall breaks and daylighting, a future wetland management technique planned under alternative B, could have a long-term moderate adverse impact the Anacostia River Seawall, which is potentially eligible for the NRHP. As discussed above under alternative B, it is assumed that the loss of integrity to the Anacostia River Seawall would result in an *adverse effect* under Section 106. Future NEPA compliance and Section 106 consultation would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Section 106 consultation would involve the District of Columbia SHPO and the Advisory Council to develop a Memorandum of Agreement that would provide for appropriate mitigation measures. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during Section 106 consultation. Overall, alternative E would result in overall negligible to long-term moderate adverse impacts (corresponds to *no adverse effect* or *adverse effect* for Section 106) on historical structures and districts.

Cumulative Impacts—The assumed finding of *adverse effect* that would result from the loss of integrity to the Anacostia River Seawall under alternative E was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts (*adverse effect*) on historic districts and structures (corresponds to *no adverse effect* for Section 106) when added to the negligible to long-term moderate adverse impacts (corresponds to *no adverse effect* or *adverse effect* for Section 106) from alternative E.

Conclusion—Alternative E would result in overall negligible to moderate, adverse impacts on historical structures and districts. Resident Canada goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. Depending on the implementation of seawall breaks and daylighting, activities that would be assessed in future NEPA and Section 106 compliance, moderate impacts could occur to the Anacostia River Seawall, a resource that is potentially eligible for the NRHP. Seawall breaks and daylighting, future wetland management techniques would alter a character-defining feature of the Anacostia River Seawall, and may diminish the integrity of the seawall, resulting in long-term moderate adverse impact and an *adverse effect* under Section 106. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

ARCHEOLOGICAL RESOURCES

Assumptions and Methodologies

As archeological resources exist essentially in subsurface contexts, potential impacts to archeological resources are assessed according to the extent to which the proposed alternatives would involve ground-disturbing activities such as excavation or grading. Analysis of possible impacts to archeological resources was based on a review of previous archeological studies, consideration of the proposed design concepts, and other information provided by the NPS.

Impacts to archeological resources occur when the proposed alternative results in whole or partial destruction of the resource, which is termed a loss of integrity in the context of Section 106. Impact thresholds for archeological resources consider both the extent to which the proposed alternative results in a loss of integrity and the degree to which these losses can be compensated by mitigating activities, such as preservation or archeological data recovery. The process begins with assessment of a resource according to its eligibility for the NRHP, as only sites considered significant enough for listing on the NRHP are protected by federal regulations.

Under federal guidelines, resources are eligible for the NRHP if they possess integrity and they meet one or more of the criteria of eligibility for inclusion in the NRHP. Most archeological resources found eligible for the NRHP are significant under criterion D because they have the potential to provide important information about the history or prehistory. However, in some circumstances, archeological resources might be found significant because (i) they are associated with events that have made a significant contribution to the broad patterns of our history (NRHP criterion A), or (ii) because they are associated with the lives of persons significant in our past (NRHP criterion B), or (iii) because they the distinctive characteristics of a type, period, or method of construction (NRHP criterion C).

Impact Threshold Definitions

For purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based on the foreseeable loss of integrity. All of these discussions consider only the direct impacts of construction, because operation of the facilities should have no ground disturbance activities and no additional effect on archeological resources under any of the alternatives under consideration. All impacts are considered long-term (e.g., lasting longer than the period of construction).

Beneficial: A resource would be preserved or stabilized in its pre-existing condition or actively stabilized/preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Negligible: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect.*

Adverse: *Minor*: Disturbance of a site(s) results in little, if any, loss of integrity. For purposes of Section 106, the determination of effect would be *no adverse effect.*

Moderate: Disturbance of a site(s) results in loss of integrity to the extent that there is a partial loss of the character-defining features and information potential that form the basis of the site's NRHP eligibility. Mitigation is accomplished by a combination of archeological data recovery and in place preservation. The determination of effect for Section 106 would be *adverse effect.*

Major: Disturbance of a site(s) results in loss of integrity to the extent that it is no longer eligible for the NRHP. Its character-defining features and information potential are lost to the extent that archeological data recovery is the primary form of mitigation. The determination of effect for Section 106 would be *adverse effect*.

Duration: All impacts to archeological resources are considered long-term.

Archeological Resources Alternatives Evaluation

Alternative A – No Action Alternative—The no action alternative would continue the existing practices for wetland management and resident Canada goose management at their current levels. The removal of sheet piling (which would require additional NEPA compliance) would have no impact on archeological resources. There would be no other changes to improve the hydrological conditions or to restore wetlands. Control of invasive plant species would continue through manual removal of invasive species and application of herbicides and other biological control agencies. The existing trails would be maintained at their current levels. None of these activities is having any impact on archeological resources, nor is it expected that continued practices would result in any impacts to archeological resources. Therefore, alternative A would have no impact on archeological resources, equivalent to *no adverse effect* under Section 106.

Cumulative Impacts—Among the various other projects considered for assessment of potential cumulative impacts to archeological resources, the following previously completed and present projects within Anacostia Park have had no impacts to archeological resources: Kenilworth Marsh, Kingman Marsh, Anacostia Riverwalk Trail, and Anacostia Skating Pavilion.

Some future projects that could have impacts on archeological resources in the study area include the 11th Street Bridges Project and the Poplar Point Redevelopment, and the Poplar Point Restoration Project. The NEPA compliance for the Poplar Point Redevelopment and the Poplar Point Restoration projects is not yet available, but the EIS for the 11th Street Bridges Project determined that the study area had a very high potential for archeological resources but the impact analysis stated that "Until archaeological surveys and testing have occurred, it is not possible to determine if resources that may be found during construction would have enough integrity to be eligible for the NRHP," implying that construction would proceed without further efforts to identify archeological resources. However, given the magnitude of these three projects within Anacostia Park, especially the 11th Street Bridges Project, adverse impacts to archeological resources could reasonably be expected as a result of these projects. Therefore, the impact from these projects would be a long-term moderate adverse impact (*adverse effects*) to archeological resources but would be dependent upon the character of the specific archeological resources involved and the extent of loss to the resources. Since the cumulative projects mentioned above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (*adverse effect*) to archeological resources (corresponds to *no adverse effect* for Section 106) when added to the lack of impacts (corresponds to *no adverse effect* for Section 106) from alternative A.

Conclusion—None of the current resident Canada goose and wetland management practices that would be continued under alternative A would have any impact on archeological resources. Since the cumulative projects mentioned above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (*adverse effect*) to archeological resources (corresponds to *no adverse effect* for Section 106) when added to the lack of impacts (corresponds to *no adverse effect* for Section 106) from alternative A.

Archeological Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and considering new rain garden areas. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. As archeological resources are present in subsurface contexts, impacts to archeological resources could occur only in situations that involve ground-disturbing activities, including cultural/educational techniques such as installation of signage and wetland management techniques such as removal of sheet piling along the Anacostia River Fringe Wetlands. Therefore, these techniques that would require ground-disturbing activities could result in direct, negligible to minor, adverse impacts to archeological resources. Future NEPA and Section 106 compliance would be necessary to fully evaluate impacts of creating new rain gardens and removing the sheet piling. In consultation with the District of Columbia SHPO, NPS would undertake future archeological studies to identify NRHP-eligible resources within the APE associated with the planned actions. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the NHPA, which would require future consultation with the District of Columbia SHPO and the Advisory Council.

Alternative B – High Wetland, High Resident Canada Goose Management—Alternative B represents the highest level of effort to control the resident Canada goose populations through various resident Canada goose management and wetland management techniques. Some of these techniques would require ground-disturbing activities that could result in direct, long-term minor to moderate adverse impacts to archeological resources. The installation of erosion control measures and mechanical seedbank regeneration would occur near Site 51NE17, and the planting of native species/shoreline buffers would occur near Site 51NE30. Other activities planned under alternative B that could impact other, as yet undiscovered archeological resources include the stream daylighting of Pope Branch and Fort DuPont Creek, as well as seawall breaks, signage, boardwalks and trails. Additional documentation of archeological resources and NEPA compliance would be necessary to assess possible impacts to archeological resources as a result of daylighting, conducting seawall breaks, and creating new boardwalks and trails. Section 106 compliance would involve continued consultation with the District of Columbia SHPO regarding the evaluation of possible NRHP-eligible archeological resources because horizontal and vertical LODs for several ground-disturbing activities have not been determined. In a letter dated January 4, 2013, the SHPO has agreed on a conditional *no adverse effect* on historic resources with the following conditions: 1) continued Section 106 consultation on the proposed ground disturbing activities' effects on archeological resources; 2) archeological identification survey, and /or geoarcheological survey if warranted; 3) mitigation of adverse effects if such cannot be avoided; and 4) reporting of archeological investigations following NPS and District guidelines. Depending on the loss of integrity to NRHP-eligible archeological resources, alternative B would result in minor to moderate, adverse impacts to archeological resources. Assuming at least a moderate adverse impact to NRHP-eligible archeological resources, NPS would develop mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council, as required by Section 106 of the NHPA.

Cumulative Impacts—The assumed *adverse effect* determination for archeological resources under alternative B was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be cumulative long-term moderate adverse cumulative impacts (*adverse effect*) on archeological resources from alternative B.

Conclusion—Alternative B would result in overall long-term minor to moderate adverse impacts on archeological resources. Some of the techniques used in wetland and resident Canada goose management would require ground-disturbing activities that could disturb archeological sites, and cause little loss of site integrity (minor) to loss of integrity to the extent where there is loss of character-defining features of the site that is the basis of the NRHP eligibility (moderate). In the event that these studies identify NRHP-eligible resources that would be subject to *adverse effects*, NPS would develop mitigation measures in accordance with Section 106 of the NHPA, as outlined above. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C has similar wetland management techniques proposed as alternative B and a moderate level of resident Canada goose management techniques. Some of the techniques would require ground-disturbing activities that could result in direct long-term minor adverse impacts (*no adverse effect*) to archeological resources. Additional documentation of archeological resources and NEPA and Section 106 compliance would be necessary to assess possible impacts to archeological resources. Future archeological identification and evaluation studies would be completed as outlined in the “Archeological Impacts Common to All Action Alternatives” above, and, in the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council.

Cumulative Impacts—The *no adverse effect* determination to archeological resources under alternative C was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term, moderate adverse cumulative impacts (corresponds to *adverse effect* for Section 106) to archeological resources when added to the long-term minor adverse impacts (corresponds to *no adverse effect* for Section 106) from alternative C.

Conclusion—While some of the techniques used in wetland and resident Canada goose management under alternative C would require ground-disturbing activities could result in long-term, adverse impacts on archeological resources, it is expected that the loss of integrity to any archeological resources, if present, would be minor (*no adverse effect* under Section 106). Future studies would be necessary to determine whether any NRHP-eligible archeological resources are present in the areas where ground disturbing activities would occur under this alternative. The cumulative impacts of alternative C on archeological resources, when considered together with other past, present and future projects in proximity of the park would be long-term moderate and adverse (*adverse effect* for Section 106).

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D has limited wetland management and resident Canada goose management techniques and as such has relatively few ground-disturbing activities that could have an impact on archeological resources. Resident Canada goose management techniques that involve ground disturbance are limited to the planting of vegetative buffers, while the only ground-disturbing techniques of wetland management are the construction of new rain gardens, and the removal or modification of structures that cause erosion or clogging of the marsh. Alternative D would require very few ground-disturbing activities, so the likelihood of impacts to archeological resources is probably negligible (*no adverse effect* under Section 106).

Cumulative Impacts—The *no adverse effect* determination to archeological resources under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (corresponds to *adverse effect* for Section 106) to archeological resources when added to the negligible impacts (corresponds to *no adverse effect* for Section 106) from alternative D.

Conclusion—Alternative D would require very few ground-disturbing activities, so the likelihood of impacts to archeological resources is probably negligible (*no adverse effect* under Section 106). The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (*adverse effect* for Section 106).

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—In terms of ground-disturbing activities that could potentially impact archeological resources, alternative E is identical to alternative B: some of the wetland management techniques and resident Canada goose management techniques could result in direct, long-term minor to moderate adverse impacts to archeological resources, equivalent to an *adverse effect* determination under Section 106. The installation of erosion control measures and mechanical seedbank regeneration would occur near Site

51NE17, and the planting of native species/shoreline buffers would occur near Site 51NE30. Other activities planned under alternative B that could impact other, as yet undiscovered archeological resources include the stream daylighting of Pope Branch and Fort DuPont Creek, as well as seawall breaks, signage, boardwalks and trails. As outlined under alternative B, additional NEPA and Section 106 compliance studies would be necessary to assess possible impacts to archeological resources as a result of daylighting, conducting seawall breaks, and creating new boardwalks and trails. In the event that that these future studies identify NRHP-eligible archeological resources that would be subject to an *adverse effect* under Section 106, NPS would develop and implement mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council, as required by Section 106 of the NHPA.

Cumulative Impacts—The potential *adverse effect* determination for archeological resources under alternative E was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, cumulative impacts would be long-term moderate and adverse (*adverse effect*) on archeological resources when added to the long-term minor to moderate impacts (*adverse effect* for Section 106) from alternative E.

Conclusion—Alternative E could result in overall long-term minor to moderate adverse impacts on archeological resources. Some of the techniques used in wetland and resident Canada goose management would require ground-disturbing activities that could disturb archeological sites to the extent that would result in a moderate loss of resource integrity, equivalent to a finding of *adverse effect* under Section 106. Otherwise, potential losses to the integrity of archeological sites would range from negligible to minor, which is equivalent to *no adverse effect* under Section 106. Future NEPA and Section 106 compliance studies would be necessary to fully evaluate potential impacts to NRHP-eligible resources. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the NHPA. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (*adverse effect* for Section 106).

PARK MANAGEMENT AND OPERATIONS

This section discusses the plan impacts to park management and operations, including resource management, maintenance, education, and visitor protection.

GUIDING REGULATIONS AND POLICIES

Park management and operations refers to the current staff available to adequately protect and preserve Anacostia Park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct Anacostia Park operations.

ASSUMPTIONS AND METHODOLOGIES

The discussion of impacts to park operations focuses on the amount of staff available to perform wetland and resident Canada goose management practices, the amount of staff to ensure visitor and resident safety, and the ability of park staff to protect and preserve resources given current funding and staffing levels. The study area includes Anacostia Park.

Actions included in the alternatives could change the park’s existing staff requirements. The evaluation considers whether or not additional workload would be added or contracted services would be required in order to accomplish a larger workload on an ongoing basis. This includes changes that may occur within all divisions of the park, including:

- **Natural Resource Management**—The natural resource management staff has limited tasks related to resident Canada goose management, including yearly egg oiling and population counts along with park volunteers and invasive plant species removal.
- **Maintenance**—Maintenance requirements related to wetlands and resident Canada goose management include maintaining goose exclusion fencing, removing trash, and maintaining trails within the park.
- **Resource Education and Visitor Protection**—Staff involved in this division include coordinating and conducting park programs to educate visitors.

General impacts of the alternatives on the park's annual operating budget and funding sources are evaluated for each alternative, which considers the financial requirements for each alternative and the availability of existing or new funding sources to meet additional operating and capital costs.

Impact Threshold Definitions

Reduced staffing needs and financial balances between operating costs and revenue sources or financial imbalances where revenue sources exceed operating costs would be considered beneficial impacts. The need for higher staffing levels that are not covered by increased revenues and financial imbalances where operating costs exceed revenue sources would be considered adverse impacts. The following thresholds were used to determine impacts to park operations:

Negligible: Park operations would not be impacted.

Adverse: *Minor*: Park operations would be impacted, and the effect would be detectable, but current levels of funding and staff would be adequate and other park operations would not be reduced.

Moderate: Park operations would be impacted, the effect would be readily apparent, and increased staff and funding would be needed or other park operations would have to be reduced and/or priorities changed.

Major: Park operations would be impacted, the effect would be readily apparent, increased staff, and funding would be needed or other park programs would have to be eliminated.

Park Operations and Maintenance Alternatives Evaluation

Alternative A – No Action Alternative—Under the no action alternative, park operations would remain unchanged. At Anacostia Park, the natural resources staff devotes much of their time to wetland and resident Canada goose management throughout the park, including monitoring the wetlands within the park, maintaining the goose exclusion fencing, conducting the quarterly goose counts within the Anacostia watershed (Syphax 2008), conducting the yearly egg oiling, invasive plant species management, limited trash removal, and limited park ranger education. The majority of these actions are currently undertaken by volunteers or are covered in existing labor costs as and estimated at approximately $30,000 per year or a total of $450,000 over the life of the plan/EIS (15 years), although this cost is contingent upon the availability of volunteers, funding, and materials similar to current conditions. Over the next 15 years, maintenance requirements would increase under this alternative if the resident Canada goose population within the park exhibits an overall increase. Additionally, the removal of sheet piling (which would require additional NEPA compliance) would require increased staff and resources necessary to complete this activity. Overall, alternative A would result in long-term minor adverse impacts to park operations and maintenance.

Cumulative Impacts—Many actions, plans, and programs place demands on park staff and budget, and contribute to adverse cumulative effects on park management and operations. These include the demand on staff time and resources from normal daily operational duties, as well as managing special use permits, special events in the park, and seasonal programs, such as the Student Conservation Association. Management and handling of land acquisitions, permits, vandalism, trash and river cleanups throughout the park, construction in the park, and development and oversight of visitor use opportunities such as recreational use of the river and interpretation programs all require staff time and money. The natural resources staff has additional demands at Anacostia Park, which included devoting much of their time to wetland and resident Canada goose management throughout the park. The resource management staff supports the egg oiling performed during the resident Canada goose breeding season and the quarterly goose counts within the Anacostia watershed as well as conducting wetland vegetation plantings, maintaining goose enclosures, and planting trees. These tasks would likely continue at current levels and these demands are expected to continue into the future with continued and possible increased visitation and future planning needs related to general resident Canada goose and wetland management and implementation of current and future activities.

Currently, the visitors experience is being enhanced in the North Field Area of Anacostia Park with a new bike/walk trail connecting the park trails with existing trails in DC and the AWI has proposed to enhance environmental education on the river's watershed and includes a proposal for a new environmental learning center on the southern portion of Kingman Island (DCOP 2009). Although the southern part of Kingman Island and Heritage Island are outside of the park boundary, these areas are currently being redeveloped as educational and passive, low-impact recreation sites and could place demands on park management and operations at Anacostia Park if these actions increase visitor use once the projects are completed. These actions that place demands on park management and operations would have a long-term, minor adverse impact.

Actions directly related to alternative A would have long-term minor adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with the No Action Alternative, would result in long-term moderate adverse cumulative impacts to park operations and management.

Conclusion—Alternative A would result in overall long-term minor adverse impacts on park operations because park operations would be impacted and the effect would be detectable, but the current resources would be adequate and other operations would not be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term, moderate, and adverse.

Park Operations and Maintenance Impacts Common to All Action (Management) Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing resident Canada goose management techniques. All techniques described above would require additional staff and resources at the park. Regardless of the alternative adopted, there would be a need for public education as well as for public safety. Increased educational opportunities as a result of the majority of the management alternatives would benefit the surrounding community by providing visitors with a greater knowledge of wetlands and the resident Canada goose. Increased staff and resources for education would be required to educate the public and to install *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations). The increased staff and resources necessary to implement the techniques associated with all action alternatives would be required to ensure a safe and beneficial experience for park visitors and would have a long-term minor to moderate adverse impact on park operations and maintenance.

Alternative B – High Wetland, High Resident Canada Goose Management—The resident Canada goose population would be intensively reduced as part of this alternative, which would reduce the population by 40 to 60 percent in the first year of the plan/EIS. Under alternative B the most aggressive wetlands management techniques are combined with intensive resident Canada goose population reduction techniques (lethal control combined with other techniques). This alternative considers new wetland restoration techniques as well. Techniques used to reduce the population could include round-up, capture, and euthanasia; and lethal removal by shooting. Alternative B includes a suite of potential techniques that would enhance existing wetland areas at the park and restore or create new wetland areas. The suite of techniques proposed as part of alternative B to improve wetlands within the park would require additional park operations resources, including maintenance, natural resource management, resident Canada goose monitoring, and visitor education. Also, many of the proposed wetland management techniques (creating tidal guts, daylighting, altering water elevations, outfall dissipation modifications, seawall breaks, reducing impervious areas, and new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements.

Techniques proposed as part of alternative B to reduce the resident Canada goose population would require qualified federal employees trained in safety and firearms use as well as additional resources such as vehicles and crates for round-up and capture of the geese. In addition to techniques proposed for reducing the population, scare/harassment programs and reproductive control techniques (increased egg oiling, egg addling, and egg replacement, applying goose hatch material), which would require additional trained staff and resources. 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. Alternative B would require public education and ensuring public safety if this alternative were implemented. Therefore, increased staff and resources for education would be required to educate the public and to install *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations). Also, increased educational opportunities would benefit the surrounding community by providing visitors with a greater knowledge of wetlands and the resident Canada goose. Finally, invasive vegetative species would continue to be managed as part as alternative B, and potentially at a higher level beyond what the NCR-EPMT is currently managing, which would require additional staff and resources.

Under alternative B, vegetation monitoring and invasive plant species management would cost approximately $386,370 annually (plus $30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately $10,000 annually, if quarterly surveys were conducted. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative B is approximately $16,356,943, which assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of lethal control, reproductive control and scare/harassment techniques because adaptive management would determine if the technique would be required and to what extent in subsequent years. The increased staff and resources necessary to implement alternative B would be required to ensure a safe and beneficial experience for park visitors and would have a long-term moderate adverse impact on park operations and maintenance.

Cumulative Impacts—Actions directly related to alternative B would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative B, would result in long-term, moderate adverse cumulative impacts to park operations and management.

Conclusion—Alternative B would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management—Alternative C has similar resident Canada goose management techniques proposed as alternative B, but proposes a less intensive population reduction for the resident Canada goose within the park (removal of 40 to 60 percent of the population within the first year of the plan/EIS). For alternative C, the current resident Canada goose population would be reduced through round-up, capture, and euthanasia, but no shooting of resident Canada geese would be included as part of alternative C. Therefore, techniques proposed as part of alternative C to reduce the resident Canada goose population would require qualified federal employees trained in safety (but not firearms use) as well as additional resources such as vehicles and crates for round-up and capture of the geese. The suite of techniques proposed as part of alternative C to improve wetlands within the park includes decreased wetland restoration techniques, but would still require additional park operations resources, including maintenance, natural resource management, resident Canada goose monitoring, visitor education, and ensuring public safety. Also, some of the proposed wetland management techniques (reduce impervious areas and install new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements. Also, increased educational opportunities and increased management of invasive plant species are included as part of alternative C. Resident Canada goose management techniques that would require additional staff and resources are proposed as part of alternative C, habitat modification, a scare/harassment program, and reproductive control techniques. Under alternative C, vegetation monitoring and invasive plant species management would cost approximately $386,370 annually (plus $30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately $10,000 annually, if quarterly surveys are conducted; these costs are the same as alternative B. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative C is approximately $10,442,157, which assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of lethal control, reproductive control and scare/harassment techniques because adaptive management would determine if the technique would be required and to what extent in subsequent years. Therefore, alternative C would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources would be required.

Cumulative Impacts—Actions directly related to alternative C would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative C, would result in long-term moderate adverse cumulative impacts to park operations and management.

Conclusion—Alternative C would result in long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D proposes a primarily non-lethal, low resident Canada goose management option to offer the lowest management effort for both wetlands and resident Canada geese. Under wetland management techniques, there are no erosion control techniques proposed and no new wetland restoration efforts proposed as part of alternative D. Only one of the proposed wetland management techniques (install new rain gardens) would require additional NEPA analysis for implementation. The lethal control technique during the one-time population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. Therefore, techniques proposed as part of alternative D to reduce the resident Canada goose population would require qualified federal employees trained in safety (but not firearms use) as well as vehicles and crates for round-up and capture of the geese. Under alternative D, vegetation monitoring and invasive plant species management would cost approximately $243,370 annually (plus $30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately $10,000 annually, if quarterly surveys are conducted; these costs less than costs estimated for alternatives B and C. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative C is approximately $5,617,141, which assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of reproductive control (no costs associated with lethal control or scare/harassment techniques since none are proposed) because adaptive management would determine if the technique would be required and to what extent in subsequent years. Therefore, alternative D would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative D includes the least amount of wetland management techniques and a less intensive resident Canada goose population reduction compared to alternatives B and C, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources would be required.

Cumulative Impacts—Actions directly related to alternative D would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative D, would result in long-term moderate adverse cumulative impacts to park operations and management.

Conclusion—Alternative D would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—This alternative includes intensive resident Canada goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park, but a full suite of wetland management techniques are proposed. Many of the proposed wetland management techniques (creating tidal guts, altering water elevations, outfall dissipation modifications, daylighting, seawall breaks, reducing impervious areas, and new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements. Resident Canada goose management techniques that are proposed as part of alternative E include habitat modification, a scare/harassment program, and reproductive control techniques. Under alternative E, vegetation monitoring and invasive plant species management would cost approximately $386,370 annually (plus $30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately $10,000 annually, if quarterly surveys are conducted; these costs are the same as alternatives B and C. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative E is approximately $16,299,543, which assumes all proposed wetland and resident Canada goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of reproductive control and scare/harassment techniques because adaptive management would determine if the technique would be required and to what extent in subsequent years. Therefore, alternative E would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative E does not include lethal population reduction of resident Canada geese compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources would be required.

Cumulative Impacts—Actions directly related to alternative E would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative E, would result in long-term moderate adverse cumulative impacts to park operations and management.

Conclusion—Alternative E would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

VISITOR USE AND EXPERIENCE

This section discusses the plan impacts to visitor use and experience, including visitation, visitor recreation and activities, soundscapes, and aesthetics as well as visitor and employee safety.

GUIDING REGULATIONS AND POLICIES

NPS *Management Policies 2006* states that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks (NPS 2006a). Because many forms of recreation can take place outside of a national park setting, the NPS therefore seeks to provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in Anacostia Park. In addition, the NPS seeks to defer to others to meet the broader spectrum of recreational needs and demands that are not dependent on a national park setting. Those others can include local, state, and other federal agencies; private industry; and nongovernmental organizations.

While recreation is a key component of NPS *Management Policies 2006*, the policies also instruct park units to maintain all native plants and animals as parts of the natural ecosystem. The NPS would achieve this by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur (NPS 2006a).

NPS *Management Policies 2006* requires restoration of degraded soundscapes to the natural condition whenever possible and protection of natural soundscapes from degradation. The NPS is directed to take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored (NPS 2006a).

ASSUMPTIONS AND METHODOLOGIES

The purpose of this impact analysis is to determine if wetland and resident Canada goose management under each alternative would be compatible with the desired goals for visitor experience and the purpose of Anacostia Park as identified in the enabling legislation. The impact analysis evaluates several aspects of visitor experience, including visitor perception of the presence of resident Canada geese, perception of the visual conditions during management practices, access to park resources, and understanding and appreciation of park values.

In addition, the purpose of this impact analysis is to determine if wetland and resident Canada goose management practices would degrade the soundscape of Anacostia Park. Context, time, and intensity together determine the level of impact for an activity. The time of day influences the impact a given noise may have. This analysis assumes that the periods of greatest sensitivity to noise includes sunrise, sunset, and at night. The study area for soundscapes includes all areas within the park and the neighboring communities.

The study area for visitor use and experience includes Anacostia Park and neighboring landowners outside of the park boundaries.

IMPACT THRESHOLD DEFINITIONS

The following thresholds were used to determine impacts to visitor use and experience, including aesthetics and recreation:

Negligible: Visitors would not be affected, or changes in visitor experience and/or understanding would be below or at the level of detection. Visitors would not be likely aware of the effects associated with the alternative.

Adverse: *Minor*: Changes in visitor experience and/or understanding would be detectable, although the changes would be slight. Visitors could be aware of the effects associated with the alternative, but only slightly.

Moderate: Changes in visitor experience and/or understanding would be readily apparent. Visitors would be aware of the effects associated with management actions. Visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors would choose to pursue activities in other available local or regional areas.

Major: Changes in visitor experience and/or understanding would be readily apparent and the action would affect the majority of visitors. Visitors would be highly aware of the effects associated with management actions. Changes in visitor use and experience would be readily apparent. Some visitors would choose to pursue activities in other available local or regional areas.

The following thresholds were used to determine impacts to soundscapes:

Negligible: Human-caused or project sounds do not compete with ambient sounds. When noise is audible, it is for short duration, with significantly lengthy periods of time that are noise free.

Adverse: *Minor*: Human-caused or project sounds are detectable above ambient sounds; however, there are frequent periods of time that are noise free. Where noise is audible, impacts occur for short durations (less than one hour) during the day.

Moderate: Human-caused or project sounds compete with ambient sounds. The noise generated is perceptible for extended periods throughout the day. There are however short periods of time that are noise free.

Major: Human-caused sounds dominate the soundscape and replace natural sounds. Natural sounds in the study area are commonly impacted by noise from management activities for most of the day without periods of time that are noise free.

User Groups

Many urban areas such as Anacostia Park provide excellent resident Canada goose habitat, such as the maintained lawns, golf course, recreational fields, and other areas because they provide excellent spring, summer, and fall forage and are in close proximity to the Anacostia River water source. In addition, the traditional predators of geese (foxes, coyotes, etc.) are present in low numbers or are absent in most urban areas such as Anacostia Park, and hunting pressure is nonexistent in the park. Some people enjoy seeing geese in urban areas, while others consider them a nuisance. There would be different expectations for different users of the park and the impacts as a result of the no action alternative and management alternatives would either be positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing 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.

Visitors Who Enjoy Resident Canada Geese at the Park

Canada geese are recognized by some park visitors as providing a number of public benefits. The benefits of a resident Canada goose population in urban areas such as Anacostia Park include the aesthetic value of the presence of these birds. For some park users, the resident Canada goose population at Anacostia Park may mark the only opportunity to view wildlife. The presence of these geese therefore, provides a positive park experience for this group of users. These visitors would be pleased to see and observe goslings and adult resident Canada geese year round in large numbers. Even though a percentage of the resident Canada goose population would be removed as a result of implementing this plan/EIS, some Canada geese would remain in the park, including both resident and migratory geese. The combined wetland and resident Canada goose management would allow wetlands to reach the desired condition of predominantly self-sustaining wetland systems and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. This would have benefits for migratory Canada geese which are a natural part of this ecosystem, and for the aesthetics of the park and experience of visitors who enjoy more natural fluctuations of geese populations.

Visitors Who Do Not Enjoy Resident Canada Geese at the Park

Park users who may not enjoy the resident Canada goose population at the park include visitors who golf at Langston Golf Course. Resident Canada geese are year-round inhabitants of the golf course and their presence may reduce the visitor experience for golfers. The majority of the Anacostia Park population of geese has been located at the Kingman Marsh/Langston Golf Course sites where there is open water for waddling and the open golf course for browsing (NPS 2009a). This area provides habitat that is safer from predators during the bird’s flightless period. In June 2010, a mean of 371 geese were counted at the Kingman Marsh/ Langston Golf Course site (Bates 2010a). Studies have shown that a well-fed, healthy adult Canada goose can produce up to 1.5 pounds of fecal matter per day (French 2001). Goose feces can reduce the aesthetic appeal of areas such as Langston Golf Course and could ultimately reduce public use (USFWS 2005). Visitors using other public areas at Anacostia Park in addition to Langston Golf Course are also affected by the geese, including visitors utilizing open playing fields. For example, it has been documented that public areas littered with accumulated goose feces have been closed due to the contamination or the threat of personal injury resulting from falls as people lose footing on the slippery material (French 2001). Specifically, Anacostia Park has received complaints from the unpleasant experience of goose fecal matter on golfer's shoes and from park visitors falling and/or rolling in goose fecal matter while playing ballgames (NPS 2010a). The presence of these geese therefore, provides a negative park experience for this group of users.

Visitors Who Do Not Care if Resident Canada Geese Are at the Park

Some visitors of the park may not care if resident Canada geese are present within the park. This user group would continue to use Anacostia Park regardless if resident Canada geese are present or absent. The presence or absence of these geese therefore, does not impact the park experience for this group of users.

Visitor Use and Experience Alternatives Evaluation

Alternative A - No Action Alternative—Park staff would continue resident Canada goose management activities at the same level as current; lethal population reduction strategies and scare/harassment techniques are not included as part of the no action alternative. The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline. Therefore, the no action alternative, which includes continuing limited trash removal within the park, would continue to have a long-term minor adverse impact on aesthetics at the park.

Under alternative A, Canada geese would remain in the park and, therefore, the soundscape would remain unchanged. The site and sounds of [migratory] Canada geese in the areas surrounding the Chesapeake Bay have been described as both stunning and stirring and have occurred for generations of forebears to the Chesapeake Bay (CBGN 2009). Impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial since visitors could continue to view goslings and adult resident Canada geese year round in large numbers.

Impacts to visitors who do not enjoy resident Canada geese at the park would continue to be long-term minor and adverse since the resident Canada goose population would not be drastically reduced as a result of the no action alternative. It is expected that the reproductive control techniques continued as part of the no action alternative (yearly egg oiling) would not limit growth enough to be noticeable to visitors within the life of this management plan using current technologies. Some visitors may avoid the Langston Golf Course or this area may experience lower usage because of the high number of resident Canada geese that utilize turf areas of the golf course.

Cumulative Impacts—The majority of projects proposed in and near Anacostia Park would enhance visitor use and experience in the area and provide additional recreational opportunities, specifically projects under the AWI. A priority of the AWI was the establishment of a continuous Anacostia Riverwalk and Trail along the east and west banks of the Anacostia River to allow 16 miles of pedestrian and cycling opportunities along both banks of the River in the park. A future benefit of the AWI is to create an integrated open-space system connecting 1,800 acres of park land, including over 100 acres of newly created public parks and new boat launching sites in Anacostia Park (DCOP 2009). East of the Anacostia River, the 11th Street Bridge Replacement Project would change the access to Anacostia Park (DCDOT and FHWA 2007). However, mitigation for this effect includes the improved access to the park and pedestrian and bicycle facilities that lead directly into Anacostia Park and the neighborhoods on either side of the river (DCDOT and FHWA 2007). Although AWI projects and the 11th Street Bridge Replacement Project would have visual impacts to the aesthetics of the park, planting vegetation and trees in the area is proposed to soften the view; tree planting is part of the Net Benefits 4(f) Programmatic Agreement with NPS (DCDOT and FHWA 2007). The projects described above would have a beneficial impact on visitor use and experience because they would enhance recreation opportunities and improve the aesthetics in and around Anacostia Park.

Other projects either underway or planned include reducing trash and debris in the Anacostia Watershed. Using funding from NOAA and led by MWCOG, Anacostia partners developed the Anacostia Trash Reduction Strategy, which improves the aesthetics of the River and the park by removing trash from the watershed (AWRP and MWCOG 2007). This project would also have a beneficial impact on visitor use and experience because it would improve the aesthetics in and around Anacostia Park.

Under alternative A, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. The beneficial impacts on these visitors as a result of alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since these projects would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative A. 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 at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term minor adverse impacts as a result of alternative A, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

Conclusion—As described above, there would be different expectations for different users of the park and the impacts as a result of the no action alternative would be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing 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 at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy

Canada geese at the park, and long-term minor adverse for those visitors who do not enjoy geese at the park.

Visitor Use and Experience Impacts Common to Action Alternatives

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along the Anacostia River Fringe Wetlands, and installing new rain garden areas. Removing sheet piling and installing new rain garden areas would require additional NEPA compliance. Resident Canada goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and cultural/education efforts. The cultural/education techniques proposed for all action alternatives include installing *No Feeding* signage and/or enforcing the no feeding of wildlife CFR (through fines for violations) as well as preparing technical brochures describing resident Canada goose management techniques. Most of the techniques described above for all action alternatives would not have an impact on visitor use and experience; however, some visitors who enjoy resident Canada geese at the park may be effected by learning of the various resident Canada goose management techniques especially lethal control via the brochure resulting in a short-term minor adverse impact on visitor experience. In contrast, some visitors who do not enjoy resident Canada geese at the park may also be affected by learning of the various resident Canada goose management techniques via the brochure resulting in a short to beneficial impact on visitor experience.

Visitor Use and Experience Impacts Common to Action Alternatives (Alternatives B – High Wetland, High Resident Canada Goose Management, and Alternative C – Moderate Wetland, Moderate Resident Canada Goose Management)

For action alternatives B and C, the resident Canada goose population would be reduced. Resident Canada geese targeted for removal through round-up, capture, and euthanasia would be taken off-site to be euthanized; lethal control would also include shooting as part of alternative B. Noise suppression devices would be used so the soundscape of the park would affected. Areas where resident Canada geese are to be removed would be temporarily closed to the public. The public would be notified of any park closures in advance when feasible. The park closures would not affect visitor use, as only small areas in the 120-acre park would be closed at a time and only during a maximum of one time per year. Therefore, visitors would not be exposed to resident Canada geese being captured and/or shot. During implementation of any of these activities, the NPS would minimize disruption to visitor use and experience. In addition to reducing the resident Canada goose population, all management alternatives include a scare/harassment program that would be implemented in open grassy areas of the park where resident Canada geese tend to congregate. The scare/harassment program includes visual deterrents that would be aesthetically unappealing to visitors who use the park and although alternative C proposes a less intensive scare/harassment program compared to alternative B, the visual deterrents that would be aesthetically unappealing to visitors who use the park would be similar and the same impact thresholds would be expected.

It is the intent of NPS to manage a population of resident Canada geese within the park for all management alternatives. Impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial since visitors could continue to view goslings and adult Canada geese year round within the park, but the population would be reduced for alternatives B and C.

It is important to note that although a percentage of the resident Canada goose population would be removed as a result of this plan/EIS, some Canada geese would remain in the park and would include both resident geese and migratory geese. The effort to help restore the freshwater tidal ecosystem and manage the resident Canada goose population would allow wetlands to reach the desired condition of predominantly self-sustaining systems (containing advanced seral-stage habitat conditions) and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. This would have benefits for migratory Canada geese which are a natural part of this ecosystem, and for visitors who wish to experience more natural fluctuations of geese populations at the park.

The resident Canada goose population in the park would be reduced but the migratory population within the park and beyond park boundaries would not be reduced as part of this plan/EIS. The site and sounds of [migratory] Canada geese in the areas surrounding the Chesapeake Bay have been described as both stunning and stirring and have occurred for generations of forebears to the Chesapeake Bay (CBGN 2009). The natural soundscape of the park would remain unchanged.

The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline. Action alternatives B and C include trash management as a wetland management technique that would have a beneficial impact on aesthetics at the park. As previously stated, the 2008 list of *Impaired District Waters and Pollutants* within and adjacent to Anacostia Park includes for the first time trash as a pollutant causing impairment (as defined by DCDE [2008]).

Impacts to visitors who do not enjoy resident Canada geese at the park would be beneficial since the resident Canada goose population would be reduced for alternatives B and C. Other management strategies are also included to make sites such as the Langston Golf Course less attractive to resident Canada geese, such as habitat modification techniques, including planting buffers, applying goose repellents, and making new plantings less desirable to geese would also deter the geese from using areas such as Langston Golf Course.

Visitors who do not care if resident Canada geese are present or absent within the park would still be affected by activities proposed. As stated above, visitor use would not be affected by park closures due to the size of the park and the soundscape of the park would not be affected by shooting activities because noise suppression would be used to minimize impacts. However, the aesthetics of the park may be negatively affected by the scare/harassment program that includes visual and auditory deterrents, but would be offset by the beneficial impacts to aesthetics of the proposed trash management program.

Cumulative Impacts—Under alternatives B and C, impacts to all visitors would be beneficial. The beneficial impacts on visitors as a result of alternatives B and C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to all visitors from alternatives B and C.

Conclusion—As described above, there would be different expectations for different users of the park and the impacts as a result of alternatives B and C. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing 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 alternatives B and C, it is the intent of NPS to manage a population of resident Canada geese within the park. For this alternative, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. Similarly, impacts to visitors who do not enjoy resident Canada geese at the park would be beneficial since the resident Canada goose population would be reduced under alternatives B and C. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for all visitors at the park.

Alternative D – Low Wetland, Low Resident Canada Goose Management—Alternative D proposes a low resident Canada goose management option with a less intensive scare/harassment program. A one-time population reduction using lethal controls of 40 to 60 percent of the resident Canada goose population could be performed during the life of this plan/EIS through round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. Compared to alternatives B and C, alternative D has a less intensive scare/harassment program and does not include trash management. The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline; therefore, alternative D, would have a long-term minor adverse impact on aesthetics at the park. However, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial for alternative D since visitors could continue to view goslings and adult resident Canada geese year round. Impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse since the resident Canada goose population would not be drastically reduced due to the primarily non-lethal (one-time lethal population reduction), low resident Canada goose management proposed as part of alternative D. Some visitors may avoid the Langston Golf Course or this area may experience lower usage if high numbers of resident Canada geese utilize turf areas of the golf course.

Cumulative Impacts—Under alternative D, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial. The beneficial impacts on these visitors as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative D. Also under alternative D, impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term minor adverse impacts as a result of alternative D, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

Conclusion—As described above, there would be different expectations for different users of the park and the impacts as a result of the alternative D would be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing 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 alternative D, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial, and impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy Canada geese at the park, and long-term minor and adverse for those visitors who do not enjoy geese at the park.

Alternative E – High Wetland, Moderate Resident Canada Goose Management, with No Lethal Control—This alternative includes intensive resident Canada goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park. Other resident Canada goose management techniques are proposed as part of alternative E and include habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material). These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park. Therefore, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial for alternative E since visitors could continue to view goslings and adult resident Canada geese year round. Impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse since the resident Canada goose population would not be drastically reduced because no lethal population reduction strategies are proposed as part of alternative E. Some visitors may avoid the Langston Golf Course or this area may experience lower usage if high numbers of resident Canada geese utilize turf areas of the golf course. Alternative E includes trash management, which would have a beneficial impact on aesthetics at the park. Similar to alternatives B and C, the scare/harassment program includes visual deterrents that would be aesthetically unappealing to visitors who use the park.

Cumulative Impacts—Under alternative E, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial. The beneficial impacts on these visitors as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative E. Also under alternative E, impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term, minor adverse impacts as a result of alternative E, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

Conclusion—As described above, there would be different expectations for different users of the park and the impacts as a result of the alternative E would be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing 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 alternative E, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial, and impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy Canada geese at the park, and long-term minor adverse for those visitors who do not enjoy geese at the park.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

This section discusses the relationship of local short-term uses of the environment versus the maintenance and enhancement of long-term productivity as well as the irreversible and irretrievable commitment of resources and climate change.

In accordance with NEPA, and as further explained in Director's Order #12 Handbook (NPS 2001), consideration of long-term impacts and the effects of foreclosing future options should be included in any NEPA document. According to the handbook (NPS 2001), and as defined by the World Commission on Environment and Development, "sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their needs." For each alternative considered in a NEPA document, considerations of sustainability must demonstrate the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. The NPS must consider if the effects of the alternatives involve tradeoffs of the long-term productivity and sustainability of park resources for the immediate short-term use of those resources. It must also consider if the effects of the alternatives are sustainable over the long term without causing adverse environmental effects for future generations (NPS 2001).

The NPS must also consider if the effects of the alternatives cannot be changed or are permanent (if impacts are irreversible). The NPS must also consider if the impacts to park resources could not be restored, replaced, or otherwise retrieved (NPS 2001). A resource commitment is considered irreversible when primary or secondary impacts from its use limit future options. Irreversible commitment applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those resources that are only renewable over long time spans. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations.

Relationship of Local Short-Term Uses vs. Long-Term Productivity

The no action alternative would trade any long-term productivity for short-term use of park resources. The resident Canada goose population would continue to grow over time and graze on the park's vegetation, including wetlands, at the expense of the long-term productivity and sustainability of the vegetation, as well as the park's visitors and their park experience.

For the management alternatives, there would be a short-term commitment of human resources and short-term impacts to the park's visitors and environment during resident Canada goose removal actions, but with the result of long-term productivity of the park's vegetation and habitat and a sustainable use of the resources in the park. Alternatives B, C, and E would require more resources due to more intense wetland and resident Canada goose management techniques proposed. Alternative D proposes low wetland and resident Canada goose management techniques and would require fewer resources. For any of the management alternatives to be sustainable, they would require long-term management, including monitoring and adaptive management to protect park resources.

Irreversible and Irretrievable Commitment of Resources

Under the no action alternative, impacts to vegetation, including wetlands, from continued resident Canada goose herbivory could result in adverse impacts to the park's wetlands if actions are not taken to reduce the resident Canada goose population, but these impacts are not regarded as irreversible. The management alternatives present the least potential for irreversible or irretrievable commitments of resources. Although resident Canada geese would be removed by lethal control under alternatives B, C, and D, a resident Canada goose population would still be maintained within the park and the wetlands would be managed to a functional level. Therefore, there are no irreversible or irretrievable commitment of resources associated with the management alternatives or the no action alternative.

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Chapter 5: Consultation and Coordination

CHAPTER 5: CONSULTATION AND COORDINATION

The intent of NEPA is to encourage the participation of federal and state-involved agencies and affected citizens in the assessment procedure, as appropriate. This section describes the consultation that occurred during development of this *Final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS*, including consultation with scientific experts and other agencies. This chapter also includes a description of the public involvement process and a list of the recipients of the final document.

HISTORY OF PUBLIC INVOLVEMENT

The public involvement activities for this plan/EIS fulfill the requirements of NEPA and NPS Director's Order #12 Handbook (NPS 2001).

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal scoping and external or public scoping. Internal scoping involved discussions among NPS personnel and the interdisciplinary planning team (IPT) regarding the purpose of and need for the management actions, issues, management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance and other project related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this planning document and impact statement, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given opportunities to express concerns or views and to identify important issues or even other alternatives.

Taken together, internal and public scoping are essential elements of the NEPA process. The following sections describe the various ways scoping was conducted for this plan/ EIS.

Internal Scoping

The internal scoping process began on February 14, 2007. The internal scoping meeting began with a presentation on the background of park resources and resident Canada goose management issues and the purpose of the plan and current management actions. The meeting also included a discussion of the no action alternative as well as thresholds and alternative elements. At this time the NPS was proposing to write a plan/EA.

A follow up internal scoping meeting was held June 12 and 13, 2007 at the Anacostia Park Headquarters to develop alternative concepts for the wetlands restoration plan/EA. The meeting included a site visit, project background, and purpose, need, and objectives of the project. During the meeting elements of wetland restoration were also discussed.

An agency scoping meeting was held Wednesday, March 28, 2008 and included representatives from both the NPS and the District. The meeting began with a presentation on Anacostia Park, the wetlands and resident Canada goose management proposed project and timeline and an overview of NEPA. The meeting utilized the roundtable discussion format to address management issues, alternatives, and resource impacts for the plan/EA.

A decision was made to complete an EIS rather than an EA for the plan. On May 21, 2008, an internal alternatives meeting was held to develop alternatives for analysis for the EIS. The meeting reviewed and updated impact topics, developed alternatives and discussed options for wetland management and resident Canada goose management.

In addition, the IPT identified a group of individuals to comprise an expert science team including university professors, wildlife biologists, wetland specialists, Canada goose experts, and resource management specialists. Two science team meetings were held during the alternatives development process in September and October 2008. The expectations of the science team were to review and provide available research and data pertaining to wetland and resident Canada goose management and to provide technical and scientific input on resident Canada goose management and monitoring. Members of the science team are listed with the document preparers in this chapter.

Public Scoping

Public scoping efforts for this planning process focus on techniques for including the public and major interest groups. Based on past experience, park staff places a high priority on following the NEPA process for public involvement and providing the public the opportunity to comment on proposed actions.

On June 25, 2007 Anacostia Park released the Public Scoping Brochure for the plan/EA for public review and comment. The public scoping brochure explained the background, the purpose and need, and the objectives of the project. The brochure also announced the dates, locations, and objectives of two public meetings. The public was invited to submit comments on the scope of the planning process and potential alternatives through August 10, 2007. During the comment period, two public scoping meetings were held on July 17 and July 18, 2007 at the U.S. Park Police Anacostia Operations Facility. Each meeting began with an open house followed by a short presentation by the NPS explaining the current Anacostia Park wetlands restoration and resident Canada goose management strategies, as well as the project planning process. NPS staff were available to visit with the workshop participants and answer questions and concerns. A total of 31 participants attended the public scoping meetings.

During the public scoping period, forty-nine separate correspondence were received and entered into the Planning, Environment, and Public Comment (PEPC) wither from direct entry by the commenter, or uploading of emails, faxes, transcripts, and hard copy letters by NPS staff. Comments were analyzed using a process developed by the NPS to compile and correlate similar public comments into a format that was used by decision makers and the project team. Comment analysis assisted the team in organizing, clarifying and addressing technical information pursuant to NEPA regulations. It also aided in identifying the topics and issues relevant for consideration in the plan/EA. A coding structure was developed during the internal scoping process to help sort comments into logical groups by topics and issues. The NPS PEPC database was used for management of the comments. A comment analysis report was generated and was made available on the PEPC website for the public. This report included the number and type of comments received, a summary of the substantive comments received, and a list of the organization or groups that participated in the public scoping effort.

After considering the comments received during public scoping, initially evaluating potential alternatives, and continuing to analyze data, the NPS decided to complete an EIS rather than an EA for this plan. On January 8, 2008, the NPS published a second newsletter that notified the public of the change of approach to the planning process, the scope of work and the next steps of the project. The newsletter also identified the subsequent posting of the NOI and invited comments to the plan/EIS. The NPS published a NOI in the Federal Register on January 9, 2008 in Volume 73, No. 6. The NOI served as an announcement of an additional 30-day public comment period. This notice specified that previous comments submitted in regards to the EA would be considered as part of the planning process for the current proposed action and did not need to be resubmitted. Only one piece of correspondence was received.

After the IPT met in May 2008 to discuss preliminary alternatives, the NPS released a third newsletter to the public on August 29, 2008. The newsletter provided background on the Anacostia Park wetlands management and resident Canada goose management strategies and outlined proposed alternatives to be evaluated in the EIS. The public was invited to submit comments on alternatives through October 3, 2008. During the comment period, seven separate correspondences were received and entered into the PEPC system either from direct entry by the commenter, or uploading of emails, faxes, and hard copy letters by NPS staff. A public content analysis report was generated and made available to the public on November 6, 2008. The report included the number and type of comments received, a summary of the substantive comments received, and a list of the organization or groups that participated in the public scoping effort.

PUBLIC COMMENTS ON DRAFT PLAN/ENVIRONMENTAL IMPACT STATEMENT

On July 21, 2011, the NPS released the *Draft Anacostia Park Wetlands and Resident Goose Management Plan/EIS* for public review and comment. The draft plan/EIS included a description of the proposed project and alternatives proposed, a description of the resources found within the study area, and an analysis of the impacts of the proposed project on these resources. The draft plan/EIS was available for public review until September 26, 2011.

During the comment period, a public meeting was held at the U.S. Park Police Anacostia Operation Facility on September 7, 2011. The public meeting began at 6:30 pm with an open house, followed by a short presentation at 7:00 pm, and a hearing to take public comments from 7:15 until 8:30 pm. NPS staff were available to visit with meeting attendees and to answer questions. Formal public comment sessions were then recorded by a court reporter. A total of three individuals attended the public meeting in Anacostia, and spoke in the public hearing.

The public were able to submit their comments on the project using any of the following methods:

- Electronically through the NPS Planning, Environment, and Public Comment (PEPC) website
- In person at the public meetings
- By mailing comments to the NPS
- By emailing comments to the NPS

During the comment period on the draft plan/EIS, thirteen correspondences from 5 states (District of Columbia, Maryland, New Jersey, Pennsylvania, and Virginia) were received. Comments were received from individuals, as well as from organizations and state and federal government agencies. Commenters generally supported the draft plan/EIS for resident Canada goose and wetland management in Anacostia. However, some commenters felt that additional non-lethal options for resident Canada goose management needed to be explored, and did not support lethal management of the resident Canada goose population. All comments, regardless of their topic, were carefully read, coded, and analyzed. Under each code, all substantive comments were grouped by similar themes, and those groups were summarized with a concern statement prepared for responses. The NPS responded to the concern statements and the responses are included in appendix E. Appendix E includes both the content analysis report and the concern response report.

This final plan/EIS will be made available for public review for a 30-day no-action period, which begins with the publication of the EPA Notice of Availability. After the 30-day no action period, a record of decision (ROD) will be prepared that will document approval of the plan, select the alternative to be implemented, and set forth any stipulations required for implementation. The ROD will be signed by the Regional Director of the National Capital Region, after which Notice of Availability of the ROD will be published in the Federal Register. This publication will then complete the NEPA process.

LIST OF RECIPIENTS

The agencies and organizations listed below were notified of the availability of this document or mailed a copy. Notifications were also made to individuals on the park's mailing list, and copies were sent to those that requested a copy.

FEDERAL DEPARTMENTS AND AGENCIES

United States Army Corps of Engineers Baltimore District

United States, Environmental Protection Agency/Chesapeake Bay Program

United States Fish and Wildlife Service, Chesapeake Bay Field Office

United States Geological Survey, Patuxent Wildlife Research Center

United States National Arboretum

USDA-APHIS Wildlife Services

DISTRICT OF COLUMBIA GOVERNMENT

DC Dept. of Health

DC Dept. of Health Watershed Protection Division

DC Fisheries and Wildlife

DC Office of Planning

DC Parks and Recreation

Metropolitan Washington Council of Governments

ANCs

ELECTED OFFICIALS

Executive Office of the Mayor

The Honorable Phil Mendelson

The Honorable Kenyan McDuffie

The Honorable Anita Bonds

The Honorable David Grosso

The Honorable David Catania

The Honorable Vincent Orange

The Honorable Jim Graham

The Honorable Jack Evans

The Honorable Mary M. Cheh

The Honorable Muriel Bowser

The Honorable Tommy Wells

The Honorable Yvette Alexander

The Honorable Marion Barry

MEDIA, ORGANIZATIONS AND BUSINESSES

Anacostia Watershed Society

Anacostia Watershed Citizen Advisory Committee

Audubon Naturalist Society

Audubon Naturalistic Society of the Central Atlantic States

Defenders of Wildlife

Chesapeake Bay Foundation

Earth Conservation Corps

Eastland Gardens Civic Association

Friends of the Earth

The Fund for Animals

Golf Course Specialists, Inc., East Potomac Park Golf Course

Kingman Park Civic Assoc.

Langston Golf Course

National Audubon Society New Columbia Chapter

National Wildlife Federation

The Humane Society of the U.S.

People for the Ethical Treatment of Animals

River Terrace Civic Association

Sierra Club

The Wilderness Society

AGENCY CONSULTATION

ENDANGERED SPECIES ACT

A consultation letter was mailed to local and federal agencies and stakeholders requesting consultation and comments regarding the proposed project at Anacostia Park. In 2005, NPS consulted with the USFWS and NOAA-Fisheries to identify any endangered or threatened species within the proposed project area. In response, USFWS sent a letter 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. NOAA-Fisheries also sent a response 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, NPS determined the types of activities associated with this project would not adversely affect the shortnose sturgeon.

The NPS also sent a consultation letter to the USFWS on December 22, 2009 explaining that subsequent to the initial consultation with USFWS, NPS was determined that an EIS was necessary for the wetland and resident Canada 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).

On 26 October 2011, the USFWS determined Kenk's amphipod (*Stygobromus kenki*) was a candidate for listing under the ESA. NPS policy is to treat candidates as listed species, especially when a species will become listed during the life of a plan. National Capital Parks —East, administrative unit for Anacostia Park, received a letter from USFWS on 6 January 2010 stating that the activities associated with the project would not affect any federally endangered species. This remains correct because Kenk's amphipod occurs north of and not within the Anacostia Park project action area.

Additionally, on 6 February 2012, during preparation of the final plan/EIS, the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) Chesapeake Bay distinct population segment was federally listed as endangered. As a result, on October 24, 2012, NPS requested technical assistance from the National Marine Fisheries Service (NMFS) Protected Resources to help determine potential for this and other federally listed species to occur in the project area (Appendix A). The National Marine Fisheries Service responded on October 31, 2012 (appendix A) stating no federally listed or proposed threatened or endangered species and/or designated critical habitat for listed species under the jurisdiction of NMFS are known to exist in the vicinity of the proposed project. As such, no further coordination with NMFS Protected Resources Division is needed (see appendix A). A copy of the consultation letters can be found in appendix A-1. Copies of the responses are included in appendix A-2.

SECTION 106

A consultation letter was sent to the DC SHPO on December 22, 2009 describing the proposed wetland and resident Canada goose management plan. A response was received on February 1, 2010 indicating that Anacostia Park is eligible for listing on the NRHP and the DC Inventory of Historic Sites.

In accordance with Section 106 of the National Historic Preservation Act, the NPS sent a copy of the draft plan/EIS to the Maryland and DC SHPOs, with a request for concurrence with a 'no adverse effect' determination for certain elements of the preferred alternative. On August 24, 2011, the Maryland SHPO responded with their determination that there are no historic properties affected by the preferred alternative in Maryland.

After subsequent consultation, the DC SHPO responded on January 4, 2013, indicating their concurrence with the ‘no adverse effect’ determination based on the following conditions: 1) Continued Section 106 consultation on the proposed ground disturbing activities’ effects on archaeological resources; 2) Archaeological identification survey, and /or geoarchaeological survey if warranted; 3) mitigation of adverse effects if such cannot be avoided; and 4) reporting of archaeological investigations following NPS and District guidelines.

Copies of the correspondence documenting completion of Section 106 compliance can be found in appendix A-1 and A-2.

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List of Preparers/Consultants

LIST OF PREPARERS AND CONSULTANTS

NATIONAL PARK SERVICE

Employee	Title	Education/Role in Preparing EIS	Experience
Lindsay Gillham	Environmental Protection Specialist, Environmental Quality Division	B.S. Natural Resources J.D. in Law Project Manager	10 years working on NEPA documents, 4 years with NPS
Dan Niosi	Environmental Protection Specialist, EQD	B.A. Environmental Studies Natural Resources/ Project Manager	14 years working in natural resource management, planning, and compliance 3 years with NPS
Kevin Noon	Natural Resource Program Center, Water Resources Division, Wetlands Program	B.L.A. Landscape Architecture M.L.A Environmental Planning M.A. Communication Research Ph.D. Wetland Ecology Provided technical input and review	31 years working with wetland ecology research, wetland restoration, permitting, NPS wetland compliance, and environmental banking
Joel Gorder	Regional Planning and Environmental Coordinator	Provided input and review	
Sue Bennett	National Capital Parks - East	Provided input and review	
Stephen Syphax	Chief of Resources, National Capital Parks – East	B.S. General Studies NPS Natural Resource Management Training Program Provided input and review, project point of contact for the park	32 years with NPS, (includes 9 years as a Natural Resource Specialist and 19 years as Chief of the Resource Management Division)
Mikaila Milton	Park Biologist, National Capital Parks – East	B.S. Biology and Chemistry M.S. Ecology Provided input and review	10 years with NPS

Employee	Title	Education/Role in Preparing EIS	Experience
James Rosenstock	Park Ranger, National Capital Parks – East	Provided input and review	35 years with NPS as a Park Ranger; 16 years field experience in Natural Resources Management
Doug Curtis	Center for Urban Ecology	Provided input and review	
Scott Bates	Regional Wildlife Biologist NPS Center for Urban Ecology	B.S. Biology M.S. Wildlife Management Provided technical input	11 years with NPS NCR and 9 years with DOD as a wildlife biologist
Jeff Runde	Aquatic Ecologist, Center for Urban Ecology	B.S. Zoology M.S. Civil and Environmental Engineering Ph.D. Aquatic Ecology Provided input and review	12 years with the University of Notre Dame; 9 years with NPS in aquatic ecology
Diane Pavek	Research Coordinator and Botanist, Center for Urban Ecology	B.S. Botany and Zoology M.S. Botany Ph.D. Botany Provided technical input and information for monitoring protocol	26 years in botany-related fields; 10 years with NPS

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Employee	Title	Education/Role in Preparing EIS	Experience
Suzanne Boltz	Senior Scientist/Senior Project Manager, EA Engineering	B.S. Environmental Biology; M.S. Fish and Wildlife Sciences. Provided project management, input and review; attended workshops to develop management plan for wetlands and resident Canada geese	18 years with EA Engineering; 21 years of experience overall Has NPS training for Director's Order-12, CBA, PEPC
Jeff Elseroad	Senior Environmental Scientist, EA Engineering	B.A. Chemistry; M.S. Environmental Engineering Provided senior technical review of plan/EIS	26 years with EA Engineering; 37 years of experience overall

Employee	Title	Education/Role in Preparing EIS	Experience
Sarah Koser	NEPA Specialist, EA Engineering	B.S. Biology; M.S. Environmental Engineering Provided NEPA expertise and wetland support, and completed field studies; provided input and review	11 years with EA Engineering
Tracy Layfield	NEPA Specialist, EA Engineering	B.S. Biology Provided input and review; attended workshops to develop management plan for wetlands and resident Canada geese	27 years with EA Engineering
Jeannette Matkowski	Environmental Scientist, EA Engineering	B.S. Biology Utilized PEPC report to develop project alternatives; task manager for public comment database and administrative record	9 years with EA Engineering
Rich Pfingston	Senior Ecological Restoration Scientist, EA Engineering	A.A. Wildlife Fisheries; B.S. Wildlife Fisheries Provided technical review, wetland management expertise, and study preparation for alternatives; attended roundtable meeting; provided input and review	5 years with EA Engineering; over 24 years of experience overall
Mark Gutberlet, P.E.	Senior Engineer, EA Engineering	B.S. Civil Engineering M.S. Civil Engineering (Geotechnical) Provided cost estimate for wetland and goose management techniques	16 years with EA Engineering
Laura Jo Oakes, P.E.	Junior Engineer, EA Engineering	B.S. Civil Engineering M.S. Civil Engineering Provided cost estimate for wetland and goose management techniques	5 years with EA Engineering; 8 years of experience overall
Jordan Klemick	GIS Specialist, EA Engineering	B.A. Geography Produced and edited figures for plan/EIS	5 years with EA Engineering; 6 years of experience overall
Kathryn Cerny-Chipman	Environmental Scientist, EA Engineering	B.A. Environmental Biology Provided support on editing and writing of plan/EIS	2 years with EA Engineering

THE LOUIS BERGER GROUP, INC.

Employee	Title	Education/Role in Preparing EIS	Experience
Charles Lee Decker	Assistant Director, Cultural Resources, The Louis Berger Group, Inc.	BA, Anthropology; MA, Anthropology Coordination of cultural resource sections for the EA	33 years of experience in cultural resource management
Lisa Kraus	Archeologist, The Louis Berger Group, Inc.	B.A., Anthropology; M.A., Anthropology Characterization of existing conditions for archeological resources	6 years of experience as a professional archeologist
Patti Kuhn	Architectural Historian, The Louis Berger Group, Inc.	B.F.A., Architectural History; M.A., Historic Preservation Characterization of existing conditions and analysis of impacts for historic structures and cultural landscapes	6 years of experience as a professional architectural historian

SCIENCE TEAM MEMBERS

Dave Ankney, University of Western Ontario – Professor (Retired)

Suzanne Boltz, EA Engineering, Science, & Technology, Inc. – Project Manager

Scott Bates, NPS Center for Urban Ecology – Wildlife Biologist

Michael Conover, Utah State – Professor of Wildland Resources

Lindsay Gillham, NPS – EQD – Environmental Protection Specialist

Mark Graham, NPS – Wildlife Biologist

Greg Kearns, Maryland-National Capital Park and Planning Commission: Patuxent River Park – Naturalist

Mikaila Milton, NPS – National Capital Parks-East - Biologist

Tim Moser, FWS – Wildlife Biologist

Richard Pfingsten, EA Engineering, Science, & Technology, Inc. - Ecosystem Restoration and Management Leader

Claire Riegelman, NPS – EQD – Environmental Protection Assistant

Jim Sherald, NPS Center for Urban Ecology – Chief of Natural Resources and Science (Retired)

Stephen Syphax, NPS – National Capital Parks-East – Supervisory Resource Management Specialist

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Appendixes

APPENDIX A: CONSULTATION AND COORDINATION

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APPENDIX A-1: AGENCY CONSULTATION LETTERS

SECTION 7

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Parks-East
1900 Anacostia Drive, S.E.
Washington, D.C. 20020

IN REPLY REFER TO.

December 22, 2009

Dr. Mary J. Ratnaswamy
Program Supervisor, Threatened & Endangered Species
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

RE: Request for Project Review for Environmental Impact Statement-- Anacostia Park Wetlands Management Plan with Resident Goose Management Strategies, Anacostia Park, Washington, D.C.

Dear Dr. Ratnaswamy:

The National Park Service (NPS) is in the process of developing an Environmental Impact Statement (EIS) for the Anacostia Park Wetlands Management Plan. This EIS will also contain Management Strategies for Resident Canada Geese. This EIS will address all of the Anacostia wetlands—remnant as well as reconstructed—in which the NPS has management responsibilities.

The focus of the Wetland Management Plan is nearly 100 acres of restored tidal wetlands in Anacostia Park, including Kenilworth Marsh, the Kingman Marshes, and the "Fringe Marshes." A number of obstacles to the success of these restored wetlands persist. Resident Canada geese consistently denude areas not protected by fencing, and questions and concerns about proper wetland elevations, invasive vegetation infestations, erosion, and sedimentation continue to arise.

The NPS initially started an Environmental Assessment (EA) to address these concerns. However, after considering comments received during public scoping, evaluating potential alternatives, and continuing to examine data, the NPS decided to complete an EIS rather than an EA for this plan. .

The scope of the EIS includes management of resident Canada geese, hydrologic regimes, invasive species, and wetland vegetation. Additionally, issues such as the effect of urbanization and toxicity will be addressed. Stabilization methods used to address erosion and sedimentation, such as the sheet piling used at Fringe Marsh, will also be examined. The EIS may identify potential future wetland restoration sites, but will not analyze them in detail.

In order to comply with its obligations under the National Environmental Policy Act (NEPA) and NPS Director's Order #12, and in compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act, the NPS respectfully requests any records your agency has for any Threatened, Rare, or Endangered Species located in the project area (see enclosed map), or that could be potentially affected by project activities.

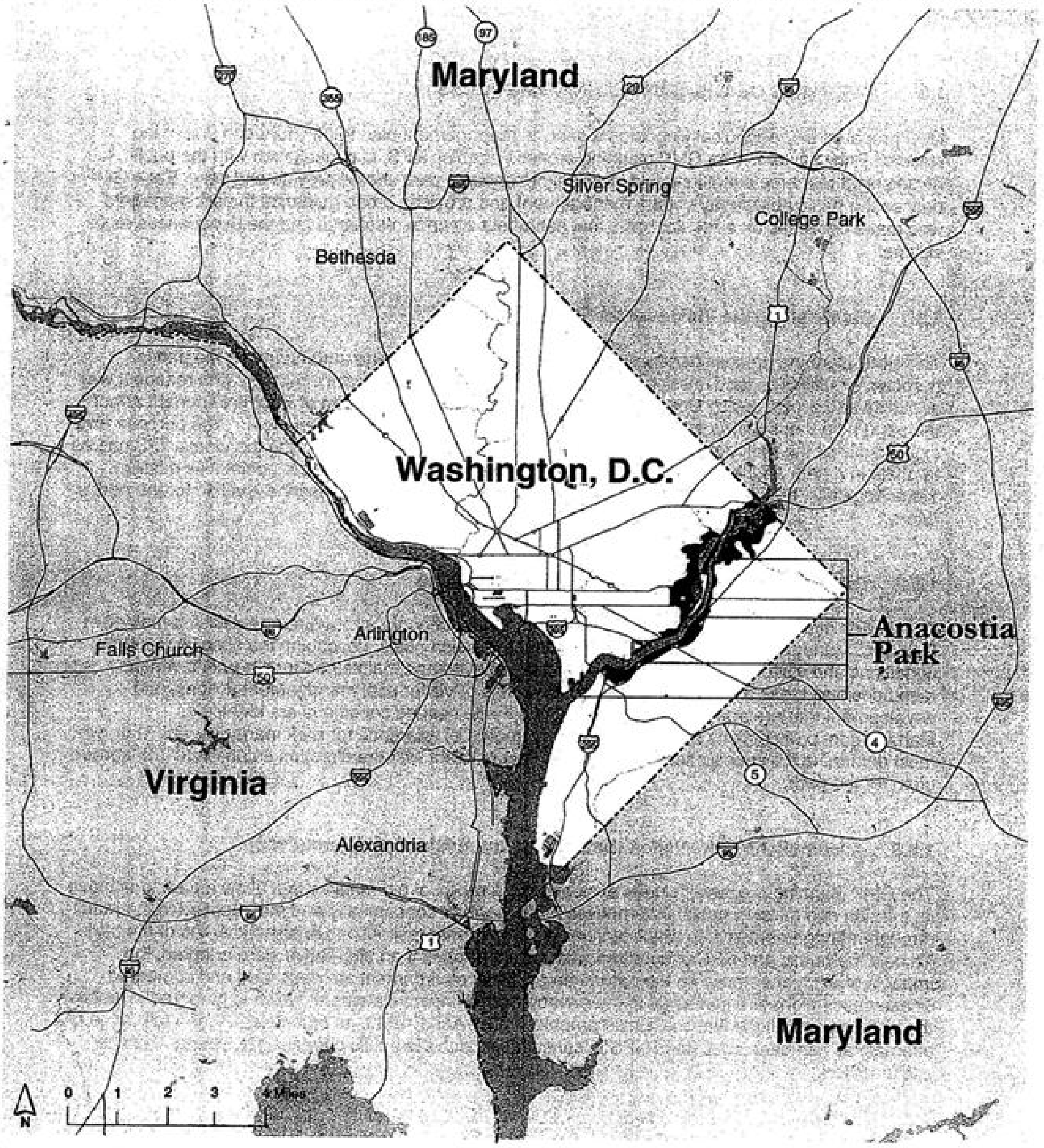
Thank you for your assistance. Please direct any comments or follow-up information to me at the letterhead address, or you may contact me directly at (202) 690-5160.

Sincerely,

Stephen W. Syphax
Chief, Resource Management Division

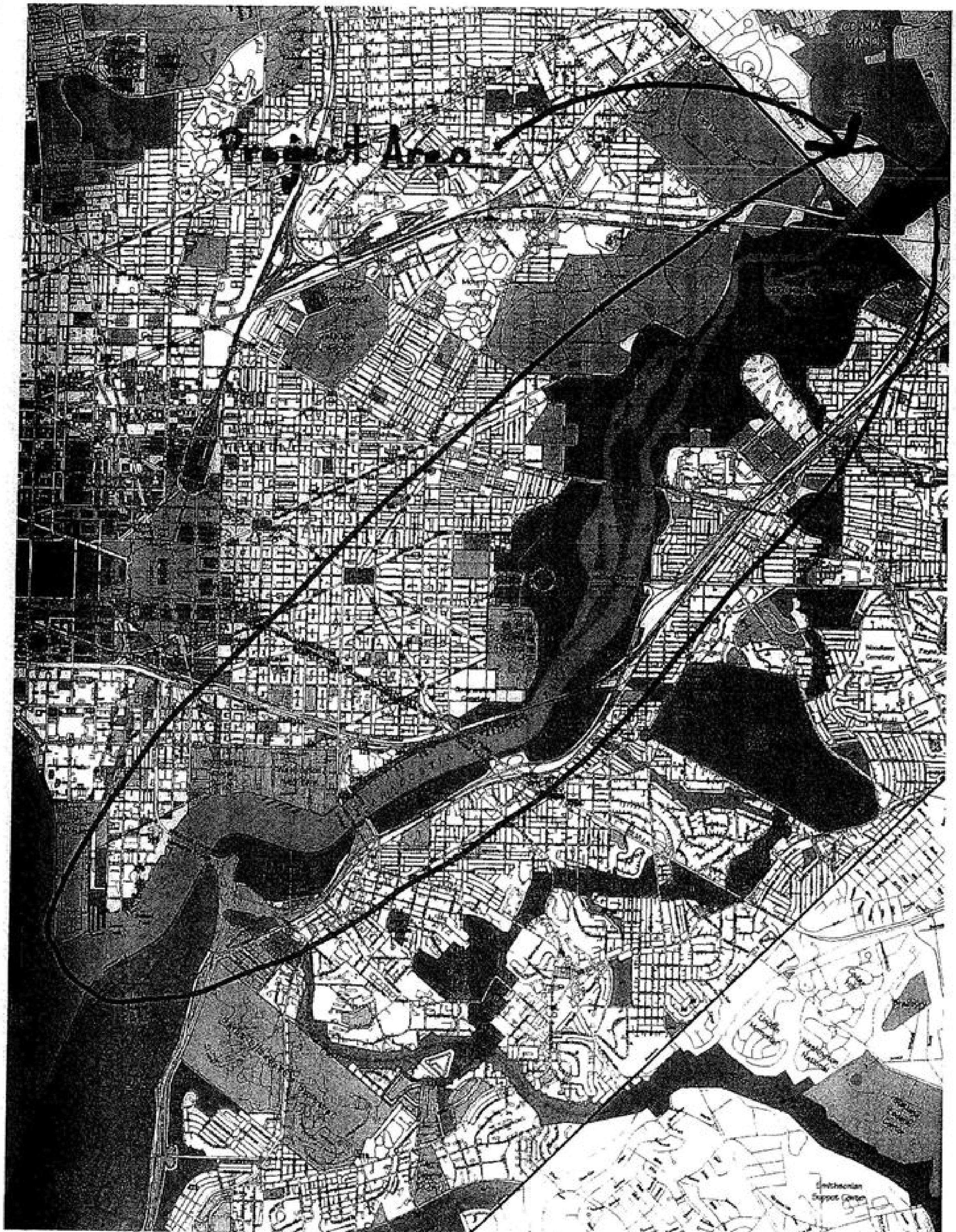
Enclosures

FIGURE 1.1



REGIONAL LOCATION

Anacostia Park -
A Unit of National Capital Parks - East
National Park Service
U.S. Department of the Interior


Project Area

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region,
Natural Resources & Science
4598 MacArthur Boulevard, N.W.
Washington, D.C. 20007-4227

NRS/N1621

19 September 2012

Andy Moser
Biologist
U.S. Fish & Wildlife Service, Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

Subject: National Park Service draft final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS—Kenk's Amphipod

Dear Mr. Moser:

This letter is a follow up to our phone conversation on 18 September 2012 about federally listed amphipods (*Stygobromus* spp.). We discussed the "Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS" because Kenk's amphipod (*Stygobromus kenki)* was made a Candidate on 26 October 2011 but is not funded for listing until 2015. We understand that FWS does not consult on Candidates; however, it is the policy of the National Park Service to treat candidates as listed species, especially when a species will become listed during the life of a plan. Enclosed are a brief description and two maps of the project impact area.

National Capital Parks—East, administrative unit for Anacostia Park, received a letter from U.S. FWS on 6 January 2010 stating that the activities associated with the project would not affect any federally endangered species. We believe this to still be correct, despite Kenk's amphipod occurring in the Anacostia River watershed within the Northwest Branch drainage in Montgomery County, Maryland, approximately three miles from the District line. However, that population is north of and not within the Anacostia Park project action area.

Do you agree with our assessment that this project is not likely to adversely affect Kenk's amphipod?

If you have any questions, please contact me at 202/339-8309. Thank you for your assistance with this matter.

Sincerely,

Diane S. Pavek

Diane S. Pavek
T&E Species Coordinator

Enclosures

cc: Genevieve LaRouche, Field Administrator, Region 5, FWS

2

Anacostia Park (NACE) Wetlands and Resident Canada Goose Management Plan/EIS

Project Location—Action Areas

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 the Anacostia River Fringe Wetlands (Figure 4). Heritage Island Wetlands were included within the discussion of Kingman Marsh for the analysis presented in this plan/EIS. This plan/EIS includes only those lands that are managed by NPS within Anacostia Park.

Anacostia Park occupies 1,300 acres along 5 miles of the Anacostia River shoreline within Washington D.C. and Maryland. 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.

FIGURE 4: LOCATIONS OF RESTORED TIDAL WETLANDS WITHIN ANACOSTIA PARK, PROJECT AREAS

Project Site Location

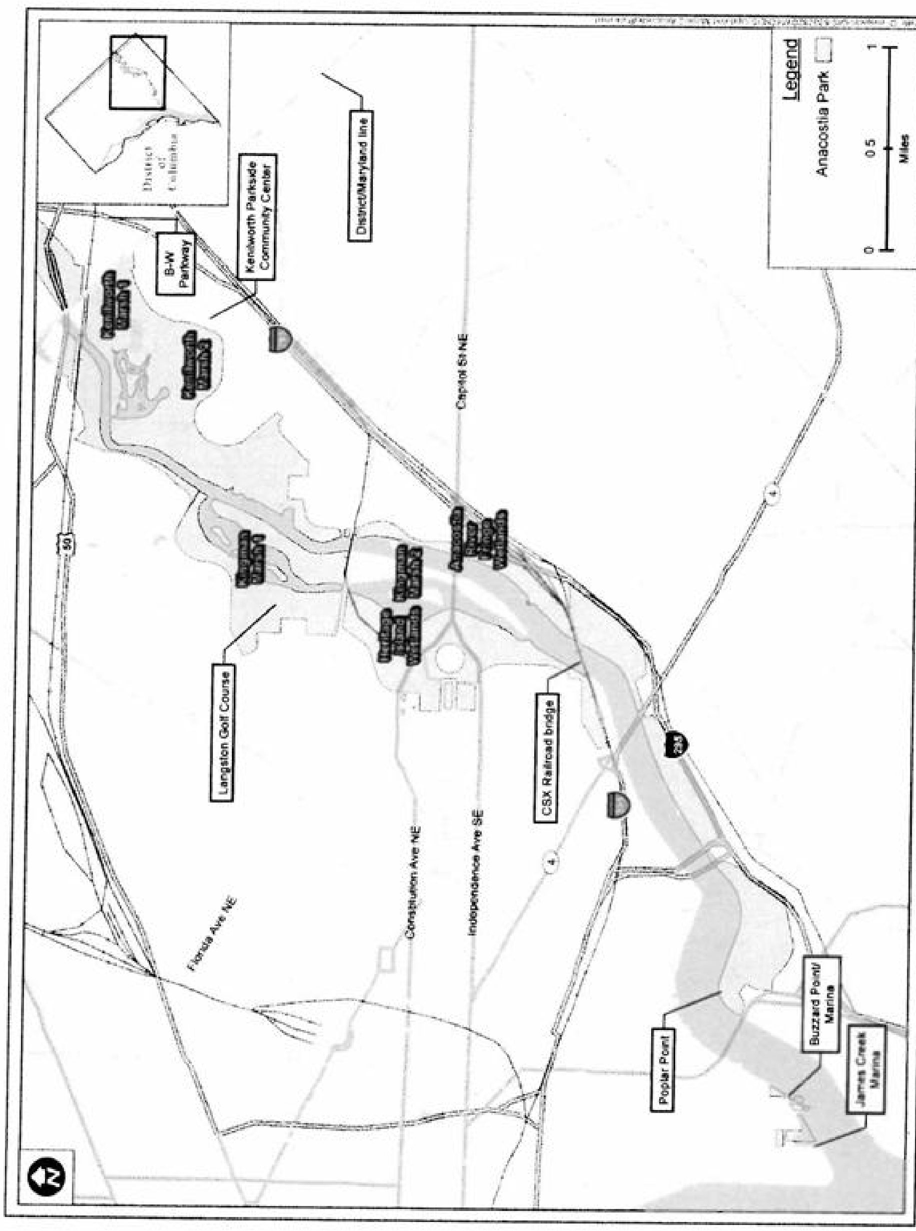


FIGURE 2: ANACOSTIA PARK

Final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS

7

1
2

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region,
Natural Resources & Science
4598 MacArthur Boulevard, N.W.
Washington, D.C. 20007-4227

NRS/N1621

24 October 2012

Danielle Palmer
Section 7 Biologist for the Shortnose & Atlantic Sturgeons
NOAA Fisheries Service, Northeast Regional Office
Protected Resources Division
One Blackburn Drive
Gloucester, MA 01930

Subject: Technical Assistance: National Park Service draft final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS--Shortnose & Atlantic Sturgeons

Dear Ms. Palmer:

The National Park Service (NPS) is managing wetlands and geese in lands along the Anacostia River, Washington, DC. A range of alternatives have been considered during the Environmental Impact Statement process ("Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS"). The project area can be seen in the attached figure.

National Capital Parks—East, administrative unit for Anacostia Park, received a letter from NOAA Fisheries on 22 November 2005 stating that the activities associated with the project would not affect the federally endangered shortnose sturgeon. We request the assistance of NOAA Fisheries in identifying any other federally listed fisheries resources that may be in the project area.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)*, Chesapeake Bay distinct population segment, was federally listed as endangered on 6 February 2012. Historically, Atlantic sturgeon have used the Potomac River with one capture and release reported in 1971 by a fisherman. The only project activity within the Anacostia River is monitoring vegetation plots, which are in shallow water on mud flats with emergent vegetation (see attached). No shellfish beds have been observed in the project area. This area is unlikely to serve as a foraging ground for sturgeon.

If you have any questions, please contact me at 202/339-8309. Thank you for your assistance with this matter.

Sincerely,

Diane S. Pavek

Diane S. Pavek
T&E Species Coordinator

cc: Patricia A. Kurkul, Regional Administrator, Northeast Region, NMFS

2

Anacostia Park (NACE) Wetlands and Resident Canada Goose Management Plan/EIS

Project Location—Action Areas

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 the Anacostia River Fringe Wetlands (Figure 4). Heritage Island Wetlands were included within the discussion of Kingman Marsh for the analysis presented in this plan/EIS. This plan/EIS includes only those lands that are managed by NPS within Anacostia Park.

Anacostia Park occupies 1,300 acres along 5 miles of the Anacostia River shoreline within Washington D.C. and Maryland. 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.

FIGURE 4: LOCATIONS OF RESTORED TIDAL WETLANDS WITHIN ANACOSTIA PARK, PROJECT AREAS

Project Site Location

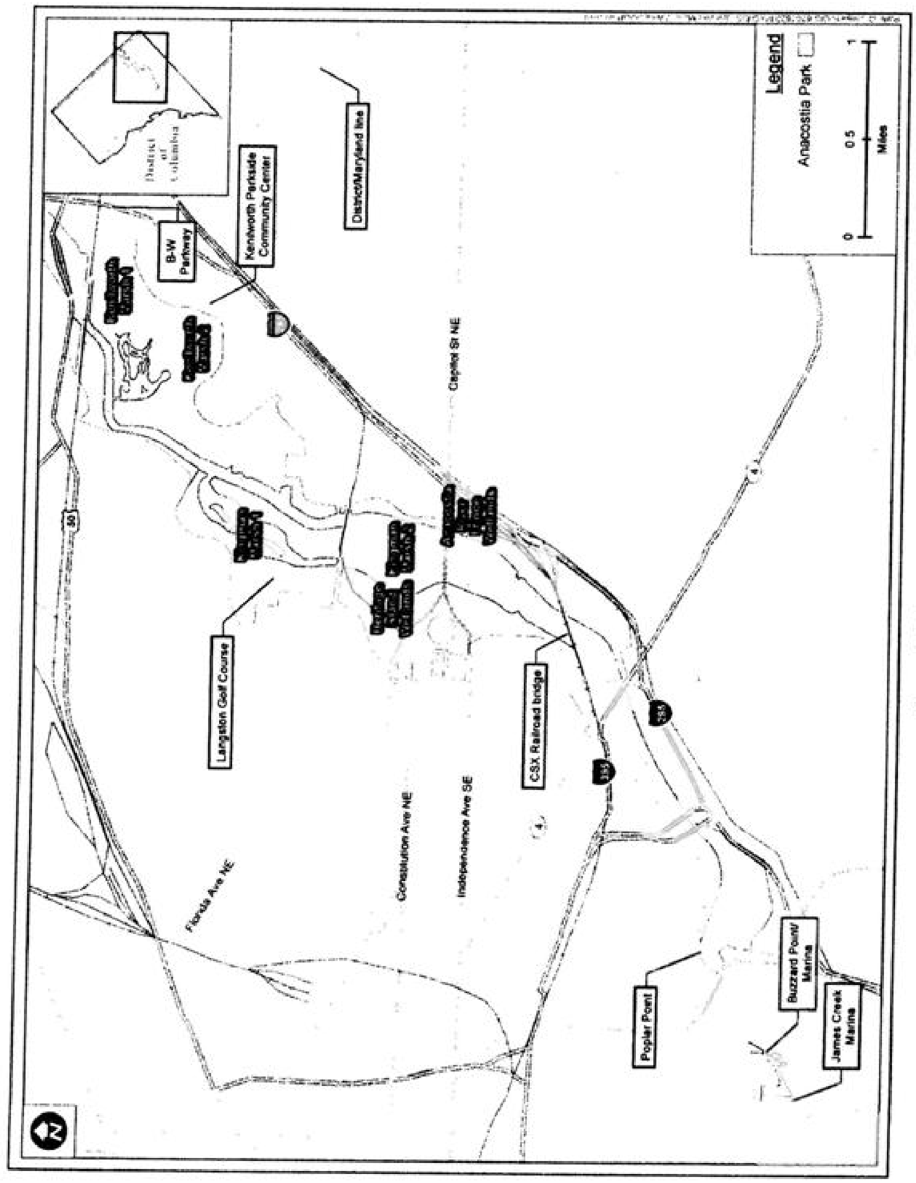


FIGURE 2: ANACOSTIA PARK

Final Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS 7

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2

SECTION 106

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Parks-East
1900 Anacostia Drive, S.E.
Washington, D.C. 20020

IN REPLY REFER TO:

A3815(NCR-NACE)

December 22, 2009

Mr. David Maloney
Associate Director
Historic Preservation Office
DC Office of Planning
801 North Capitol Street
Washington, DC 20002

Subject: Environmental Impact Statement-- Anacostia Park Wetlands Management Plan with Resident Goose Management Strategies, Anacostia Park, Washington, D.C.

Dear Mr. Maloney:

This letter is to inform you that the National Park Service (NPS), in compliance with the National Environmental Policy Act (NEPA), is developing an Environmental Impact Statement (EIS) for the Anacostia Park Wetlands Management Plan. This EIS will also contain Management Strategies for Resident Canada Geese. This EIS will address all of the Anacostia wetlands—remnant as well as reconstructed—in which the NPS has management responsibilities. In the months to come, we anticipate having an EIS containing management details and alternative actions proposed for your review and comment.

The focus of the EIS is nearly 100 acres of restored tidal wetlands in Anacostia Park, including Kenilworth Marsh, the Kingman Marshes, and the "Fringe Marshes." A number of obstacles to the success of these restored wetlands persist. Resident Canada geese consistently denude areas not protected by fencing, and questions and concerns about proper wetland elevations, invasive vegetation infestations, erosion, and sedimentation continue to arise.

The NPS initially started an Environmental Assessment (EA) to address these concerns. However, after considering comments received during public scoping, evaluating potential alternatives, and continuing to examine data, the NPS decided to complete an EIS rather than an EA for this plan. The scope of the EIS includes management of resident Canada geese, hydrologic regimes, invasive species, and wetland vegetation. Additionally, issues such as the effect of urbanization and toxicity will be addressed. Stabilization methods used to address erosion and sedimentation, such as the sheet piling used at Fringe Marsh, will also be examined. The EIS may identify potential future wetland restoration sites, but will not analyze them in detail.

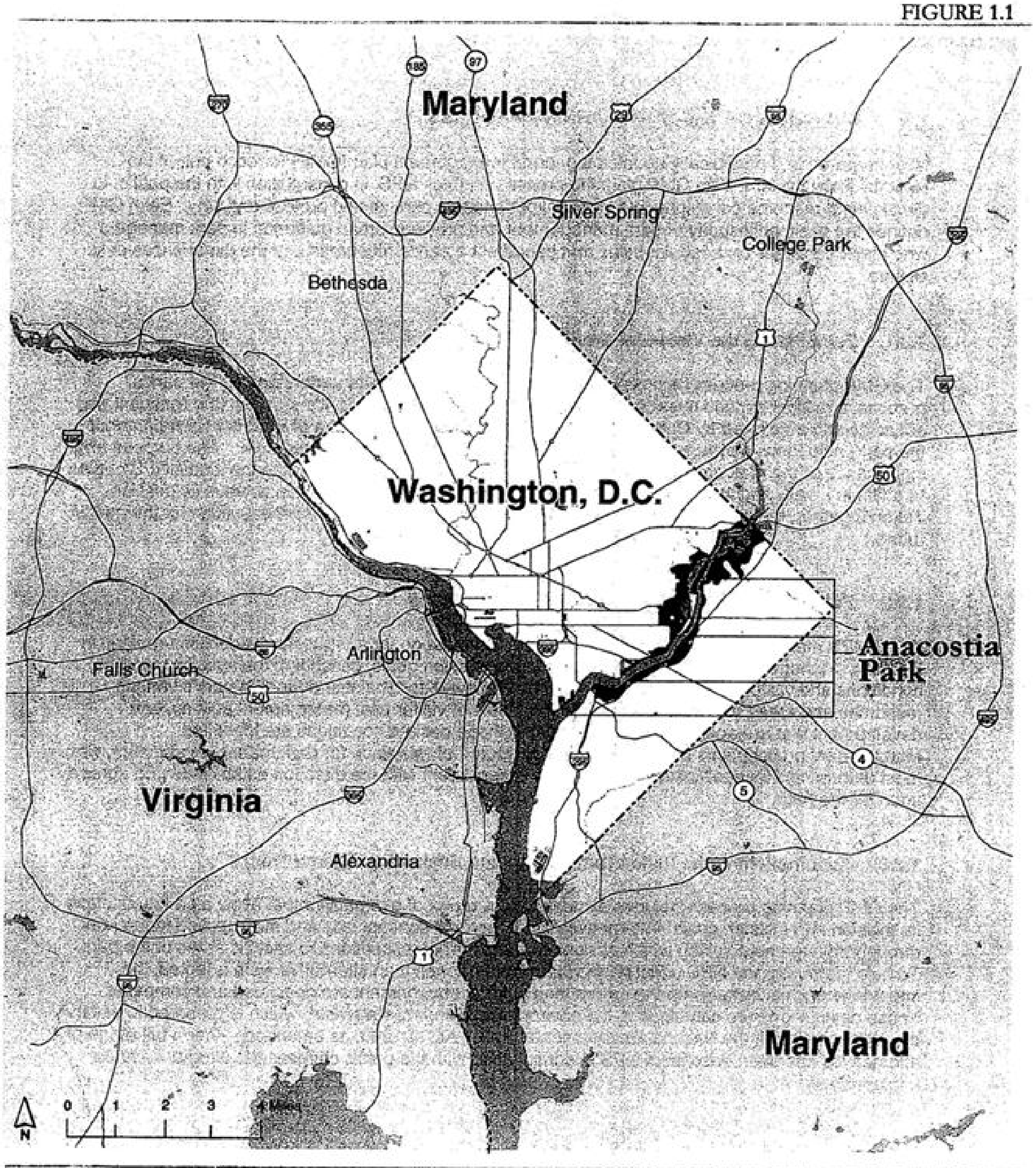
Please contact Stephen Syphax in our Resource Management Division at (202) 690-5160 if you have any questions or require additional information.

Sincerely,

Stephen W. Syphax
Chief, Resource Management Division

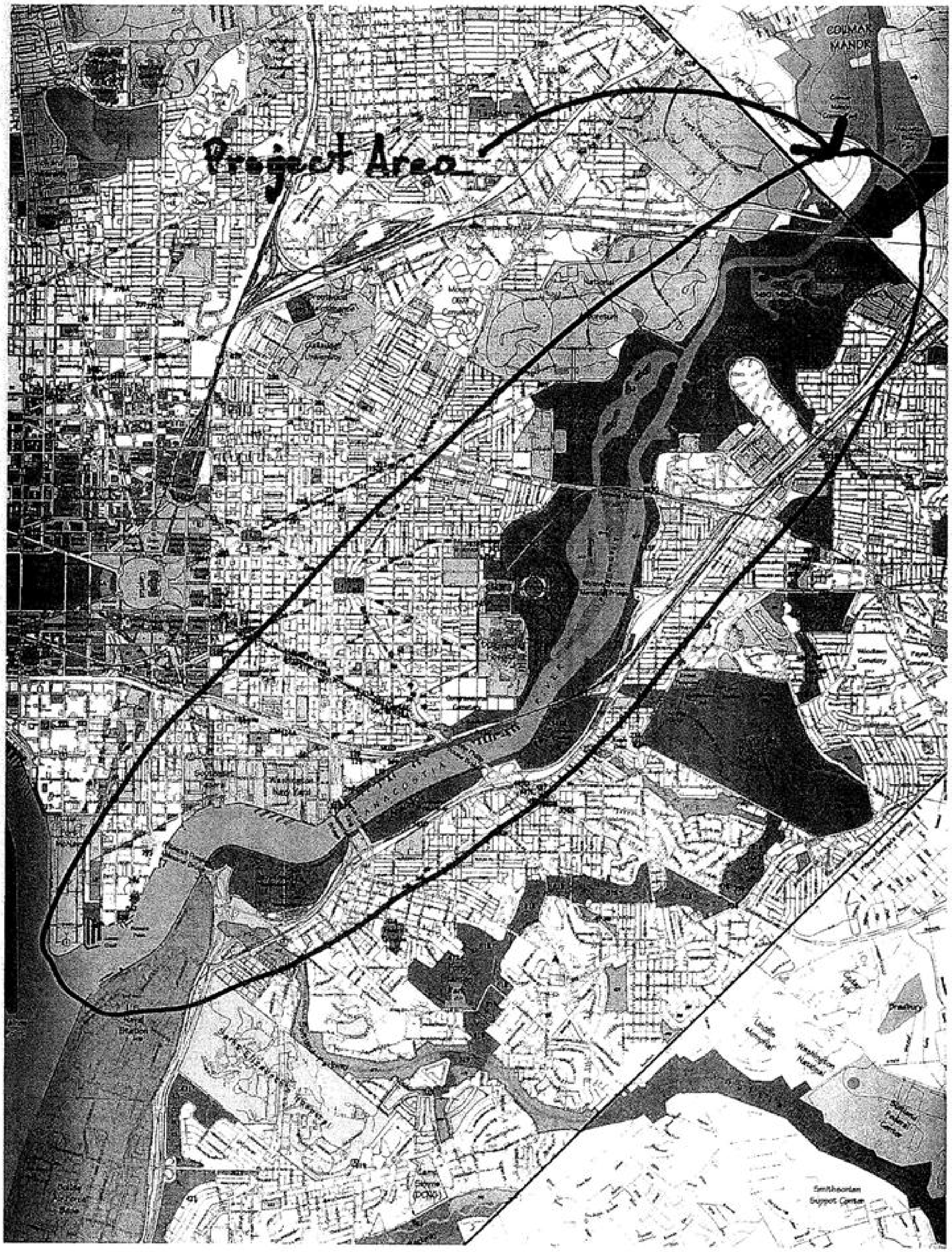
Enclosures

FIGURE 1.1



REGIONAL LOCATION

Anacostia Park -
A Unit of National Capital Parks - East
National Park Service
U.S. Department of the Interior


Project Area
COLMAR MANOR
ANACOSTIA
Smithsonian Support Center

APPENDIX A-2: AGENCY RESPONSES

SECTION 7

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

November 10, 2005

Ms. Susan Rudy
Natural Resources Program Manager
NPS-East
1900 Anacostia Dr., S.E.
Washington, DC 20020

RE: Resident Canada Goose Mgmt. project/NPS/Anacostia Pk., Washington, DC

Dear Ms. Rudy:

This responds to your letter, received October 20, 2005, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened in the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or should additional information on the distribution of listed or proposed species become available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. Limited information is currently available regarding the distribution of other rare species in the District of Columbia. However, the Nature Conservancy and National Park Service (NPS) have initiated an inventory of rare species within the District. For further information on such rare species, you should contact Marcus Koenen of the DC Natural Heritage Program at (202) 342-1443 ext. 216.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if alterations of wetlands is proposed, the U.S. Army Corps of Engineers,

"Siemien, M. Jon (DOH)" <jon.siemien@dc.gov>

11/22/2005 02:24 PM EST

To: Susan_Rudy@nps.gov
cc: "Pfaffko, Mary (DOH)" <mary.pfaffko@dc.gov>
Subject: RE: Goose Management EA/ Consultation w/ NMFS

Susan,

I received the information you wanted from NOAA I originally contacted Marta Nammack, who once upon a time worked for DC Fisheries, and she told me she wouldn't be the one to deal with the issue. Marta contacted Julie Crocker (julie.crocker@noaa.gov) at NOAA and she wrote:

==

Hi Jon.

There is a population of the endangered shortnose sturgeon in the Chesapeake Bay and individuals have been documented in the Potomac River. Transient shortnose sturgeon may also occur in the Anacostia River. Giving the information Marta passed on a quick read, the types of activities do not look like they would affect shortnose sturgeon in the rivers and as such section 7 consultation would not be necessary. Please let me know if you need additional information.

Julie

==

Looks like NPS is clear with NOAA. If you need any further information please let me know.

- Jon

M. Jon Siemien
Chief, Fisheries Research Branch
Acting Program Manager, Fisheries & Wildlife Division
Acting Branch Chief, Wildlife Management Branch
Fisheries & Wildlife Division
DC Department of Health
51 N Street, N.E., Room 5003
Washington, DC 20002
Phone: 202-535-2273
Fax: 202-535-1373
jon.siemien@dc.gov

-----Original Message-----
From: Susan_Rudy@nps.gov [mailto:Susan_Rudy@nps.gov]
Sent: Friday, October 21, 2005 10:08 AM
To: jon.siemien@dc.gov
Subject: Fw: Goose Management EA/ Consultation w/ NMFS

Hello Jon-

Just found out you're in charge over there now - congrats.

Please see the message below.

Thanks,

Susan

Susan Rudy
Natural Resources Program Manager
National Capital Parks-East
1900 Anacostia Drive, S.E.
Washington D.C. 20020

202.690.5167
202.690.0862 (fax)
susan_rudy@nps.gov

"...the heritage of our lands is not a fact, but a responsibility, an obligation, a task. A pleasure."
Wallace Stegner

----- Forwarded by Susan Rudy/NACE/NPS on 10/21/2005 10:06 AM -----

Susan Rudy

To: "Palmer, Ira (DOH)" <ira.palmer@dc.gov>
10/21/2005 09:37 AM EDT
cc: "Pfaffko, Mary (DOH)" <mary.pfaffko@dc.gov>, "Katju, Dhananjaya (DOH)" <dhananjaya.katju@dc.gov>, "Hill, Peter (DOH)" <peter.hill@dc.gov>, Stephen Syphax/NACE/NPS@NPS

Subject: Goose Management EA/ Consultation w/ NMFS

Good morning Ira,

As you probably know, we (NPS & DC) are working w/USDA/Wildlife Services on an EA for Resident Canada Goose Management in Anacostia Park

As part of the NEPA process, we need to check w/ FWS and NMFS regarding the presence of RTE species (terrestrial & aquatic respectively) and ascertain from them if RTE species are present and if so do our proposed activities require consultation under Section 7 of the ESA.

I have already informally contacted the FWS regarding the terrestrial species on NPS land, and sent them a map & brief description of or proposed project. We don't have jurisdiction over the waters of the Anacostia, and so would like you guys to deal w/ NMFS. I think that the same information sent to FWS would be appropriate for NMFS - and am sending it to you separately for your review.

My contact at NMFS is Marta Nammack, (301)713-1401 x180 <Marta.Nammack@noaa.gov>.

Please keep me in the loop on correspondence w/ NMFS, as I am keeping the administrative record for this process.

Thanks,

Susan

Susan Rudy
Natural Resources Program Manager
National Capital Parks-East
1900 Anacostia Drive, S.E.
Washington D.C. 20020

202.690.5167
202.690.0862 (fax)
susan_rudy@nps.gov

"...the heritage of our lands is not a fact, but a responsibility, an obligation, a task. A pleasure."
Wallace Stegner

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575

January 6, 2010

United States Department of the Interior
National Park Service
National Capital Parks East
1900 Anacostia Drive, S. E.
Washington, D.C. 20020

RE: Anacostia Park Wetlands Management Plan with resident Goose Management Strategies, Anacostia Park Washington DC

Dear: Stephen W. Syphax

This responds to your letter, received December 29, 2009, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened in the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or should additional information on the distribution of listed or proposed species become available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. Limited information is currently available regarding the distribution of other rare species in the District of Columbia. However, the Nature Conservancy and National Park Service (NPS) have initiated an inventory of rare species within the District. For further information on such rare species, you should contact Mary Pfaffko of the National Park Service at (202)-535-1739.

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delist) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle will still be protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act. As a result, starting on August 8, 2007, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007.

If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at:
http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities. This proposed permit process will not be available until the Service issues a final rule for the issuance of these take permits under the Bald and Golden Eagle Protection Act.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if alterations of wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interests in these resources. If you have any questions or need further assistance, please contact Devin Ray at (410) 573-4531.

Sincerely,

Leopoldo Miranda
Field Supervisor

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

OCT 3 1 2012

Diane S. Pavek
United Stated Department of the Interior
National Park Service
National Capital Region
Natural Resources and Science
4598 MacArthur Boulevard, N.W.
Washington, D.C. 20007-4227

Re: Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS

Dear Ms. Pavek,

This is in response to your October 24, 2012, letter regarding the Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS. Based on NOAA's National Marine Fisheries (NMFS) Service Protected Resources review of the material you provided us, no federally listed or proposed threatened or endangered species and/or designated critical habitat for listed species under the jurisdiction of NMFS are known to exist in the vicinity of your proposed project. As such, no further coordination with NMFS Protected Resources Division is needed. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact Danielle Palmer at (978) 282-8468.

Sincerely,

Kimberly Damon-Randall
Acting Assistant Regional Administrator
for Protected Resources

EC: Palmer
File Code: Sec 7 No Species Present 2012_ Anacostia Park Wetlands and Resident Canada Goose Management Plan/EIS

SECTION 106

GOVERNMENT OF THE DISTRICT OF COLUMBIA
HISTORIC PRESERVATION OFFICE
OFFICE OF PLANNING

February 1, 2010

Mr. Stephen Syphax
Chief, Resource Management Division
National Park Service
National Capital Parks-East
1900 Anacostia Drive, SE
Washington, DC 20020

RE: Environmental Impact Statement for Anacostia Park Wetlands Management Plan with Resident Goose Management Strategies, Anacostia Park

Dear Mr. Syphax:

Thank you for contacting the DC State Historic Preservation Office (SHPO) regarding the above-referenced undertaking. We have reviewed the project information in accordance with Section 106 of the National Historic Preservation Act and are writing to provide our initial comments regarding effects on historic properties.

As you are aware, Anacostia Park has been determined eligible for listing in the National Register of Historic Places and the DC Inventory of Historic Sites. Therefore, we look forward to reviewing the Environmental Impact Statement (EIS) and to assisting the National Park Service in its efforts to avoid, minimize or mitigate any adverse effects on historic properties that may result from the wetlands management plan and resident goose management strategies.

If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841. Otherwise, we thank you for providing this opportunity to comment and we look forward to receiving the EIS as soon as it becomes available.

Sincerely,

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

09-412

2000 14th Street NW, Fourth Floor, Washington, DC 20009
202-442-8800 fax 202-442-7638

201102942

F
NPS
EJL / JES

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Parks-East
1900 Anacostia Drive SE
Washington, D.C. 20020

RECEIVED
JUL 25 2011
BY:

Dear Sir or Madam:

PR Co.

The National Park Service (NPS), announces the availability of the Draft Anacostia Park Wetland and Resident Goose Management Plan and Draft Environmental Impact Statement (DEIS) for public review and comment.

The purpose of this Draft Plan/EIS is to guide and direct the actions of the NPS in the management of wetlands and resident Canada geese at Anacostia Park. It seeks to provide an integrated tool designed to allow for long-term planning and management for both wetlands and resident Canada geese, including strategies to facilitate the success and functionality wetland restoration activities at the park.

Five alternatives are analyzed in detail in the Draft Plan/EIS: the no action alternative, which represents the continuation of current management activities, and four action alternatives that range in the type, number, and intensity of wetland management techniques and goose management techniques. 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.

This DEIS was prepared in accordance with National Environmental Policy Act (NEPA) of 1969, as amended, and implementing regulations 40 CFR Parts 1500-1508, and NPS Director's Order #12 and Handbook, Conservation Planning, Environmental Impact Analysis, and Decision-Making (DO-12). Compliance with Section 106 of the National Historic Preservation Act of 1966 is occurring in parallel with the NEPA process.

Access to the Document:

Public review copies of the DEIS will be available at the following locations:

Kenilworth Aquatic Gardens Visitor Center
1550 Anacostia Avenue, NE
Washington, D.C. 20019

Langston Golf Course Club House
2600 Benning Road, NE
Washington, D.C. 20002

The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking.

Jonathan Sager Date 8/24/11

*No HP in Maryland

Archeo: IBBC 8/12/2011

JES 8/24

Thank you for your interest and participation in this process.

Sincerely,

for Alexcy Romero
Superintendent
National Capital Parks-East

GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICE

DC STATE HISTORIC PRESERVATION OFFICE
SECTION 106 REVIEW FORM

TO: Mr. Alexcy Romero, Supt. National Capital Parks East (NACE), NPS
Dr. Stephen Potter, Regional Archaeologist, National Capital Region, NPS
Mr. Robert Mocko, Environmental Protection Specialist, NACE, NPS

PROJECT NAME/DESCRIPTION: Proposed Goose Management Plan EIS, Anacostia Park, NACE

PROJECT ADDRESS/LOCATION DESCRIPTION: Preferred Alternative (Alt. B) is in the northern section of Anacostia Park, in the Kenilworth area between Benning Road Bridge and Kenilworth Aquatic Gardens. The LOD will occur in a variety of locations and settings including Kingman Island, fringe wetlands, seawalls, and Kenilworth Park.

DC SHPO PROJECT NUMBER: 09-412

The DC State Historic Preservation Office (DC SHPO) has reviewed the above-referenced federal undertaking(s) in accordance with Section 106 of the National Historic Preservation Act and has determined that:

☐ This project will have **no effect** on historic properties. No further DC SHPO review or comment will be necessary.

☐ There are **no historic properties** that will be affected by this project. No further DC SHPO review or comment will be necessary.

☐ This project will have **no adverse effect** on historic properties. No further DC SHPO review or comment will be necessary.

☒ This project will have **no adverse effect** on historic properties **conditioned** upon fulfillment of the measures stipulated below.

☒ **Other Comments / Additional Comments** (see below):

The goose management plan will not adversely affect the built environment, however, as the EIS describes the project, the Preferred Alternative (Alt. B) identified by the NPS includes ground-disturbing activities that have the potential to adversely affect ARCHAEOLOGICAL resources. These activities include installation of signposts, removal of steel sheeting, installation of water gardens, stream daylighting, etc. NPS indicated in the EIS that additional Section 106 consultation for archaeology would occur because of the prehistoric sensitivity of the original ground surface of Anacostia Park despite large areas mantled in fill or located on made land. Because horizontal and vertical LODs for the various ground-disturbing activities have yet to be identified, additional Section 106 consultation will be needed. For these reasons we have made a finding of *Conditional* No Adverse Effect on historic resources. The conditions are: 1) Continued Section 106 consultation on the proposed ground disturbing activities' effects on archaeological resources; 2) Archaeological identification survey, and /or geoarchaeological survey if warranted; 3) mitigation of adverse effects if such cannot be avoided; and 4) reporting of archaeological investigations following NPS and District guidelines.

Should unanticipated archaeological discoveries be made during this undertaking, please contact the DC SHPO archaeologist immediately at 202-442.8836 or at ruth.trocolli@dc.gov.

Ruth Trocolli

BY: ________________ DATE: 4 January 2013

Ruth Trocolli, Ph.D., Archaeologist for the State Historic Preservation Office

1100 4th Street, S.W., Suite E650, Washington, D.C. 20024 202-442-7600, fax 202-442-7638

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APPENDIX B: VEGETATIVE MONITORING PLAN

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PRELIMINARY MONITORING PROTOCOL FOR THE TIDAL FRESHWATER WETLAND RESTORATION HERBIVORY STUDY IN NATIONAL CAPITAL PARKS--EAST

ABSTRACT

Four tidal freshwater wetland restoration projects have been undertaken within Anacostia Park on lands managed by the National Park Service since 1993. Monitoring the impacts of Canada goose (*Branta canadensis*) herbivory on the wetland vegetation will play a key role in determining the long-term health of these tidal freshwater wetland restorations. This Implementation Plan lays out monitoring for impacts of herbivory on the vegetation in Kingman Area 1 and inferred to the other wetland areas.

BACKGROUND

In the early to mid-1900's, dredging and filling operations combined with sea wall installation destroyed the extensive tidal freshwater marshes along the Anacostia River in Washington, D.C. In an effort to restore a portion of those once extensive wetlands, the U.S. Army Corps of Engineers (USACE) and the District Department of the Environment (DDOE), working in conjunction with National Park Service National Capital Parks-East (NPS), designed and implemented a series of four tidal freshwater wetland restoration projects along the tidal Anacostia, on lands managed by NPS. The US Geological Survey Patuxent Wildlife Research Center (Cooperator) has taken the lead on monitoring all four wetland restorations, working in conjunction with DDOE, NPS, USACE, and the University of Maryland.

HERBIVORY MONITORING

BASIC APPROACH

Effects of herbivory will be investigated through the use of experimental modules consisting of one unfenced control plot and one sampling plot. The elevated-fence exclosure is designed to exclude only (mature) Canada geese, while allowing access to fish, turtles, and other possible herbivores. This will not exclude goslings, and therefore, impacts from fish/turtle herbivory will include goslings.

The monitoring described here represents a strategic approach to the study of herbivory at the Anacostia Park wetland restorations. It builds on the following advantages of working at Kingman Area 1:

1. Extensive herbivory has already been observed at Kingman Area 1.
2. Kingman Area 1 is fairly large, providing approximately 6.6 ha of potential emergent marsh habitat. It is anticipated that there is sufficient acreage of both unvegetated (unfenced) habitat and vegetated (previously fenced) habitat with the desired elevation range to accommodate modules in both types of habitat. It is useful to know whether the outcome is influenced by the starting habitat or not, since Kingman Area 1 has fairly large areas of each type.
3. Kingman Area 1 has numerous previously fenced areas that have revegetated following the installation of exclosures by Anacostia Wetland Society. Existing herbivory protection will be removed from the areas targeted for vegetated modules fairly quickly and without the need for heavy machinery to provide vegetated habitat of appropriate elevation for experimental purposes.

While the herbivory monitoring described does not attempt to demonstrate impacts of herbivory on vegetation in wetland restorations adjacent to all of the areas where Canada goose management actions might be implemented, we will be able to infer the effect to the vegetation of these areas. Since Canada geese are mobile and the distances separating these areas are relatively small (approximately 5 kilometers maximum), demonstrating herbivory impacts at Kingman Area 1 supports Canada goose management actions anywhere within Anacostia Park.

Study Modules

The study will use 16 modules, designed to be divided evenly between the two habitat types.

A two-plot module consists of one unfenced control plot and one elevated-fenced exclosure plot. This keeps the design simple and the implementation as cost-effective as possible. Surveillance of elevated-fenced plots, either through motion sensor cameras or periodic on-the-ground surveillance by park staff for goose tracks inside elevated-fence exclosures could be used to help document the nature of any herbivory experienced at these plots. The use of elevated-fenced exclosures should also reduce the possibility that the exclosures themselves will trap sediment and alter elevations and nutrient levels within.

Modules will be placed in unvegetated habitat (unfenced) or vegetated habitat (large, previously fenced areas) in the required elevation range. For the vegetated modules it will be necessary to remove existing fencing in order for the control plots to function properly as controls. Modules will be allocated to random locations within the areas of adequate elevation, maintaining a minimum separation distance among modules of 5 m. Module locations will be recorded using GPS.

Vegetation is sampled within 1 m by 2 m plots (figure C-1), the sampling design used in recent monitoring of the River Fringe and Heritage Island Wetlands Restorations (Krafft et al. 2009). Two corners of the sampling plot are marked with 1.9 cm diameter PVC poles. The taller pole (total length of 3 m, with approximately 2.4 m projecting above-ground) aids in locating the plot visually from a distance. The shorter pole (total length of 1.4 m, with approximately 0.6 m projecting above-ground) provides a second corner for orienting the 1 m by 2 m PVC quadrat frame during sampling events.

Fenced exclosures measure approximately 3 m by 4 m, which should be small enough to deter Canada geese from flying into the exclosures from above, but large enough to provide an approximately 1-m buffer around the sample plot. The inclusion of a buffer protects the sample plot in the elevated-fence exclosure from possible edge effects from Canada geese stretching their necks under the elevated fencing at low tide to graze on plants within their reach. Equipping the exclosures with a gate and a buffer also allows closer examination of the sampling plot, which means that data can be collected at the species level and used to determine species richness in addition to the percent cover.

Exclosures are constructed using vinyl-wrapped wire mesh fence with a recommended mesh size of 5 cm by 10 cm and 1.4 m high. The wire fence is attached to metal t-posts using plastic cable ties. The metal t-posts are 2.4 m tall, allowing for approximately 1 m below ground to provide good stabilization. The taller height limits the possibility of Canada geese swimming over the tops of the exclosures at high tide. A lower elevated height of 0.2 m was chosen rather than the 0.25 m used in the previous studies on the Anacostia and Patuxent to provide additional deterrence to goose entry. This reduction would not be expected to act as a deterrent to most fish or turtles. Horizontal stringing and flagging will be attached to the exclosures on the diagonal to further deter geese from entering the exclosures from above, although the small size of the exclosures should make this method of entry unlikely.

Sampling plots will be arranged in a linear fashion within the modules, as shown in figure C-1. Allocation of the control and fenced-exclosure plot(s) to the available positions within each module will be random.

Elevations

Given the important role elevation plays in determining percent cover, species richness, and species composition in the marsh, comparability of sample plots with respect to elevation will be maintained by limiting the placement of sample plots to an elevation range of 0.25 to 0.37 m NAVD 88. This range was chosen based on previous work in the Anacostia wetland restorations (Krafft et al. 2009, Hammerschlag et al. 2006, Neff 2002) that indicates this range (equivalent to 1.60 to 2.00 ft NGVD 29) is high enough to support native wetland vegetation, but low enough to reduce the probability of invasion by the non-native, common reed (*Phragmites australis*). Sampling plot elevations will be measured periodically to determine change over time. It is recommended that elevations be monitored in 2009 during the plot location process and again in 2011. Elevations should be obtained with a surveyor's level, a laser level, or other appropriate equipment, pegged to local benchmarks.

Field Work Timeline

Exclosures should be installed in April/May, or as soon thereafter as is feasible, so that germinating annuals will not be decimated by herbivory before the exclosures are set up. Exclosures will be examined periodically by Park staff during the growing season to confirm that they are intact, especially following major storm events, and to confirm that goose tracks are not present within elevated-fenced exclosures. Baseline vegetation data will be collected for the study in early June, right after removal of the old protective fencing form the new experimental modules. Annual vegetation monitoring will be conducted in August, prior to the seasonal senescence of a number of the key dominant species (Krafft et al. 2009).

Since the purpose of this monitoring is to measure the general herbivory response rather than tracking individual species that may peak and senesce at different times, an annual August monitoring is sufficient. This plan anticipates, based on past experience that vegetation will volunteer within the exclosures, given appropriate elevation and protection from herbivory. This may take more than one growing season. In the event that Canada goose herbivory is documented by this study and management actions are undertaken, herbivory monitoring should continue after the management actions to provide quantitative statistical documentation of the recovery of vegetation in the unfenced control plots.

Vegetation Sampling Methods

A 1 m by 2 m PVC quadrat frame will be hooked over the two PVC plot markers to delineate the boundaries of the sampling plot. Ocular estimation will be used to record percent cover by cover types consisting of species (or nearest known taxon) and the unvegetated cover type, if present. Percent cover numbers will total at least 100 %. Totals will exceed 100 % in cases where vertical layers of species overlap. Plants do not have to be rooted within the sampling plot to be included in the percent cover data. Cover will be recorded to the nearest percent for values between 1 and 15. Values less than 1 % will be recorded as 0.5 % or 1 %, whichever is closer. Values between 15 and 95 % will be recorded to the nearest 5 %. Values between 95 % and 100 % can be recorded to the nearest percent.

Statistical Analysis

Total vegetative cover, species richness, and elevation data will be analyzed statistically. For data sets where the residuals are normally distributed and the variances are acceptable, analysis of variance (ANOVA) will be used to compare data among plot types (unfenced control plots and elevated-fenced exclosure plots), habitat type (vegetated or unvegetated), and their interaction. 'Module' will be included in the model as well, and we will investigate models that allow correlation between the plots within a module. Data may be transformed prior to analysis (e.g., using a natural log transformation) to improve normality. Post pairwise comparisons will be made using Tukey's Studentized Range Test of Least

Squares Means (family-wise error rate with alpha= 0.05). After the first year, data meeting the necessary normality and variance assumptions will be analyzed using a mixed model repeated measures analysis of variance (SAS, 2003, PROC MIXED). A variety of models will be tested to determine whether an unstructured model (which allows correlation between any two periods to be different) or compound symmetry model (which assumes the same correlation between any two time periods) produce better fit based on a lower value for Akaike's Information Criterion (AIC).

For data sets that do not meet adequate standards of normality and homogeneity of variance, we will consider using alternate statistical analyses such as loglinear models.

CONCLUSIONS

The tidal freshwater wetland restorations located in Anacostia Park have the potential to provide Washington D.C. with environmental benefits through increased habitat for wetland wildlife and plants, increased ability to slow the pace of flood waters and filter pollutants, educational benefits by providing living laboratories in an inner-city setting where that is a rare commodity, and natural aesthetic benefits, also in short supply in the urban environment. Everyone benefits if these wetland restorations located on lands managed by NPS are well-managed and functioning to their optimal capability. Herbivory has limited the ability of these wetland restorations to function at their optimal capability. Data collected through this monitoring plan would provide the quantitative data needed to make sound management decisions regarding these wetlands.

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SAS

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USDA, NRCS

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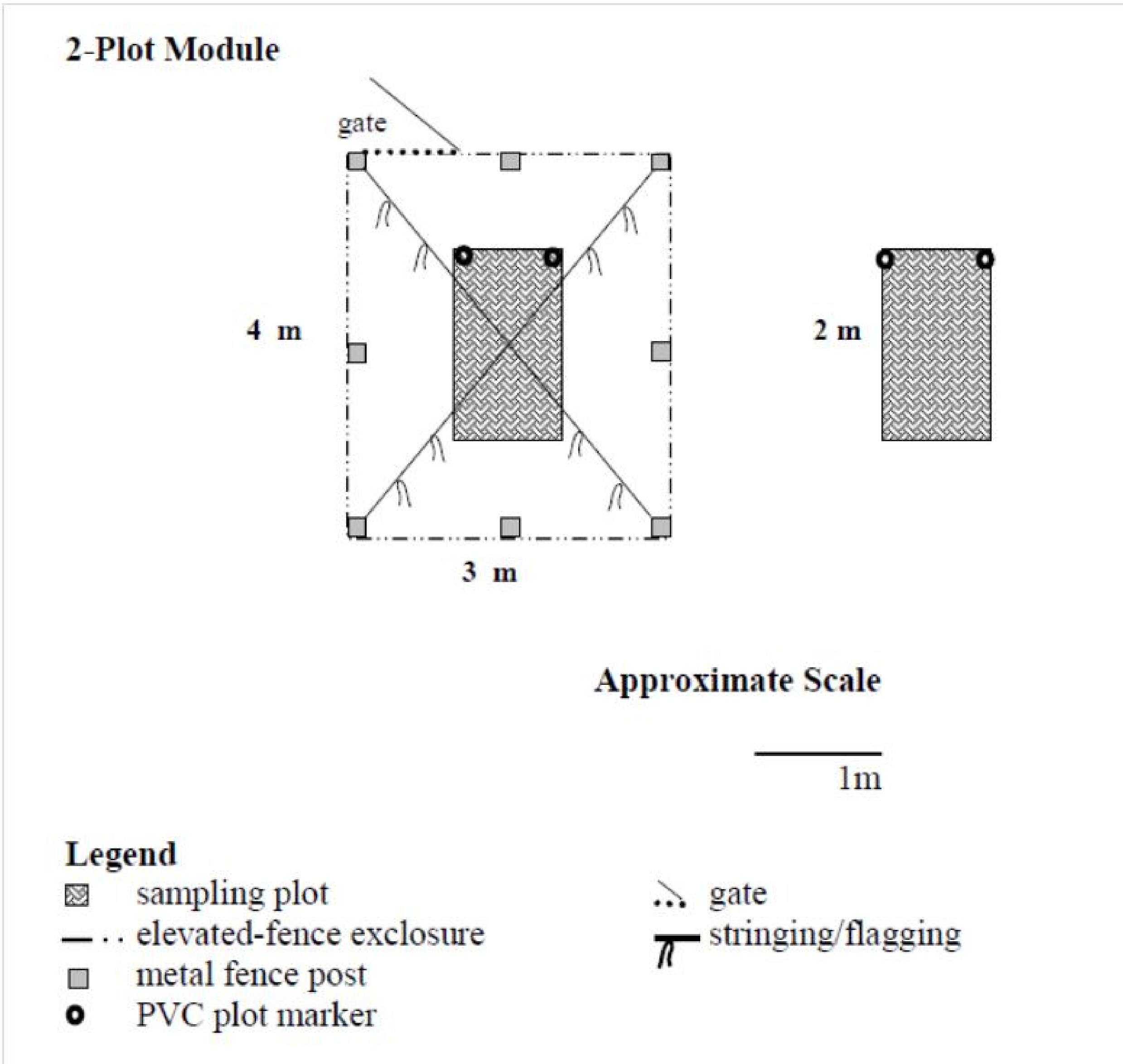

FIGURE C-1: SCHEMATIC DIAGRAM OF AN EXPERIMENTAL MODULE FROM AN AERIAL VIEW. THE MODULE CONSISTS OF ONE ELEVATED-FENCED EXCLOSURE PLOT AND ONE UNFENCED CONTROL PLOT.

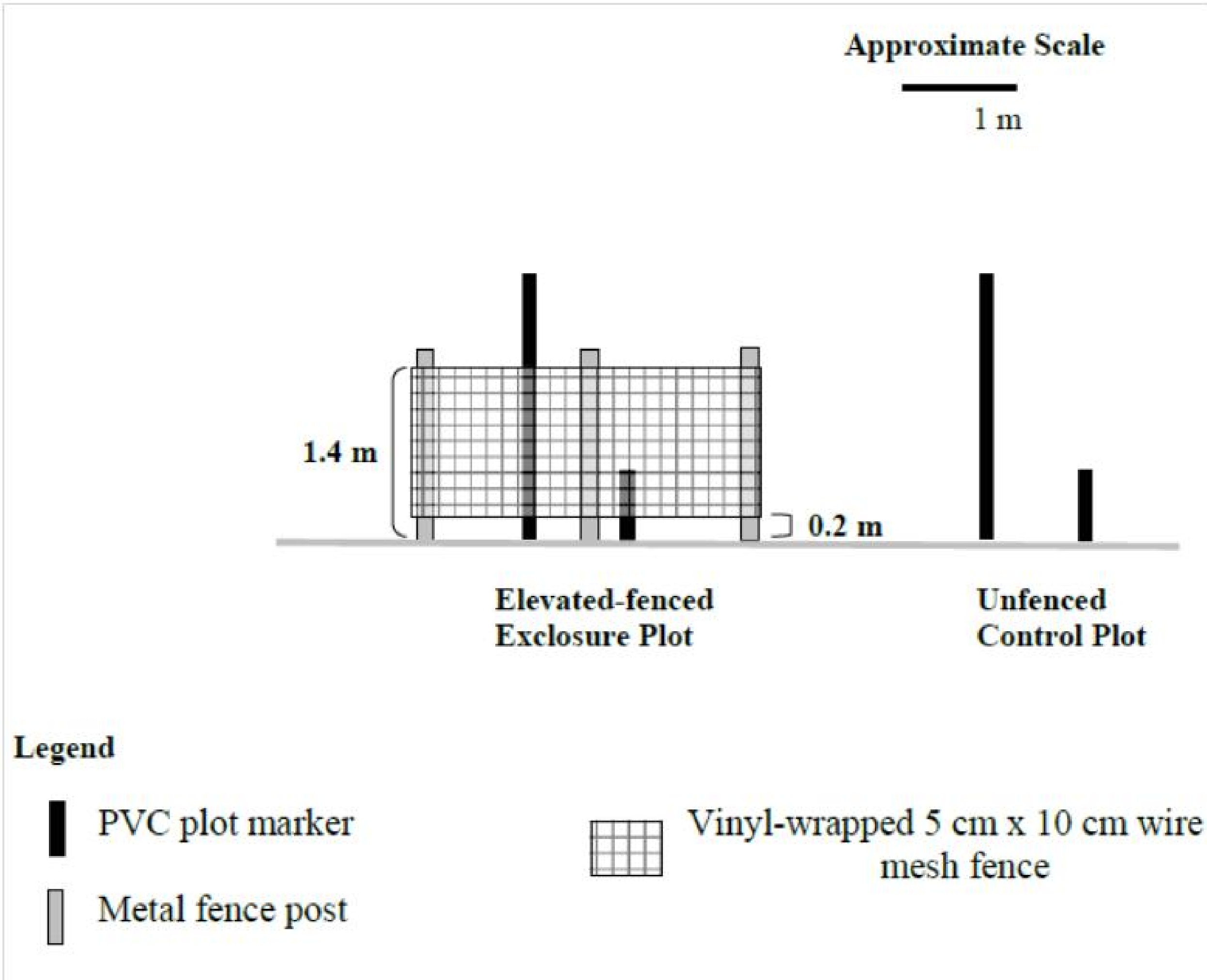

FIGURE C-2: SCHEMATIC DIAGRAM OF AN EXPERIMENTAL MODULE FROM A SIDE VIEW.

APPENDIX C: PLANT SPECIES LIST

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TABLE C-1: LIST OF SPECIES PLANTED FOR ANACOSTIA MARSH RECONSTRUCTION

Common Name	Scientific Name	Notes
High Marsh Plants		
Buttonbush	*Cephalanthus occidentalis*	
Marsh hibiscus	*Hibiscus moscheutos*	
Rice cutgrass	*Leersia oryzoides*	Struggled initially; recovered later
Lizard's tail	*Saururus cernuus*	Did not survive for very long
Mid-Marsh Plants		
Water plantain	*Alisma plantago-aquatic*	Did not survive for very long
Tussock sedge	*Carex stricta*	
Blue flag	*Iris versicolor*	Did not survive for very long
Arrow arum	*Peltandra virginica*	
Smartweed species	*Polygonum* spp.	
Pickerelweed	*Pontedaria cordata*	
Duck potato	*Sagittaria latifolia*	
Common three-square	*Scirpus americanus*	Did not survive for very long
Soft-stem bulrush	*Scirpus validus*	
Lesser bur-reed	*Sparganium americanum*	Did not survive for very long
Giant bur-reed	*Sparganium eurycarpum*	Did not survive for very long
Low Marsh Plants		
Spatterdock	*Nuphar advena*	
Volunteer Plants		
Red maple	*Acer rubrum*	
Beggar-ticks	*Bidens* sp.	
Sedge species	*Carex* spp.	
Spike rush species	*Eleocharis* spp.	
Rice cutgrass	*Leersia oryzoides*	
Purple loosestrife	*Lythrum salicaria*	
Common reed grass	*Phragmites australis*	
Smartweed species	*Polygonum* spp.	
Cottonwood	*Populus deltoides*	
Duck potato	*Sagittaria latifolia*	
Willow species	*Salix* sp.	
Narrow-leaved cattail	*Typha angustifolia*	
Broad-leaved cattail	*Typha latifolia*	
Wild rice	*Zizania aquatica*	

TABLE C-2: PLANT SPECIES USED FOR WETLAND AND GOOSE MANAGEMENT TECHNIQUES THAT ARE LESS PALATABLE TO CANADA GEESE

Common Name	Scientific Name	Type of Plant
Yellow pond lily	*Nuphar advena*	Herbaceous
Arrow arum	*Peltandra virginica*	Herbaceous
Soft-stem bulrush	*Schoenoplectus tabermontanae*	Herbaceous
Soft rush	*Juncus effusus*	Herbaceous
Broad-leaved cattail	*Typha latifolia*	Herbaceous
Rice cutgrass	*Leersia oryzoides*	Herbaceous
Water purslane	*Ludwigia palustris*	Herbaceous
Swamp milkweed	*Asclepias incarnata*	Herbaceous
Common button bush	*Cephalanthus occidentalis*	Woody
Swamp rose	*Rosa palustris*	Woody
Crimsoneyed rosemallow	*Hibiscus moscheutos*	Woody
Southern arrowood	*Viburnum spp.*	Woody
Shrub dogwood	*Cornus spp.*	Woody
Willow species	*Salix spp.*	Woody

APPENDIX D: SPECIES LISTS

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TABLE D-1: PLANT AND ANIMAL LISTS

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
PLANTS				
Acalypha rhomboidea	Rhombic cooperleaf or three-seeded	--	--	--
Acer negundo	Box elder	--	--	--
Acer rubrum	Red maple	--	--	--
Agrostis gigantean	Redtop bentgrass	--	--	--
Ailanthus altissima	Tree-of-heaven	--	--	--
Alisma platago	Water plantain	--	--	--
Allium canadense	Wild garlic	--	--	--
Allium vineale	Field garlic	--	--	--
Alnus serrulata	Smooth alder	--	--	--
Alopecurus carolinianus	Carolina foxtail	--	--	--
Amaranthus hydrides	smooth pigweed	--	--	--
Amaranthus retroflexus	rough pigweed	--	--	--
Amaranthus sp.	Water hemp	--	--	--
Amorpha fruticosa	False indigo	--	--	--
Ampelamus albidus	Sandvine or honeyvine	--	--	--
Ampelopsis brevipedunculata	Porcelain berry	--	--	--
Anagallis arvensis	Scarlet pimpernel	--	--	--
Asclepias incarnata	Swamp milkweed	--	--	--
Asclepias syriaca	Common milkweed	--	--	--
Arabidopsis thaliana	Mouse-ear cress	--	--	--
Artemisia annua	Annual wormwood	--	--	--
Artemisia vulgaris	Mugwort or wormwood	--	--	--
Aster lanceolatus	Eastern lined aster	--	--	--
Betula nigra	River birch	--	--	--
Bidens frondosa	Beggar-ticks	--	--	--
Bidens spp.	Stick-tight	--	--	--
Boehmeria cylindrica	False nettle	--	--	--
Bromus japonicus	Japanese chess	--	--	--
Bromus wildenowii	Rescue grass	--	--	--
Calystegia sepium	Hedge bindweed	--	--	--
Carex shortiana	Short's sedge	G5	S2	E
Carex stipata	Crowded sedge	--	--	--
Carex stricta	Tussock sedge	--	--	--
Carex vulpinoidea	Foxtail sedge	--	--	--
Cedrus atlantica	Atlas cedar	--	--	--
Cephalanthus occidentalis	Buttonbush	--	--	--
Chaenorrhinum minus	Lesser toadflax	--	--	--
Chaerophyllum procumbens	Spreading chervil	--	--	--
Chenopodium album	Lamb's quarters	--	--	--
Chenopodium ambrosioides	Mexican tea	--	--	--
Cicuta maculata	Common water hemlock	--	--	--
Clematis terniflora	Yarn-leaved clematis	--	--	--
Cuscuta gronovii	Common dodder	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Cuscuta pentagona	Field-dodder or five-angled dodder	--	--	--
Cynodon dactylon	Bermuda grass	--	--	--
Cyperus erythrorhizos	Red-rooted galingale	--	--	--
Cyperus esculentus	Yellow nutsedge	--	--	--
Cyperus iria	Yellow cyperus	--	--	--
Datura stramonium	Jimson weed	--	--	--
Daucus carota	Queen anne's lace	--	--	--
Desmanthus illinoensis	Bundleflower or prairie mimosa	--	--	--
Echinochloa crusgalli	A barnyard grass	--	--	--
Eclipta prostrate	Yerba-de-tajo	--	--	--
Eleocharis engelmannii	Engelmann's spikerush	G4?	S3	--
Eleocharis sp.	Spike rush	--	--	--
Elymus virginicus	Virginia wild-rye	--	--	--
Elytrigia repens	Quackgrass	--	--	--
Erianthus ravennae	Ravenna plume grass	--	--	--
Erigeron annus	Annual or daisy fleabane	--	--	--
Eupatorium altissimum	Tall eupatorium	G5	S3	--
Euphorbia maculata	Milk or spotted purslane	--	--	--
Galium aparine	Cleavers bedstraw	--	--	--
Galium pedmontanum	A bedstraw	--	--	--
Geum canadense	White avens	--	--	--
Hemerocallis fulva	Common day lily	--	--	--
Helenium autumnale	Yellow sneezeweed	--	--	--
Hibiscus laevis	Halberd-leaved rose mallow	G5	S3	--
Hibiscus moscheutos	Rose mallow	--	--	--
Hibiscus syriacus	Rose of Sharon	--	--	--
Hordeum pusillum	Little barley	--	--	--
Humulus japonicus	Japanese hop	--	--	--
Impatiens capensis	Jewelweed or orange touch-me-not	--	--	--
Ipomoea coccinea	Red morning glory	--	--	--
Ipomoea hederacea	Ivy-leaved morning-glory	--	--	--
Ipomoea lacunosa	Small-flowered morning-glory	--	--	--
Ipomoea purpurea	Common morning-glory	--	--	--
Iris pseudacorus	Yellow iris	--	--	--
Iris versicolor	Blue flag	--	--	--
Juncus acuminatus	Narrow-flowered rush	--	--	--
Juncus effuses	Soft rush	--	--	--
Justica americana	American water-willow	--	--	--
Leersia oryzoides	Rice cutgrass	--	--	--
Lepidium campestre	Field cress	--	--	--
Lepidium virginicum	Poor-man's pepper	--	--	--
Lespedeza cuneata	Chinese lespedeza	--	--	--
Lespedeza stipulacea	Korean bushclover	--	--	--
Lonicera japonica	Japanese honeysuckle	--	--	--
Lycium barbarum	Chinese matrimonyvine	--	--	--
Lysimachia ciliata	Fringed loosestrife	--	--	--
Lythrum salicaria	Purple loosestrife	--	--	--
Malva neglecta	Common mallow or chesses	--	--	--
Matricicaria recutita	Wild chamomile	--	--	--
Mazus pumilus	Japanese mazus	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Medicago lupulina	Black medick	--	--	--
Melilotus alba	White sweet clover	--	--	--
Melilotus officinalis	Yellow sweet clover	--	--	--
Monarda fistulosa	Wild bergamot	--	--	--
Muhlenbergia schreberi	Nimbleweed	--	--	--
Nelumbo lutea	American lotus	--	--	--
Nuphar advena	Spatterdock	--	--	--
Oenothera biennis	Common evening primrose	--	--	--
Peltandra virginica	Arrow arum	--	--	--
Phleum pratense	Timothy grass	--	--	--
Phragmites australus	Phragmites	--	--	--
Phytolacca americana	Pokeweed	--	--	--
Pilea pumila	Clearweed	--	--	--
Plantago lanceolata	English plantain	--	--	--
Poa compressa	Canada bluegrass	--	--	--
Poa pratensis	Kentucky bluegrass	--	--	--
Polygonum aviculare	Prostrate knotweed	--	--	--
Polygonum convolvulus	Black bindweed	--	--	--
Polygonum hydropiper	Water pepper	--	--	--
Polygonum lapathifolium	Dock-leaved smartweed	--	--	--
Polygonum perfoliatum	Mile-a-minute tearthumb	--	--	--
Polygonum persicaria	Lady's thumb smartweed	--	--	--
Polygonum punctatum	Dotted smartweed	--	--	--
Pontederia cordata	Pickeral-weed	--	--	--
Populus deltoides	Cottonwood	--	--	--
Potentilla norvegica	Rough cinquefoil or strawberry weed	--	--	--
Pueraria lobata	Kudzu	--	--	--
Ranunculus sceleratus	Cursed crowfoot	--	--	--
Rorippa palustris	Common yellow water-cress	--	--	--
Rudbeckia laciniata	Cutleaf or tall coneflower	--	--	--
Rumex altissimus	Tall dock	G5	S1	E
Rumex crispus	Curly dock	--	--	--
Sagittaria latifolia	Common or broad-leaved arrowhead	--	--	--
Salix nigra	Black willow	--	--	--
Saururus cernuus	Lizard tail	--	--	--
Scirpus americanus	Olney three-square	--	--	--
Scirpus atrovirens	Black bulrush	--	--	--
Scleranthus annuus	Annual knawel	--	--	--
Scripus validus	Soft stem bulrush	--	--	--
Scutellaria lateriflora	Mad-dog skullcap	--	--	--
Setaria glauca	Yellow foxtail	--	--	--
Setaria viridis	Green foxtail	--	--	--
Sibara virginica	Virginia cress	--	--	--
Sicyos angulatus	Bur cucumber	--	--	--
Silene latifolia	White champion	--	--	--
Sisymbrium officinale	Hedge mustard	--	--	--
Solanum carolinense	Horse-nettle	--	--	--
Solanum nigrum	American or black nightshade	--	--	--
Sophora japonica	Japanese pagoda tree	--	--	--
Sparganium americanum	Lesser bur-reed	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Sparganium eurycarpum	Giant bur-reed	--	--	--
Torilis arvensis	Field hedge-parsley	--	--	--
Tragopogon dublus	Fistulous goat's beard	--	--	--
Trifolium arvense	Rabbitfoot clover	--	--	--
Trifolium pratense	Red clover	--	--	--
Trifolium repens	White clover	--	--	--
Tripsacum dactyloides	Gama grass	--	--	--
Typha angustifolia	Narrow-leaved cattail	--	--	--
Typha latifolia	Broad-leaved cattail	--	--	--
Ulmus americana	American elm	--	--	--
Ulmus pumila	Siberian elm	--	--	--
Valerianella locusta	Blue corn-salad	--	--	--
Veronica peregrina	Purslane speedwell	--	--	--
Vicia angustifolia	Common vetch	--	--	--
Vitis vulpina	Winter grape	--	--	--
Wisteria frutescens	Atlantic wisteria	--	--	--
Zizania aquatica	Wild rice	--	--	--
AMPHIBIANS				
Acris crepitans	Northern cricket frog	--	--	--
Ambystoma maculaturm	Spotted salamander	--	--	--
Ambystoma opacum	Marbled salamander	--	--	--
Bufo americanus	American toad	--	--	--
Bufo woodhousii fowleri	Fowler's toad	--	--	--
Desmognathus fuscus	Northern dusky salamander	--	--	--
Eurycea bislineata bislineata	Northern two-lined salamander	--	--	--
Hemidactylium scutatum	Four-toed salamander	--	--	--
Notothalmus viridescens	Red spotted newt	--	--	--
Plethodon cinereus	Red-backed salamander	--	--	--
Pseudacris crucifer	Spring peeper	--	--	--
Pseudacris triseriata	Upland chorus frog	--	--	--
Pseudotriton ruber	Northern red salamander	--	--	--
Rana catesbeiana	Bullfrog	--	--	--
Rana clamitans melanota	Green frog	--	--	--
Rana palustris	Pickerel frog	--	--	--
Rana sylvatica	Wood frog	--	--	--
Rana utricularia	Southern leopard frog	--	--	--
	Gray treefrog	--	--	--
BRYOZOA				
Pectinella magnifica	Jelly-ball freshwater bryozoan	--	--	--
FISH				
Anguilla rostrata	American eel	--	--	--
Dorosoma cepedianum	Gizzard shad	--	--	--
Fundulus diaphanus	Banded killifish	--	--	--
Ictalurus nebulosus	Brown bullhead	--	--	--
Ictalurus punctatus	Channel catfish	--	--	--
Lepomis gibbosus	Pumpkinseed	--	--	--
Lepomis macrochirus	Bluegill	--	--	--
Lepomis megalotis	Longear sunfish	--	--	--
Micropterus salmoides	Largemouth bass	--	--	--
Morone americanus	White perch	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Notropis hudsoninus	Spottail shiner	--	--	--
	Mummichog	--	--	--
	Mosquito fish	--	--	--
	Carp	--	--	--
	Striped bass	--	--	--
LEPIDOTERA				
Ancyloxypha numitor	Least skipper	--	--	--
Atalopedes campestris	Sachem skipper	--	--	--
Boloria bellona	Meadow fritillary	--	--	--
Calycopis cecrops	Red-banded hairstreak	--	--	--
Celastrina ladon pseudargi	Spring azure	--	--	--
Celastrina ladon	Summer azure	--	--	--
Cercyonis p. pegala	Common wood nymph	--	--	--
Colias eurytheme	Orange sulphur	--	--	--
Colias philodice	Clouded sulphur	--	--	--
Danaus p. plexippus	Monarch	--	--	--
Epargyeus clarus	Silver-spotted skipper	--	--	--
Euptoieta claudia	Variegated fritillary	--	--	--
Everes comyntas	Eastern blue tailed	--	--	--
Junonia coenia	Common buckeye	--	--	--
Limenitis archippus	Viceroy	--	--	--
Nymphalis a. antiopa	Mourning cloak	--	--	--
Papilio g. glaucus	Eastern tiger swallowtail	--	--	--
Papilio polyxenes	Black swallowtail	--	--	--
Papilio troilus	Spicebush swallowtail	--	--	--
Pholisora catullus	Common sootywing	--	--	--
Pieris rapae	Cabbage white	--	--	--
Poanes zabulon	Zabulon skipper	--	--	--
Polygonia interrogationis	Question mark	--	--	--
Pontia protodice	Checkered white	--	--	--
Psyciodes tharos	Pearl crescent	--	--	--
Satyrodes appalachia	Appalachian brown	--	--	--
Vanessa atalanta	Red admiral	--	--	--
Vanessa cardui	Painted lady	--	--	--
	Silvery checkerspot	--	--	--
	Eastern comma	--	--	--
	Horace's duskywing	--	--	--
	Juvenal's duskywing	--	--	--
	Wildindigo duskywing	--	--	--
	Hackberry emperor	--	--	--
	Great spangled fritillary	--	--	--
	Variegated fritillary	--	--	--
	Little glassywing	--	--	--
	Gray hairstreak	--	--	--
	Red-spotted purple	--	--	--
	Queen	--	--	--
	Little wood satyr	--	--	--
	Hayhurst's scallopwing	--	--	--
	Broadwinged skipper	--	--	--
	Common-checkered skipper	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Crossline skipper	--	--	--
	Dun skipper	--	--	--
	Fiery skipper	--	--	--
	Ocola skipper	--	--	--
	Peck's skipper	--	--	--
	Cloudless sulphur	--	--	--
	Zebra swallowtail	--	--	--
	Checkered white	--	--	--
BIRDS				
	Bittern, American	G4	S1S2B	I
	Bittern, least	G5	S1S3B	I
	Blackbird, red-winged	--	--	--
	Blackbird, rusty	--	--	--
	Bluebird, eastern	--	--	--
	Bobolink	--	--	--
	Bunting, indigo	--	--	--
	Cardinal, northern	--	--	--
	Catbird, gray	--	--	--
	Chat, yellow-breasted	--	--	--
	Chickadee, Carolina	--	--	--
	Coot, American	--	--	--
	Cormorant, double-crested	G5	S1B	--
	Cowbird, brown-headed	--	--	--
	Creeper, brown	--	--	--
	Crow, American	--	--	--
	Crow, fish	--	--	--
	Cuckoo, black-billed	--	--	--
	Cuckoo, yellow-billed	--	--	--
	Dickcissel	G5	S2B	--
	Dove, mourning	--	--	--
	Dove, rock	--	--	--
	Dowitcher, long-billed	--	--	--
	Dowitcher, short-billed	--	--	--
	Duck, black	--	--	--
	Duck, bufflehead	--	--	--
	Duck, canvasback	--	--	--
	Duck, gadwall	--	--	--
	Duck, common goldeneye	--	--	--
	Duck, hybrid domestic	--	--	--
	Duck, long-tailed	--	--	--
	Duck, mallard	--	--	--
	Duck, oldsquaw	--	--	--
	Duck, hybrid peking	--	--	--
	Duck, northern pintail	--	--	--
	Duck, ring-necked	--	--	--
	Duck, ruddy	--	--	--
	Duck, northern shoveler	--	--	--
	Duck, blue-winged teal	--	--	--
	Duck, green-winged teal	--	--	--
	Duck, American wigeon	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Duck, wood	--	--	--
	Dunlin	--	--	--
	Eagle, American bald	G4	S2S3	T
	Egret, cattle	--	--	--
	Egret, great	--	--	--
	Egret, snowy	--	--	--
	Falcon, peregrine	G4	S1B	I
	Finch, house	--	--	--
	Finch, purple	G5	S3B	--
	Finch, yellow shafted	--	--	--
	Flicker, northern	--	--	--
	Flycatcher, acadian	--	--	--
	Flycatcher, great crested	--	--	--
	Flycatcher, least	G5	S3S4B	--
	Flycatcher, willow	--	--	--
	Flycatcher, yellow-bellied	--	--	--
	Gallinule, common	--	--	--
	Gnatcatcher, blue-gray	--	--	--
	Goldfinch, American	--	--	--
	Goose, Canada	--	--	--
	Goose, hybrid domestic	--	--	--
	Goose, greater white-fronted	--	--	--
	Goose, snow	--	--	--
	Grackle, common	--	--	--
	Grebe, eared	--	--	--
	Grebe, horned	--	--	--
	Grebe, pied-billed	G5	S2B	--
	Grebe, red-necked	--	--	--
	Grosbeak, blue	--	--	--
	Grosbeak, evening	--	--	--
	Grosbeak, rose-breasted	--	--	--
	Gull, bonaparte's	--	--	--
	Gull, franklin's	--	--	--
	Gull, greater black-backed	--	--	--
	Gull, herring	--	--	--
	Gull, laughing	G5	S1B	--
	Gull, lesser black-backed	--	--	--
	Gull, ring-billed	--	--	--
	Harrier, northern	G5	S2B	--
	Hawk, broad-winged	--	--	--
	Hawk, cooper's	--	--	--
	Hawk, red-shouldered	--	--	--
	Hawk, red-tailed	--	--	--
	Hawk, sharp-shinned	--	--	--
	Heron, back-crowned night	--	--	--
	Heron, great blue	--	--	--
	Heron, green	--	--	--
	Heron, little blue	--	--	--
	Heron, yellow-crowned night	G5	S3B	--
	Hummingbird, ruby-throated	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Ibis, glossy	--	--	--
	Jay, blue	--	--	--
	Junco, dark-eyed	G5	S2B	--
	Kestrel, American	--	--	--
	Killdeer	--	--	--
	Kingbird, eastern	--	--	--
	Kingbird, western	--	--	--
	Kingfisher, belted	--	--	--
	Kinglet, golden-crowned	G5	S2B	--
	Kinglet, ruby-crowned	--	--	--
	Lark, horned	--	--	--
	Loon, common	--	--	--
	Loon, red-throated	--	--	--
	Martin, purple	--	--	--
	Meadowlark, eastern	--	--	--
	Merganser, common	--	--	--
	Merganser, hooded	G5	S1B	
	Merganser, red-breasted	--	--	--
	Merlin	--	--	--
	Mockingbird, northern	--	--	--
	Nighthawk, common	G5	S3S4B	--
	Nuthatch, red-breasted	G5	S1B	--
	Nuthatch, white-breasted	--	--	--
	Oriole, northern Baltimore	--	--	--
	Oriole, orchard	--	--	--
	Osprey	--	--	--
	Owl, barred	--	--	--
	Owl, great horned	--	--	--
	Phalarope, northern	--	--	--
	Phalarope, red-necked	--	--	--
	Phoebe, eastern	--	--	--
	Pine siskin	--	--	--
	Pipit, american	--	--	--
	Pipit, water	--	--	--
	Plover, american golden	--	--	--
	Plover, semipalmated	--	--	--
	Quail, bobwhite common	--	--	--
	Rail, common moorhen	--	--	--
	Rail, sora	--	--	--
	Rail Virginia	--	--	--
	Robin, American	--	--	--
	Sanderling	--	--	--
	Sandpiper, least	--	--	--
	Sandpiper, pectoral	--	--	--
	Sandpiper, semipalmated	--	--	--
	Sandpiper, solitary	--	--	--
	Sandpiper, spotted	--	--	--
	Sandpiper, stilt	--	--	--
	Sandpiper, western	--	--	--
	Sandpiper, white-rumped	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Sapsucker, yellow-bellied	G5	SHB	--
	Scaup, lesser	--	--	--
	Shoveler, northern	--	--	--
	Snipe, common	--	--	--
	Sparrow, American tree	--	--	--
	Sparrow, chipping	--	--	--
	Sparrow, field	--	--	--
	Sparrow, fox	--	--	--
	Sparrow, grasshopper	--	--	--
	Sparrow, house	--	--	--
	Sparrow, lincoln's	--	--	--
	Sparrow, savannah	G5	S3S4B	--
	Sparrow, song	--	--	--
	Sparrow, swamp	--	--	--
	Sparrow, vesper	G5	S3S4B	--
	Sparrow, white-crowned	--	--	--
	Sparrow, white-throated	--	--	--
	Starling, European	--	--	--
	Stilt, black-necked	--	--	--
	Swallow, bank	G5	S3S4B	--
	Swallow, barn	--	--	--
	Swallow, cliff	--	--	--
	Swallow, rough-winged	--	--	--
	Swallow, tree	--	--	--
	Swan, tundra	--	--	--
	Swift, chimney	--	--	--
	Tanager, scarlet	--	--	--
	Teal, green-winged	--	--	--
	Teal, blue-winged	--	--	--
	Tern, Caspian	--	--	--
	Tern forester's	--	--	--
	Tern, least	G4	S2B	--
	Thrasher, brown	--	--	--
	Thrush, gray-cheeked	--	--	--
	Thrush, hermit	--	--	--
	Thrush, swainson's	--	--	--
	Thrush, veery	--	--	--
	Thrush, wood	--	--	--
	Titmouse, tufted	--	--	--
	Towhee, eastern	--	--	--
	Towhee, rufous-sided	--	--	--
	Vireo, blue-headed	--	--	--
	Vireo, red-eyed	--	--	--
	Vireo, solitary	--	--	--
	Vireo, warbling	--	--	--
	Vireo, white-eyed	--	--	--
	Vireo, yellow-throated	--	--	--
	Vulture, black	--	--	--
	Vulture, turkey	--	--	--
	Warbler, american redstart	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Warbler, bay-breasted	--	--	--
	Warbler, black-and-white	--	--	--
	Warbler, black-throated blue	G5	S3S4B	--
	Warbler, black-throated green	--	--	--
	Warbler, blackburnian	G5	S1S2B	--
	Warbler, blackpoll	--	--	--
	Warbler, blue-winged	--	--	--
	Warbler, canada	G5	S3B	--
	Warbler, cape may	--	--	--
	Warbler, cerulean	G4	S3S4B	--
	Warbler, chestnut-sided	--	--	--
	Warbler, common yellowthroat	--	--	--
	Warbler, connecticut	--	--	--
	Warbler, hooded	--	--	--
	Warbler, kentucky	--	--	--
	Warbler, magnolia	G5	S3S4B	--
	Warbler, nashville	G5	S1S2B	I
	Warbler, orange-crowned	--	--	--
	Warbler, ovenbird	--	--	--
	Warbler, palm	--	--	--
	Warbler, parula northern	--	--	--
	Warbler, prairie	--	--	--
	Warbler, prothonotary	--	--	--
	Warbler, wilson's	--	--	--
	Warbler, yellow	--	--	--
	Warbler, yellow-rumped	--	--	--
	Waterthrush, Louisiana	--	--	--
	Waterthrush, northern	G5	S2S3B	--
	Waxwing, cedar	--	--	--
	Wigeon, American	--	--	--
	Woodcock, American	--	--	--
	Woodpecker, downy	--	--	--
	Woodpecker, hairy	--	--	--
	Woodpecker, pileated	--	--	--
	Woodpecker, red-bellied	--	--	--
	Woodpecker, red-headed	--	--	--
	Wood-pewee, eastern	--	--	--
	Wren, carolina	--	--	--
	Wren, house	--	--	--
	Wren, marsh	--	--	--
	Wren, winter	G5	S2B	--
	Yellowlegs, greater	--	--	--
	Yellowlegs, lesser	--	--	--
MAMMALS				
Blarina brevicauda	Short-tail shrew	--	--	--
Castor canadensis	Beaver	--	--	--
Condylura cristata	Starnose mole	--	--	--
Diadelphis marsupialis	Opossum	--	--	--
Eptesicus fuscus	Big brown bat	--	--	--
Lassiurus borealis	Red bat	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Lutra canadensis lataxina	River otter	--	--	--
Marmota monax	Woodchuck	--	--	--
Microtus pennsylvanicus	Meadow vole	--	--	--
Mustela vision	Mink	--	--	--
Odocoileus virginiana	White-tailed deer	--	--	--
Ondatra zibethica	Muskrat	--	--	--
Peromyscus leucopus	White-footed mouse	--	--	--
Procyon lotor	Raccoon	--	--	--
Scalopus aquaticus	Eastern mole	--	--	--
Sciurus carolinesis	Eastern gray squirrel	--	--	--
Sylvilagus floridanus	Eastern cottontail	--	--	--
Tamias striatus	Eastern chipmunk	--	--	--
Urocyon cinereoargenteus	Gray fox	--	--	--
Vulpes vulpes	Red fox	--	--	--
MANTODEA				
Mantis religiosa	Preying mantis	--	--	--
MOLLUSKS				
Pyganodon cataracta	Eastern floater mussel	--	--	--
ODONATA				
Anax junius	Common green darner dragonfly	--	--	--
Perithemis tenera	Eastern amberwing dragonfly	--	--	--
Tramea lacerata hagen	Black saddlebag dragonfly	--	--	--
	Blue dasher	--	--	--
	Spangled skimmer	--	--	--
	Common whitetail	--	--	--
	Lilypad forktail	--	--	--
	Eastern pondhawk	--	--	--
	Slaty skimmer	--	--	--
	Widow skimmer	--	--	--
	Swamp darner	--	--	--
	Familiar bluet	--	--	--
REPTILES				
Carphophis amoenus	Eastern worn snake	--	--	--
Chelydra serpentina	Snapping turtle	--	--	--
Chrysemys p. picta	Eastern painted turtle	--	--	--
Clemmys guttata	Spotted turtle	--	--	--
Columber c. constrictor	Northern black racer snake	--	--	--
Chrysemys p. picta	Eastern painted turtle	--	--	--
Diadophis punctatus edwardsi	Northern ringneck snake	--	--	--
Elaphe o. obsoleta	Black rat snake	--	--	--
Eumeces fasciatus	Five-lined skink	--	--	--
Heterodon platyrhinos	Eastern hognose snake	--	--	--
Kinosternon s. subrubrum	Eastern mud turtle	--	--	--
Nerodia s. sipedon	Northern water snake	--	--	--
Ophedodrys aestivus	Rough green snake	--	--	--
Pseudemys rubriventris	Red-bellied turtle	--	--	--
Regina septemvittata	Queen snake	--	--	--
Sceloporus undulatus hyacinthinus	Fence lizard	--	--	--
Sternotherus odoratus	Eastern mud turtle	--	--	--
Sternotherus odoratus	Common musk turtle	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Storeria d. dekayi	Northern brown snake	--	--	--
Terrapene c. carolina	Eastern box turtle	--	--	--
Thamnophis sauritis	Ribbon snake	--	--	--
Thamnophis sirtalis	Eastern garter snake	--	--	--
Trachemys scripta elegans	Red-eared slider turtle	--	--	--

[1] *The District of Columbia utilizes the species rankings adopted by the Maryland Wildlife and Heritage Service Natural Heritage Program.*

[2] *This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions as shown below have been taken from Code of Maryland Regulations (COMAR) 08.03.08.*

Global Rank	*G2*	*Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.*
	G5	*Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.*
	G?	*The species has not yet been ranked.*
State Rank	*S1*	*Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation. Species with this rank are actively tracked by the Wildlife and Heritage Service.*
	S2	*State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Wildlife and Heritage Service.*
	S3	*Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Wildlife and Heritage Service.*
	S4	*Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.*
	SH	*Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.*
	_B	*A qualifier at the end of a rank. This species is a migrant and the subrank refers only to the breeding statusof the species in Maryland. This species may have a different subrank for non-breeding populations.*
State Status	*E*	*Endangered. A species whose continued existence as a viable component of the State's flora and fauna is determined to be in jeopardy.*
	I	*In Need of Conservation. An species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.*
	T	*Threatened. A species of flora or fauna that appears likely, within the foreseeable future, to become endangered in the State.*

Source: Draft Anacostia Park GMP

TABLE D-2: INVASIVE PLANT SPECIES PREVIOUSLY TREATED AT ANACOSTIA PARK

Scientific Name	Common Name	Treatment Location
Ailanthus altissima	Tree-of-heavan	KAG, AC
Alliaria petiolata	Garlic mustard	KAG
Ampelopsis brevipedunculata	Amur peppervine	KAG, AP, AC
Arctium minus	Lesser burdock	AP
Artemisia annua	Sweet sagewort	AC
Artemisia vulgaris	Common wormwood	AP
Celastrus orbiculatus	Asian bittersweet	KAG
Chenopodium album	Lambsquarters	AP
Cichorium intybus	Chickory	AC
Clematis terniflora	Sweet autumn virginsbower	KAG, AP
Glechoma hederacea	Ground ivy	KAG, AC
Hedera helix	English ivy	KAG
Lamium amplexicaule	Henbit deadnettle	AP
Lespedeza cuneata	Sericea lespedeza	KAG
Ligustrum vulgare	European privet	KAG
Lonicera japonica	Japanese honeysuckle	KAG, AP, AC
Lonicera spp.	Honeysuckle species	KAG, AP, AC
Lythrum salicaria	Purple looestrife	KAG, AP, AC
Microstegium vimineum	Nepalese browntop	KAG, AC
Morus alba	White mulberry	AP, AC
Phragmites australis	Common reed	KAG, AP
Polygonum cuspidatum	Japanese knotweed	AP, AC
Persicaria perfoliata	Asiatic tearthumb	KAG, AC
Pueraria montana	Kudzu	AP, AC
Rosa multiflora	Multiflora rose	KAG, AC
Rumex crispus	Curly dock	AP
Setaria faberi	Japanese bristlegrass	KAG
Wisteria sinensis	Chinese wisteria	KAG

Note: KAG = Kenilworth Aquatic Gardens, AP = Anacostia Park, AC = Arboretum Corridor, as defined in NPS 2006

TABLE D-3: AQUATIC BIRDS OCCURRING AT ANACOSTIA PARK

Common Name	Scientific Name	Feeding Habit
Resident Over-winter Breeding Duck-Like Birds		
Bufflehead	*Bucephala albeola*	Omnivore
Canvasback	*Aythya valisineria*	Grazer
Gadwall	*Anas strepera*	Omnivore
Goldeneye	*Bucephala clangula*	Invertebrates
Mallard	*Anas platyrhynchos*	Omnivore
Oldsquaw	*Clangula hyemalis*	Invertebrates
Pintail	*Anas acuta*	Omnivore
Ringneck duck	*Aythya collaris*	Grazer
Northern shoveler	*Anas clypeata*	Omnivore
Ruddy duck	*Oxyjura jamaicensis*	Grazer
Blue-winged teal	*Anas discors*	Omnivore
Green-winged teal	*Anas crecca*	Omnivore
American widgeon	*Anas Americana*	Grazer
Wood duck	*Aix sponsa*	Grazer
Canada goose	*Branta Canadensis*	Grazer
Snow goose	*Chen caerulescens*	Grazer
Common merganser	*Mergus merganser*	Piscivore
Hooded merganser	*Lophodytes cucullatus*	Invertebrates
Red-breasted merganser	*Mergus serrator*	Piscivore
American coot	*Fulica Americana*	Grazer
Eared grebe	*Podiceps nigricollis*	Piscivore
Horned grebe	*Podiceps auritus*	Piscivore
Pied-billed grebe	*Podilymbus podiceps*	Piscivore
Red-necked grebe	*Podiceps grisegena*	Piscivore
Common loon	*Gavia immer*	Piscivore
Red-throated loon	*Gavia stellata*	Piscivore
Sora rail	*Porzana Carolina*	Omnivore
Virginia rail	*Rallus limicola*	Omnivore
Common gallinule	*Gallinula chloropus*	Omnivore

Common Name	Scientific Name	Feeding Habit
Wading Birds		
American bittern	*Botaurus lentiginosus*	Piscivore/ Invertebrates
Least bittern	*Ixobrychus exilis*	Piscivore/ Invertebrates
Cattle egret	*Bubulcus ibis*	Invertebrates
Great egret	*Casmerodius albus*	Invertebrates
Snowy egret	*Egretta thula*	Invertebrates
Black-crowned night heron	*Nycticorax nyticorax*	Piscivore/ Invertebrates
Great blue heron	*Ardea herodias*	Piscivore
Green heron	*Butorides virescens*	Piscivore/ Invertebrates
Little blue heron	*Egretta caerulea*	Piscivore/ Invertebrates
Gulls and Terns		
Herring gull	*Larus argentatus*	Omnivore
Laughing gull	*Larus atricilla*	Piscivore
Ring-billed gull	*Larus delawarensis*	Omnivore
Caspian tern	*Sterna caspia*	Piscivore
Forsters tern	*Sterna forsteri*	Piscivore
Least tern	*Sterna antillarum*	Piscivore
Sandpipers		
Dunlin	*Calidris alpina*	Invertebrates
Sanderling	*Calidris alba*	Invertebrates
Least sandpiper	*Calidris minutilla*	Invertebrates
Pectoral sandpiper	*Calidris melanotos*	Invertebrates
Semipalmated		
sandpiper	*Calidris pusilla*	Invertebrates
Solitary sandpiper	*Tringa solitaria*	Invertebrates
Spotted sandpiper	*Acitis macularia*	Invertebrates
Stilt sandpiper	*Calidris himantopus*	Invertebrates
Blackbirds		
Red-ringed blackbird	*Agelaius phoeniceus*	Omnivore
Rusty blackbird	*Euphagus carolinus*	Omnivore
Other Species		
Double-crested cormorant	*Phalacrocorax auritus*	Piscivore
Belted kingfisher	*Ceryle alcyon*	Piscivore
Osprey	*Pandion haliaetus*	Piscivore

TABLE D-4: LIST OF SPECIES OF GREATEST CONSERVATION NEED THROUGH THE DISTRICT WILDLIFE ACTION PLAN IN THE DISTRICT OF COLUMBIA

Common Name	Scientific Name
Birds	
Acadian Flycatcher	*Empidonax virescens*
American Bittern	*Botaurus lentiginosus*
American Black Duck	*Anas rubripes*
American Woodcock	*Scolopax minor*
Bald Eagle	*Haliaeetus leucocephalus*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Bobolink	*Dolichonyx oryzivorus*
Broad-winged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Cerulean Warbler	*Dendroica cerulean*
Chimney Swift	*Chaetura pelagica*
Eastern Meadowlark	*Sturnella magna*
Eastern Towhee	*Pipilo erythrophthalmus*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Great Horned Owl	*Bubo virginianus*
Hooded Warbler	*Wilsonia citrine*
Kentucky Warbler	*Oporornis formosus*
Least Bittern	*Ixobrychus exilis*
Louisiana Waterthrush	*Seiurus motacilla*
Marsh Wren	*Cistothorus palustris*
Northern Bobwhite	*Colinus virginianus*
Ovenbird	*Seiurus aurocapilla*
Prothonotary Warbler	*Protonotaria citrea*
Red-shouldered Hawk	*Buteo lineatus*
Scarlet Tanager	*Piranga olivacea*
Sora	*Porzana carolina*
Virginia Rail	*Rallus limicola*
White-eyed Vireo	*Vireo griseus*
Wilson’s Snipe	*Gallinago delicata*
Wood Duck	*Aix sponsa*
Wood Thrush	*Hylocichla mustelina*

Common Name	Scientific Name
Worm-eating Warbler	*Helmitheros vermivorus*
Yellow-throated Vireo	*Vireo flavifrons*
Mammals	
Allegheny Woodrat	*Neotoma magister*
American Mink	*Mustela vison*
Eastern Chipmunk	*Tamias striatus*
Eastern Cottontail	*Sylvilagus floridanus*
Eastern Red Bat	*Lasiurus borealis*
Eastern Small-footed Myotis	*Myotis lebii*
Gray Fox	*Urocyon cinereoargenteus*
Northern River Otter	*Lutra canadensis*
Southern Bog Lemming	*Synaptomys cooperi*
Southern Flying Squirrel	*Glaucomys volans*
Virginia Opossum	*Didelphis virginiana*
Reptiles	
Bog Turtle	*Clemmys muhlenbergii*
Common Musk Turtle	*Sternotherus odoratus*
Corn Snake	*Elaphe guttata guttata*
Eastern Box Turtle	*Terrapene carolina*
Eastern Fence Lizard	*Sceloporus undulates*
Eastern Garter Snake	*Thamnophis sirtalis*
Eastern Hognose Snake	*Heterodon platirhinos*
Eastern Mud Turtle	*Kinosternon subrubrum*
Eastern Painted Turtle	*Chrysemys picta picta*
Eastern Ribbon Snake	*Thamnophis sauritus*
Eastern Worm Snake	*Carphophis amoenus amoenus*
Five-lined Skink	*Eumeces fasciatus*
Northern Black Racer	*Coluber constrictor*
Northern Brown Snake	*Storeria dekayi*
Northern Copperhead	*Agkistsrodon contortrix*
Northern Ringneck Snake	*Diadophis punctatus edwardsii*
Queen Snake	*Regina septemvittata*
Redbelly Turtle	*Pseudemys rubriventris*
Rough Green Snake	*Opheodrys aestivus*
Scarlet Snake	*Cemophora coccinea copei*
Spotted Turtle	*Chrysemys guttata*

Common Name	Scientific Name
Timber Rattlesnake	*Crotalus horridus*
Wood Turtle	*Clemmys inscuplta*
Amphibians	
American Toad	*Bufo americanus*
Bullfrog	*Rana catesbeiana*
Fowler's Toad	*Bufo fowleri*
Marbled Salamander	*Ambystoma opacum*
Eastern Mud Salamander	*Pseudotriton m. montanus*
Northern Cricket Frog	*Acris crepitans*
Northern Dusky Salamander	*Desmognathus fuscus*
Northern Spring Peeper	*Pseudacris crucifer*
Northern Two-lined Salamander	*Eurycea bislineata*
Pickerel Frog	*Rana palustris*
Northern Red Salamander	*Pseudotriton rubber ruber*
Redback Salamander	*Plethodon cinereus*
Red Spotted Newt	*Notophthalmus viridescens*
Spotted Salamander	*Ambystoma maculatum*
Upland Chorus Frog	*Pseudacris feriarum feriarum*
Wood Frog	*Rana sylvatica*
Fish	
Alewife	*Alosa pseudoharengus*
American Eel	*Anguilla rostrata*
American Shad	*Alosa sapidissima*
Atlantic Sturgeon	*Acipenser oxyrhynchus*
Blueback Herring	*Alosa aestivalis*
Bowfin	*Amia calva*
Central Stoneroller	*Campostoma anomalum*
Greenside Darter	*Etheostoma blennioides*
Hickory Shad	*Alosa mediocris*
Shortnosed Sturgeon	*Acipenser brevirostrum*
Silverjaw Minnow	*Ericymba buccata*
Warmouth	*Lepomis gulosus*
Invertebrates	
A Copepod	*Acanthocyclops columbiensis*
A Copepod	*Acanthocyclops villosipes*
A Copepod	*Attheyella (Canthocamptus) illiniosensis*

Common Name	Scientific Name
A Copepod	*Attheyella (Mrazekiella) illiniosensis*
A Copepod	*Attheyella (Mrazekiella) obatogamensis*
A Copepod	*Bryocamptus hutchinsoni*
A Copepod	*Bryocamptus minutus*
A Copepod	*Bryocamptus nivalis*
A Copepod	*Bryocamptus zschokkei*
A Copepod	*Diacyclops harryi*
A Copepod	*Diacyclops nearcticus*
A Copepod	*Eucyclops agilis*
A Copepod	*Macrocyclops albidus*
A Copepod	*Paracyclops fimbriatus chiltoni*
Alewife Floater	*Anodonta implicata*
Appalachian Grizzled Skipper	*Pyrgus wyandot*
Appalachian Spring Snail	*Fontigens bottimeri*
Brook Floater	*Alasmidonta varicosa*
Crossline Skipper Butterfly	*Polites origenes*
Dwarf Wedgemussel	*Alasmidonta heterodon*
Eastern Comma Butterfly	*Polygonia comma*
Eastern Pondmussel	*Ligumia nasuta*
Edward's Hairstreak	*Satyrium edwardsii fontigens bottimeri*
Emerald Spreadwing	*Lestes dryas*
Fine-lined Emerald	*Somatochlora filosa*
Frosted Elfin	*Callophrys irus*
Great Spangled Fritillary Butterfly	*Speyeria cybele*
Green Floater	*Lasmigona subviridis*
Grey Petaltail	*Tachopteryx thoreyi*
Hay's Spring Amphipod	*Sygobromus hayi*
Kenk's Amphipod	*Stygobromus kenki*
Lilypad Forktail Damselfly	*Ischnura kellicotti williamsoni*
Little Glassywing Butterfly	*Pompeius verna*
Mocha Emerald Dragonfly	*Somatochlora linearis*
Monarch Butterfly	*Danaus p. plexippus*
Mottled Duskywing	*Erynnis martialis*
Pizzini's Cave Amphipod	*Stygobromus pizzinii*
Potomac Groundwater Amphipod	*Stygobromus tenuis potomacus*
Question Mark Butterfly	*Polygonia interrogationis*

Common Name	Scientific Name
Red Admiral Butterfly	*Vanessa atalanta rubria*
Regal Fritillary Butterfly	*Speyeria idalia*
Sedge Sprite	*Nehalennia irene*
Sphagnum Sprite	*Nehalennia gracilis*
Spiny-foot Copepod	*Attheyella villosipes*
Tidewater Mucket	*Leptodea ochracea*
Tiger Spiketail Dragonfly	*Cordulegster errones*
Triangle Floater	*Alasmidonta undulata*
Unicorn Clubtail Dragonfly	*Arigomphus villosipes*
Variegated Fritillary Butterfly	*Euptoieta claudia*
Yellow Lampmussel	*Lampsilis cariosa*

APPENDIX E: COMMENTS AND RESPONSES ON THE DRAFT PLAN/ENVIRONMENTAL IMPACT STATEMENT

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National Park Service
U.S. Department of the Interior

Anacostia Park
Washington, D.C.

PUBLIC COMMENT SUMMARY REPORT

DRAFT ANACOSTIA PARK WETLANDS AND RESIDENT GOOSE MANAGEMENT PLAN/ENIRONMENTAL IMPACT STATEMENT

December 2012

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INTRODUCTION AND GUIDE

INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA), its implementing regulations, and NPS guidance on meeting NEPA obligations, Anacostia Park must assess and consider comments submitted by the public on the *Draft Anacostia Park Wetlands and Resident Canada Goose Management Plan and Environmental Impact Statemen*t (Draft plan/EIS), and provide responses to those considered substantive.

This report provides a summary of the public comment process, describes how the NPS considered public comments, and provides responses to those comments.

PUBLIC COMMENT PROCESS SUMMARY

On July 21, 2011, the NPS released the *Draft Anacostia Park Wetlands and Resident Goose Management Plan/EIS* for public review and comment. The Draft plan/EIS was available for public review until September 26, 2011. This public comment period was announced in the Federal Register; through mailings sent to interested parties, elected officials, and appropriate local and state agencies; and by press releases. The plan/EIS was made available through several outlets, including the NPS Planning, Environment, and Public Comment (PEPC) website (http://parkplanning.nps.gov/anacostia_wetland_and_goose_management_plan_DEIS), local libraries and community centers, and on CD or in hardcopy by request.

During the scoping period, a public meeting was held at the U.S. Park Police Anacostia Operation Facility on September 7, 2011. The scoping meeting began at 6:30 pm with an open house, followed by a short presentation at 7:00 pm, and a hearing to take public comments occurred from 7:15 until 8:30 pm. NPS staff were on hand to visit with meeting attendees and to answer questions.

Three individuals attended the public meeting in Anacostia, and spoke at the public hearing.

The public were also able to submit their comments on the project electronically through the PEPC website and By mailing comments to the NPS.

NATURE OF COMMENTS RECEIVED

During the comment period on the Draft plan/EIS, thirteen correspondences from 5 states (District of Columbia, Maryland, New Jersey, Pennsylvania, and Virginia) were received. Comments were received from individuals, as well as from organizations and state and federal government agencies. Commenters generally supported the Draft plan/EIS for goose and wetland management in Anacostia. However, some commenters felt that additional non-lethal options for goose management needed to be explored, and did not support lethal management of the goose population.

All comments, regardless of their topic, were carefully read and analyzed and are presented in this report. Commenters will continue to be notified of the project's progress, and are encouraged to visit the NPS PEPC website at www.parkplanning.nps.gov/anac to view information pertaining to this project.

THE COMMENT ANALYSIS PROCESS

Comment analysis is a process used to compile and combine similar public comments into a format that can be used by decision makers and the EIS Team. Comment analysis assists the team in organizing, clarifying, and addressing technical information pursuant to National Environmental Policy Act (NEPA) regulations. It also aids in identifying the topics and issues to be evaluated and considered throughout the planning process.

The process includes five main components:

- Developing a coding structure
- Employing a comment database for comment management
- Reading and coding of public comments
- Interpreting and analyzing the comments to identify issues and themes
- Preparing a comment summary

A coding structure was developed to help sort comments into logical groups by topics and issues. The coding structure was derived from an analysis of the range of topics discussed during internal NPS scoping, past planning documents, and the comments themselves. The coding structure was designed to capture all comment content rather than to restrict or exclude any ideas.

The NPS PEPC database was used for management of the comments. The database stores the full text of all correspondence and allows each comment to be coded by topic and issue. Some outputs from the database include tallies of the total number of correspondence and comments received, sorting and reporting of comments by a particular topic or issue, and demographic information regarding the sources of the comments.

Analysis of the public comments involved the assignment of the codes to statements made by the public in their PEPC entries, letters, email messages, and at the public meeting. All comments were read and analyzed.

Although the analysis process attempts to capture the full range of public concerns, this content analysis report should be used with caution. Comments from people who chose to respond do not necessarily represent the sentiments of the entire public. Furthermore, this was not a vote-counting process, and the emphasis was on content of the comment rather than the number of times a comment was received. This report is intended to be a summary of the comments received, rather than a statistical analysis.

DEFINITION OF TERMS

Primary terms used in this document are defined below.

Correspondence: A correspondence is the entire document received from a commenter. It can be in the form of a letter, email, written comment form, note card, open house transcript, or petition. Each piece of correspondence is assigned a unique identification number in the PEPC system.

Comment: A comment is a portion of the text within a correspondence that addresses a single subject. It should include information such as an expression of support or opposition to the use of a potential management tool, additional data regarding an existing condition, or an opinion debating the adequacy of the analysis.

Code: A grouping centered on a common subject. The codes were first developed during the initial scoping process for the plan/EIS and were refined based on the comments received.

Concern: Concerns are a written summary of all substantive comments received under a particular code. Some codes were further separated into several concern statements to provide a better focus on the content of the comments. A substantive comment is defined in the NPS Director's Order 12 (DO-12) Handbook as one that does one or more of the following (Director's Order 12 Handbook, Section 4.6A):

- Question, with a reasonable basis, the accuracy of information presented in the EIS;
- Question, with reasonable basis, the adequacy of the environmental analysis;
- Present reasonable alternatives other than those presented in the EIS; and/or
- Cause changes or revisions in the proposal.

As further stated in the handbook, substantive comments "raise, debate, or question a point of fact or policy. Comments in favor of or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, are not considered substantive." While all comments were read and considered and will be used to help create the Final plan/EIS, only those determined to be substantive are typically analyzed for creation of concern statements for response from the NPS.

GUIDE TO THIS DOCUMENT

This report is organized as follows:

Content Analysis Report: This is the basic report produced from PEPC that provides information on the numbers and types of comments received, organized by code. The first section of the report provides a summary of the number of comments that were coded under each topic. The second section provides general demographic information, such as the states where commenters live, the number of letters received from different categories of organizations, etc.

Public Scoping Comment Summary: This report summarizes the substantive comments received during the scoping process. These comments are organized by codes and further organized into concern statements. Below each concern statement are representative quotes, which have been taken directly from the text of the public's comments and have not been edited; therefore some spelling and grammar errors were not corrected. Representative quotes further clarify the concern statements.

Index by Organization Type: This list identifies all codes that were assigned to each individual piece of correspondence and is arranged by organization type. In many instances, the organization type was not defined by the commenter; therefore, organizations were listed as "Unaffiliated Individuals". Those correspondence identified as N/A represent individuals who did not submit their first or last name.

Comment Index by Code: This list identifies which commenters or authors (identified by PEPC organization type) commented on which topics, as identified by the codes used in this analysis. The report is organized by code, and under each code is a list of the authors who submitted comments that fell under that code, and their correspondence numbers. Those correspondences identified as N/A represent unaffiliated individuals.

CONTENT ANALYSIS REPORT

Comment Distribution by Code

Code	Description	# of Comments
AE12000	Affected Environment: Wildlife And Wildlife Habitat	2
AL1300	Alternatives: New Elements	11
AL1500	Alternative B: Supports Alternative	4
AL1900	Vegetative Buffers	1
AL2800	Alternative E: Supports Alternative	2
AL3900	Alternative D: Supports Alternative	1
AL4000	Alternative Elements: Supports Non-Lethal Measures	2
AL4200	Lethal Control	4
AL4210	Oppose Lethal Control	3
AL4300	Alternative Elements: Scare Tactics	1
AL4400	Alternative Elements: Fencing	1
AL4600	Egg Addling	1
AL4900	Goose Nest Destruction	1
AL5000	Goose Population Goal	2
CC1100	Effects of Climate Change	3
CR4000	Cultural Resources: Impact Of Proposal And Alternatives	3
DE1100	Document Edits	6
GA1000	Impact Analysis: Impact Analyses	2
LU1100	Land Use	1
MP1100	Monitoring Protocol	1
PC1100	Project Costs	4
PN1100	Purpose and Need: Methods and Assumptions	1
PN1600	Other Park Goals and Management Plans	1
PP1100	Public Participation	1
PSAE010	Wetland Restoration	1
PSAE040	Wetland functions	1
PSCA001	Non-goose impacts on water quality	2
PSCA010	Other stressors on restored wetlands	1
PSSM002	Need for Additional Data/Science	5
VE4000	Visitor Experience: Impact Of Proposal And Alternatives	2
WF1100	Wildlife Feeding	1
WH1100	Wildlife and Wildlife Habitat	1
WQ4000	Water Resources: Impact Of Proposal And Alternatives	1
Total		**74**

Note: Each comment may have multiple codes. As a result, the total number of comments may be different from the actual comment totals)

Correspondence Signature Count by Organization Type

Organization Type	# of Correspondences
Federal Government	2
Conservation/Preservation	1
State Government	1
Unaffiliated Individual	9
Total	**13**

Correspondence Signature Count by Correspondence Type

Type	# of Correspondences
Web Form	6
Letter	3
E-mail	1
Transcript	3
Total	**13**

Correspondence Distribution by State

State	Percentage	# of Correspondences
District of Columbia	30.77	4
Maryland	23.08	3
New Jersey	7.69	1
Pennsylvania	7.69	1
Virginia	7.69	1
Unknown	23.08	3
Total		**13**

Correspondence Distribution by Country

Country	Percent	# of Correspondences
United States	100%	13
Total		**13**

PUBLIC COMMENT SUMMARY

AE12000 - AFFECTED ENVIRONMENT: WILDLIFE AND WILDLIFE HABITAT

Concern ID:	34531
CONCERN STATEMENT:	The classification and status of "Resident" Canada geese needs to be defined more clearly in the EIS. In addition, the NPS needs to explain in terms relevant to the NPS mission how resident Canada geese are treated as invasive species.
Representative Quote(s):	**Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife **Comment ID:** 235708 **Organization Type:** Unaffiliated Individual **Representative Quote:** The DEIS fails to discuss fully what is meant by "resident" geese and "invasive" species. The NPS has a strict protective mandate for native species of wildlife and does not intervene in their management except and where those species have, largely under anthropogenic influences, become so numerous that their control can be justified. Not only do the conditions articulated in the DEIS fail to warrant the killing proposed, but the argument(s) concerning the status of "resident" geese are not sufficient. NPS describes migratory geese by commenting "Migratory geese are a natural part of the ecosystem, which play an important role in the system." (DEIS: 17). It then describes "resident" geese as a "nuisance" species (DEIS: 20) and by saying "Resident geese stay within Anacostia Park and the surrounding area year round, which ultimately disrupts the natural ecosystem." (DEIS: 17). NPS relegates the major description and discussion of "resident" geese to the section on "Invasive Wildlife Species" (pgs. 157ff) and makes further references to "resident" geese as an "invasive" species in a way that either demonstrates poor understanding of what "resident" and "invasive" mean (e.g., discussion on page 161) or suggest that NPS is simply accepting the perspectives of management agencies with wholly different charters and missions. **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife **Comment ID:** 235709 **Organization Type:** Unaffiliated Individual **Representative Quote:** NPS must be very careful in the argument it is attempting to make here, which is essentially that "resident" Canada geese lack the "value" of native (i.e., migratory) geese and are a "nuisance" (DEIS: 20) species. That argument may be made (however weakly) by those responsible for managing geese as a consumptive resource, but it should not be applied to species that are engaging in adaptive behavior. Beyond this, NPS must demonstrate how artificially engineered and planted wetlands can be identified as "native biodiversity" when "resident" geese cannot. The Final EIS must explain in terms relevant to the NPS mission (as articulated in its Organic Act) how Canada geese can be treated as an "invasive" species. It must provide evidence that a service-wide standard can be applied with respect to other species of native wildlife throughout the parks as regards their classification and status. The perspective applied to "resident" geese in this DEIS is consistent with classifications that flow from agencies who manage these birds for consumptive purposes and do not go to the point, or heart, of NPS positions or policies governing native species.
Response:	In response to this comment, the NPS has added a discussion regarding the behavioral differences that distinguish resident Canada geese from migratory Canada geese in Chapter 3, “Resident Canada Geese” of the Final plan/EIS.

Resident migratory Canada geese are never referred to in the plan/EIS as “invasive” species. The NPS does not consider resident Canada geese an invasive species. The Draft plan/EIS discussion of resident Canada geese (on page 158) did follow a discussion of Invasive Wildlife Species on the previous page, which could have made it appear to be a sub-topic of the invasive wildlife discussion. To address this misunderstanding, the NPS has updated the formatting of the Final plan/EIS by changing the headings to make the division between the sections more clear and alleviate confusion. The term “invasive” is used in the plan/EIS to refer to plant species as well as certain wildlife species (mice and rats but not resident Canada geese), so the text regarding resident Canada geese was clarified and is clearly separated from the discussion of invasive wildlife species in the “Wildlife” section of Chapter 3 in the Final plan/EIS. Also, the text found in the “Invasive Wildlife Species” section of Chapter 3 of the Final plan/EIS has been re-written to reduce the confusion that NPS categorizes Canada geese as invasive, which they do not.

In response to **Comment ID: 235709**, NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. See, generally, 16 U.S.C. § 1 (NPS “shall promote and regulate the use of Federal areas known as national parks…by such mean and measures as conform with the fundamental purpose of the parks…to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations”) and 16 U.S.C. § 3(“ [The Secretary of the Interior] may… provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any of [the parks, monuments, and reservations under the jurisdiction of the National Park Service]”).

NPS *Management Policies 2006* instruct park units to maintain as parts of the natural ecosystems of parks all native plants and animals. NPS would achieve this maintenance by “preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur” (NPS 2006, sec. 4.4.1). 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 under certain circumstances. This section also states that management may be necessary when a population occurs in unnaturally high or low concentrations 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.

Section 4.4.2 of the NPS *Management Policies 2006* also require that parks “assess the results of managing plant and animal populations by conducting follow-up monitoring or other studies to determine the impacts of the management methods on nontargeted and targeted components of the ecosystem.” This strategy is described in this plan including specific thresholds for taking action, goals of management actions, as well as adaptive management and associated monitoring. Whenever NPS identifies a possible need for reducing the size of a park plant or animal population, the decision would be based on scientifically valid resource information that has been obtained through consultation with technical experts, literature review, inventory, monitoring, or research (NPS 2006, sec. 4.4.2.1). The Science Team was assembled to complete this task. A new section titled “Authority to Manage Resident Canada Geese" of the Final plan/EIS has been added to Chapter 1.

The NPS has thoroughly explained the reasoning why resident Canada geese at the park are acting as "nuisance" species. Both the *Atlantic Flyway Resident Goose Management Plan* (1999) and the USFWS *Final Environmental Impact Statement: Resident Canada Goose Management* (2005) have suggested to "manage" and "reduce" the resident Canada goose population and both reports refer to the nuisance problems or nuisance issues associated with resident Canada geese.

AL1300 - ALTERNATIVES: NEW ELEMENTS

Concern ID: 34532

CONCERN STATEMENT: Commenters suggested integrating the park's Resident Canada Goose Management Plan with other regional jurisdictions.

Representative Quote(s):
Corr. ID: 12 **Organization:** Anacostia Watershed Society
Comment ID: 235910 **Organization Type:** Conservation/Preservation
Representative Quote: I know that this is only for the Park, but it would be nice if this effort is integrated more regionally with other jurisdictions. Because, you know, we're going to be getting geese from, you know, north, south, east and west. Well, mostly north and south.

Response: One of the specific objectives of this plan/EIS is to cooperate and coordinate with the District, USACE, and other government agencies, as well as other stakeholders currently implementing or interested in implementing a wetlands and resident Canada goose management strategy. This is explicitly stated in Chapter 2, Table 3, "The Degree to which Each Alternative Meets Objectives". Chapter 2, "Adaptive Management", was updated to state that adaptive management considers that other regional organizations (such as USDA APHIS Wildlife Services and Maryland-National Capital Park and Planning Commission) are currently conducting or have conducted wetland management and Canada goose management activities in the vicinity of ANAC and how the NPS is working regionally with these organizations to manage resident Canada geese along the Anacostia River. This information had been previously incorporated into the cumulative impacts analysis of Chapter 4 under the Resident Canada Geese topic as a result of resident Canada geese reductions through harvesting (hunting through MDNR program) in Maryland and other mid-Atlantic states in the Atlantic Flyway. Following the public comment period, this discussion was added to and enhanced in the "Resident Canada Geese" topic in Chapter 4 of the Final plan/EIS. Additionally in a larger sense, numerous efforts by various federal, local, and community organizations have been completed and are either currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. NPS would continue to work with these agencies and organizations regarding wetland management in the Anacostia River Watershed and through adaptive management.

Concern ID: 34533

CONCERN STATEMENT: Commenters suggested additional goose management elements to be added to the management plan. Suggestions included purchasing a machine that cleans goose feces, allowing grass areas to be at least six inches in height to deter resident Canada geese, nest destruction, and applying goose repellent to grass areas.

Representative Quote(s):
Corr. ID: 1 **Organization:** *Not Specified*
Comment ID: 235684 **Organization Type:** Unaffiliated Individual
Representative Quote: we want you to buy a machine, as used on long island, to clean up the pooop. it will pick it up off the ground for deposition to a waste facility.
Corr. ID: 4 **Organization:** People for the Ethical Treatment of Animals (PETA)

Comment ID: 235700 **Organization Type:** Unaffiliated Individual
Representative Quote: Other successful goose deterrent methods include keeping grass at least 6" tall on lawns and spraying goose repellent (i.e., ReJeXiT Migrate) on lawns.
Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife
Comment ID: 238776 **Organization Type:** Unaffiliated Individual
Representative Quote: In our many years of direct experience with Canada goose programs we have found that egg and nest destruction, combined with harassment such as by trained dogs (Castelli & Sleggs 2000), can be highly successful in eliminating Canada goose problems when timed and applied correctly.

Response: The Draft plan/EIS did not originally consider purchasing a machine that removes Canada goose feces, but this option was explored in response to public comments. The premise is to use a machine to collect goose feces at appropriate locations such as Langston Golf Course, athletic playing fields, or other lawn areas at the park and then deposit the feces at a waste facility. While this is a useful suggestion, it would not fully address the goals and objectives of this plan/EIS, which includes the primary concern of wetland plant removal by resident Canada geese. The park has determined that a machine to collect and remove goose feces is not feasible at this time due to cost, unknown effectiveness, and operational needs associated with the machine. However, this option may be discussed further with the concessioner at Langston Golf Course in the future as a tool for removal of resident Canada geese feces at the golf course.

This plan/EIS provides the detailed techniques for wetland management and goose management which must be applied, in most cases, in combination with other techniques to meet the goals and objectives of this plan/EIS for the park. For example, habitat modification techniques are being considered to manage the resident Canada geese at the park. As part of the habitat modification techniques described in chapter 2 of the Final plan/EIS for the preferred alternative (alternative B), the NPS would plant new riparian buffers immediately along the shoreline, and increase the width of existing vegetated buffers, which would have a similar screening effect as allowing grassy areas to grow to a 6-inch height to deter resident Canada geese. For a detailed discussion of these habitat modification techniques and locations where they are proposed, please see Chapter 2, Alternative B, Figures 5 and 6 of the Final plan/EIS. NPS maintenance has a goal of managing grass height in recreational areas at 3 to 3.5 inches. Allowing grass to grow to heights of 6 inches in recreational areas would not be consistent with the purpose, significance and mission goals of the park as described in Chapter 1, “Anacostia’s Park Purpose, Significance, and Mission Goals” of the Final plan/EIS.

As described in the plan/EIS, the NPS currently conducts egg oiling as part of its resident Canada goose management program; this may continue and be supplemented with egg addling under the preferred alternative (alternative B) as described in Chapter 2, Alternative B of the Final plan/EIS. Other reproductive control techniques were also considered to achieve the desired conditions for this plan/EIS but were dismissed as not feasible. In addition to oiling/addling, some eggs could be removed from the nest and replaced with wooden, plastic, or unfertilized eggs. This would result in resident Canada geese continuing to incubate the eggs and not re-nesting in a different area. Scare and harassment techniques designed to frighten resident Canada geese are also included as part of the preferred alternative as described in Chapter 2, Alternative B of the Final plan/EIS and may include using both visual deterrents and dogs to scare and harass the resident Canada geese. While these techniques are considered and are part of the preferred alternative, goose nest destruction was a technique that was dismissed from further analysis during the process of alternative formulation because when nests are destroyed resident Canada geese may re-nest in or near the first or original nest as described in Chapter 2, "Techniques Dismissed From Further Consideration" of the Final plan/EIS.

In regards to goose repellent, the NPS has applied it to grass in the past at the park but it was expensive and ineffective in deterring resident Canada geese. However, the NPS is considering applying approved goose repellents such as GooseChase to prevent resident Canada geese from grazing within turf areas under alternative C, as described in Chapter 2, Alternative C of the Final plan/EIS. This plan/EIS presents the entire suite of possible techniques for wetland management and for goose management. Many of these techniques are not mutually exclusive, some of these techniques overlap, and many should be considered in conjunction with other measures to be most successful.

Concern ID: 34535

CONCERN STATEMENT: Commenters suggested additional wetland management elements to be added to the management plan. Suggestions included modifying large impervious areas such as the RFK Memorial Stadium parking lots to reduce runoff within the park, including Poplar Point, creating additional wetlands throughout the park, and re-examining the Barney Circle wetland project.

Representative Quote(s): **Corr. ID:** 2 **Organization:** USGS Patuxent Wildlife Research Center

Comment ID: 235686 **Organization Type:** Unaffiliated Individual

Representative Quote: The third listed objective for wetlands (P. 3) should be more explicit and/or elements considered under wetland restoration should be more comprehensive. Implicit in that third objective should be:
The National Park Service (NPS) saw fit to include Wetland Management in this EIS as one of the two principal elements even though it is overtly directed toward goose management and its repercussions. As the primary manager of almost all the tidal wetlands along the Anacostia in Washington, D.C. and in fact the entire Anacostia estuary, the NPS MUST exert itself consistent with the wetland management responsibilities it is accepting, as the leader (i.e., utilize strong proactive LEADERSHIP) toward achieving restoration of the Anacostia estuary as an integrated system. This then goes beyond the current piecemeal locations of the few reconstructed wetlands and thus among other things needs to include overt support for additional reconstructed freshwater tidal wetlands in the Anacostia....Nowhere that I could find in the EIS in conjunction with wetland restoration was there mention of actively seeking creation of additional wetlands using placed sediments. (Hidden away p. 192 under Soils, Alternative B it does say………"Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River….thus stabilizing soils adjacent to the Anacostia River ". So, hardly a ringing call for restoration of the river and creating habitat.) For the Anacostia wetland system to be functional as a unit there needs to be a critical mass of interrelated/interconnected wetlands - especially to be able to attract and support wetland fauna that once flourished there. This important thrust is supported by:

(p. 29) Section 4.6 of NPS Policies 2006:
(1) Provide leadership and take action…..

(2) Preserve and enhance…..

(P. 28) NPS Management Policies 2006 , Sect. 4.41: NPS will
achieve this (…maintain plants and animals) by "preserving and restoring the natural abundance, diversity, distribution, habitat and behavior….and ecosystem in which they occur.

(p. 29 and 30) NPS Management Policies 2006 ('Wetlands')….. In addition the NPS will strive (i.e. exert leadership!! - RSH) to achieve a longer term goal....through restoration of previously degraded or destroyed wetlands…..the Service will to the

extent practicable, restore them to pre disturbance conditions.
(P.30 and 135) Under Director's Order #77-1 and Order # 12 (p.
Corr. ID: 6 **Organization:** *Not Specified*
Comment ID: 235723 **Organization Type:** Unaffiliated Individual
Representative Quote: 4. The RFK Memorial Stadium parking lots should be modified to reduce runoff into the Anacostia. Those parking lots are the largest impervious surfaces within the park, yet there are few measures discussed to control their runoff.
Corr. ID: 6 **Organization:** *Not Specified*
Comment ID: 235884 **Organization Type:** Unaffiliated Individual
Representative Quote: An analytical synthesis of those results would aid future efforts.

2. The wetlands at the Poplar Point Site should be included in the plan/EIS. The first sentence of the document states, "The purpose of this plan is to guide and direct the actions of the National Park Service (NPS) in the management of wetlands … at Anacostia Park." (p. i) Clearly, the Poplar Point wetlands are within the park, but they have been omitted from the plan/EIS.

NPS has stated that "NPS acknowledges that community involvement activities relating to the development of the Poplar Point Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) are on-going. CERCLA and the NCP also require community relations activities to be conducted. NPS and the District will use their best efforts to coordinate the community relations activities for the RI/FS, EIS and other Site processes." (NPS and District of Columbia, Poplar Point Settlement Agreement, September 19, 2008, Appendix B, p. 7, available at http://www.nps.gov/nace/parkmgmt/upload/2008-Administrative-Order-on-Consent.pdf)

NPS appears to have stopped work on its earlier Poplar Point EIS. No notices or documents have been added to the NPS's "Planning, Environment and Public Comment" website (http://parkplanning.nps.gov/projectHome.cfm?projectID=22344) for that EIS for the last three years. This wetland/geese plan/EIS states that "The NPS and the District Government have partnered to initiate the [Poplar Point] EIS, which is currently in the planning stages; an EIS is proposed for release to the public in winter 2009/2010." (p. 189) However, no such EIS on Poplar Point has ever been released.

3. The Barney Circle wetland projects should be re-examined. Barney Circle was a proposed highway project to be built where Pennsylvania Avenue, S.E. crosses the Anacostia. New wetland projects were planned, but never implemented, for environmental remediation. Those project plans may have useful ideas for this plan/EIS.
Corr. ID: 12 **Organization:** Anacostia Watershed Society
Comment ID: 235908 **Organization Type:** Conservation/Preservation
Representative Quote: We want to see more area of wetlands. We want to see, you know, a healthier wetland ecosystem with a nice diversity of plant species which provides a lot of ecosystem services that this river really needs.
Corr. ID: 13 **Organization:** *Not Specified*
Comment ID: 235903 **Organization Type:** Unaffiliated Individual
Representative Quote: You talk about at several different points in the plan impervious surfaces and yes, those are important, but the biggest impervious surface you can talk about or you're not addressing and that's the parking lots around the stadium and if you're going to come up -- these little rain gardens are nice and you ought to be doing them, but, I mean you've got huge imperious surfaces and you don't address that at all.

	Corr. ID: 13 **Organization:** *Not Specified* **Comment ID:** 235905 **Organization Type:** Unaffiliated Individual **Representative Quote:** In the alternative, you don't mention restoration and opening up of the wetlands at Poplar Point. So, this is an EIS, the wetlands in the Anacostia Park, but there's really no discussion of the wetlands at Poplar Point and you're going to tell me well, something else is going on about that. Something else has been going on for 20 years. I've been following this for a very long time and so, I would like to see the wetlands at Poplar Point restoration and opening them to the public as an alternative. It fits in the goals of this EIS and why you're leaving it out is a mystery to me.
Response:	As stated in Chapter 1, 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 would be an integrated tool for the long-term planning and management of restored wetlands and resident Canada geese at the park. While the creation of new wetlands is outside the scope of this plan/EIS and would require additional NEPA compliance, the concepts presented in this plan/EIS would apply to previously restored wetlands and any wetland restored in the future at Anacostia Park. To clarify properties included in this plan/EIS, the NPS has updated the Chapter 1, "Project Location" description in the Final plan/EIS.
Concern ID:	34537
CONCERN STATEMENT:	The DEIS should follow the Integrated Pest Management conditions with the NPS's eleven step procedure to determine management objectives and actions for addressing resident Canada geese within the park.
Representative Quote(s):	**Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife **Comment ID:** 235710 **Organization Type:** Unaffiliated Individual **Representative Quote:** The DEIS fails to follow IPM policies and practices The DEIS fails to establish a plan for managing conflicts with Canada geese that follows NPS IPM policies. In employing an IPM approach it would be incumbent on NPS to determine management objectives, then set action thresholds, monitor, and choose action based on selection of least- to most-invasive approaches in order (McShea & DiSalvo 2001). It is consistent with an IPM approach as well that actions be coordinated and integrated in regional approaches, something we have attempted to emphasize in both initial scoping (Brasted to Hazlewood, 8/9/07) and alternatives drafting (Brasted to Syphax, 10/3/08) comments we have submitted. Further, the DEIS' preferred alternative calls for the lethal control of a vertebrate species, raising additional concerns and setting a high bar for how management is planned and implemented. The Final EIS must, therefore, meet the IPM conditions included in the NPS' own 11-step procedure (DiSalvo 2009) as well in the stepwise approach codified in contemporary vertebrate pest management (see summary in Hadidian 2010). The DEIS does not examine nonlethal management options sufficiently and demonstrates a general lack of understanding concerning how conflicts with Canada geese can be addressed and resolved that is disconcerting. This is especially at issue given the apparent restriction of most, or all, concerns for goose herbivory to the Kingman Marsh site-activities that are likely tied directly to the concentration of geese at the adjacent golf course (Paul et al. 2004). The attraction of geese to sites such as golf courses is well known and the presence of both resident and migratory Canada geese can be successfully addressed with nonlethal means (e.g., Woodruff & Green 1995). Yet, the DEIS (pg. 167) mentions that course managers had only once tried to use a trained dog to deter geese from the site. The Final EIS must present a plan that follows an IPM approach consistent with NPS policies and that demonstrates a systematically integrated series of actions that proceed from least- to most-invasive for the species being managed.

Response: Although the current resident Canada goose population could in some ways arguably be regarded as "pests", NPS does not believe that they fully fit within the regular understanding of that term. We do not believe our authority to manage wildlife in Anacostia Park and to avoid damage to natural resources requires strict adherence to an Integrated Pest Management (IPM) approach.

Nonetheless, after reviewing the NPS Management Policies 2006 (section 4.4.5.2) and the required 11-step process, we feel this plan essentially followed the recommended approach. We feel the intent of these IPM policies has been followed but did add text to clarify some differences. For example, we added text in Chapter 2 of the Final plan/EIS to note that although the preferred alternative includes the use of lethal control and other techniques that would result in a substantial reduction in resident Canada geese in the first 5 years to address resource management concerns, subsequent (future) management may not require lethal control, as discussed in Chapter 2, under the description of "Resident Canada Goose Management" in Alternative B. Also in Chapter 2, under the description of "Resident Canada Goose Management" in Alternative C and Alternative D, the statement was added that subsequent management may not require lethal control if population goals are being met under other non-lethal methods and tools. Once the initial reduction is achieved, less invasive methods may be effective in maintaining desired population levels. The NPS believes it has presented and fully analyzed a suite of options, including non-lethal tools, both in the context of the preferred alternative as well as the other action alternatives. For example, both Alternative A (No Action Alternative) and Alternative E provide non-lethal options that the NPS considered in detail, and the remaining alternatives include a combination of both non-lethal and lethal measures. Non-lethal options are also an important tool available throughout the life of the plan/EIS under the preferred alternative, as described in Chapter 2 of the Final plan/EIS under the description of "Resident Canada Goose Management" in Alternative B. Ultimately, the techniques used to meet the objectives of the plan and desired conditions would be guided by the results of monitoring and adaptive management as described in Chapter 2, "Adaptive Management" of the Final plan/EIS. Also, the authority of NPS to manage wildlife and other natural resources within the boundaries of units of the national park system is described in Chapter 1, under the "Authority of NPS to Manage Resident Canada Geese" section.

AL1900 - VEGETATIVE BUFFERS

Concern ID: 34539

CONCERN STATEMENT: Vegetation should be allowed to grow along banks, which will restrict resident Canada geese nesting and hinder movement.

Representative Quote(s): **Corr. ID:** 4 **Organization:** People for the Ethical Treatment of Animals (PETA)

Comment ID: 235697 **Organization Type:** Unaffiliated Individual

Representative Quote: Allow vegetation to flourish on banks to impede the movement of geese (birds will refrain from nesting in areas where predators will be an issue)

Response: Allowing vegetation to grow along the shoreline of the Anacostia River is part of the Preferred Alternative (alternative B) and is described in Chapter 2, Alternative B of the Final plan/EIS under "Habitat Modification".

AL4000 - ALTERNATIVE ELEMENTS: SUPPORTS NON-LETHAL MEASURES

Concern ID: 34542

CONCERN STATEMENT: More humane population control should be an option in resolving conflicts with resident Canada geese.

Representative Quote(s):

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife
Comment ID: 235883 **Organization Type:** Unaffiliated Individual
Representative Quote: The Humane Society of the United States. American Society for the Prevention of Cruelty to Animals, and City Wildlife would be delighted, and offers here, to explore the nonlethal options further with you and to commit time and resources from our organization to a trial program to fully test the efficacy of resolving conflicts with geese in a holistic, integrated, and environmentally responsible manner.

Corr. ID: 10 **Organization:** *Not Specified*
Comment ID: 235737 **Organization Type:** Unaffiliated Individual
Representative Quote: As a citizen of this area, I would strongly urge the park service to consider more humane, and more ecologically sound options for population control
and/or to make the areas a bit less appealing to a nesting goose.

Response: NPS has limited success in using solely non-lethal methods to control the resident Canada goose population, both with and without volunteers (though NPS acknowledges the benefits of volunteer support). Alternative A (No Action Alternative) and Alternative E both involve non-lethal options and the remaining alternatives include a combination of both non-lethal and lethal measures. Due to damage to natural resources and the large size of the resident Canada goose population, the park has determined that lethal control is necessary to reduce the population of resident Canada geese and is therefore proposed as part of the Preferred Alternative (alternative B). The primary tool to be used would be round-up, capture, and euthanasia, which would be conducted as humanely as possible in accordance with guidance from the American Veterinary Medicine Association, as described in Chapter 2, Alternative B of the Final plan/EIS. Non-lethal options are also an important tool available for use throughout the life of the plan/EIS, as described in Chapter 2, Alternative B of the Final plan/EIS. Ultimately, monitoring and adaptive management would be used to assess the appropriate combination of techniques to meet the objectives and desired conditions, as described in numerous sections of the plan/EIS (see also response to concern ID 34537).

AL4200 - LETHAL CONTROL

Concern ID: 34543

CONCERN STATEMENT: Commenters stated that using lethal control in the park should not be practiced because it is not an effective long-term management tool, it is cruel for the animals, and any use of firearms within Washington DC is likely to be a controversial issue.

Representative Quote(s):

Corr. ID: 4 **Organization:** People for the Ethical Treatment of Animals (PETA)
Comment ID: 235695 **Organization Type:** Unaffiliated Individual
Representative Quote: Respectfully, lethal methods never work in the long run to control geese populations, and will actually backfire. When animals are killed/removed from the area, a spike in the food supply results. This causes survivors and newcomers to breed at an accelerated rate, and populations can actually increase. Lethal measures are also very cruel. Setting aside the mode of killing (and the trauma that goes with), when adults are removed, families are torn apart, flock dynamics are disrupted, and vulnerable young are left to starve.

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife
Comment ID: 235882 **Organization Type:** Unaffiliated Individual
Representative Quote: We have great respect and pride as Americans in NPS and its mission which, put in the vernacular, is to protect and preserve our nation's natural resources. You should not be in the business of killing wild animals except under the most compelling, justifiable, and urgent need. Nothing of the sort is identified here.
Corr. ID: 6 **Organization:** *Not Specified*
Comment ID: 235726 **Organization Type:** Unaffiliated Individual
Representative Quote: Shooting geese in the District of Columbia is not a reasonable option. In fact, it is a really bad idea. Guns are a controversial subject in Washington. The park is in the middle of a major urban area. This is not rural Maryland, like Jug Bay. Shooting geese within the District threatens to jeopardize your whole plan by public controversy.
Corr. ID: 13 **Organization:** *Not Specified*
Comment ID: 235900 **Organization Type:** Unaffiliated Individual
Representative Quote: I think that shooting the geese is just not a viable option in the District of Columbia. Guns period are a very controversial issue and I think you're going to just torpedo this whole plan by shooting ducks or the geese and yes, it works over at Patuxent, but it's a completely different kind of atmosphere.

Response: Due to damage to natural resources and the large size of the goose population as described in this plan/EIS, the NPS feels lethal control is necessary to reduce the population of resident Canada geese and it is therefore proposed as part of the preferred alternative (alternative B). The primary method the NPS anticipates using includes round-up, capture, and euthanasia, which would be conducted in the most humane way possible, in accordance with American Veterinary Medicine Association guidance (see Chapter 2, Alternative B, Resident Canada Goose Management Lethal Control of the Final plan/EIS). While the other possible lethal control method does include shooting, this would only be used in isolated incidences and in a controlled manner as described in the “Lethal Control” section of Chapter 2, Alternative B, and “Resident Canada Goose Management” of the Final plan/EIS. If shooting is required for isolated incidences, this activity would only be undertaken by qualified federal employees that are trained, experienced, and licensed to use a firearm. The NPS discussed eliminating the use of firearms (shooting) in limited instances as part of lethal control. We feel this is an effective tool for resident Canada goose management and it is used by other agencies in the vicinity of the park. The USDA APHIS Wildlife Service uses firearms during goose operation activities associated with National Airport (at Roaches Run, a waterbody located adjacent to the airport) along the Potomac River in Virginia and the Maryland-National Capital Park and Planning Commission allows a waterfowl hunting program (including Canada geese) at their Jug Bay facility on the Patuxent River. Therefore, the NPS believes shooting should be retained as a tool available for use in limited instances under the preferred alternative (alternative B).

The plan/EIS acknowledges that relocating or removing resident Canada geese would be a stop-gap effort because the site must also be modified to make it less attractive to resident Canada geese, or the removed geese would be replaced with new geese (Gosser et al. (1997)). Additionally, Dr. Allan (1999) states that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). As a result, this plan/EIS integrates wetland management techniques along with goose management techniques and integrates adaptive management as well. Habitat modification techniques are proposed as part of the preferred alternative (alternative B) to make the sites less attractive to resident Canada geese, including planting buffers, applying goose repellents, installing and maintaining exclusion fencing, and making new plantings less desirable to resident Canada geese through plant species selection. These techniques could be employed in conjunction with population reduction techniques. Adaptive management would also be integrated throughout the process to monitor the population and any correlation with increased food supplies as a result of a decreased resident Canada geese population.

In response to concerns over the impacts of lethal removal, the NPS could not locate scientific sources of information to substantiate the comments assertions. However, we have updated the text of the "Lethal Control" section in Chapter 2, Alternative B, Alternative C, and Alternative D, "Resident Canada Goose Management" of the Final plan/EIS to state that the resident Canada geese captured during the round-ups would only include mature geese and self-sufficient young-of-the year geese. Goose round-ups would occur during the summer months when adult geese are molting and flightless (starting June 15 in the Mid-Atlantic) and when young-of-the-year (juveniles less than 1 year old) are considered self-sufficient but unable to fly. Therefore, young-of-the-year geese that remain in the park after the roundups would be expected to survive on their own.

AL4210 - OPPOSE LETHAL CONTROL

Concern ID: 34545

CONCERN STATEMENT: Commenters are opposed to using lethal control of resident Canada geese within the park because they feel the park has not fully examined other management options and they find the presence of the resident Canada geese within the park enjoyable.

Representative Quote(s):

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife
Comment ID: 235703 **Organization Type:** Unaffiliated Individual
Representative Quote: However, the plan by NPS to kill hundreds of Canada geese as part of its larger wetlands restoration initiative along the Anacostia River is wrong at a number of levels, and it certainly does not rise to the standards necessary to justify lethal control. We are gravely concerned that geese have been targeted for management within this complex system that is impacted by so many anthropogenic factors. We have questions concerning the identification and delineation of impacts, the documentary basis from which statements about geese and their ecological relationships are made, and the effort made to fully consider alternative means of conflict resolution that are more reasonable and more consistent with an integrated pest management (IPM) approach. We argue, with all respect, that NPS has not seriously considered, researched, or evaluated alternatives to killing and has moved on a decision to use lethal control on the basis of incomplete information and misunderstandings about geese. The decision to proceed with lethal control as the preferred alternative has, as we see it, been made prematurely and recklessly.

Corr. ID: 10 **Organization:** *Not Specified*
Comment ID: 235736 **Organization Type:** Unaffiliated Individual
Representative Quote: Please reconsidering using lethal methods to control the Canadian Geese populations along the wetlands of our Anacostia River. As a local resident of Southeast, Washington DC, I enjoy the presence of ALL area wildlife, and consider the geese to be a symbol of just how far the river's recovery has come from years past. Surely then, the park service must recognize that the killing of mass numbers of these beautiful creatures is not only inhumane, but moreover a poorly contrived method for the management of a perhaps out of balance ecological system.

Response: As a result of damage to natural resources and the large size of the resident Canada goose population, the NPS feels that lethal control is necessary to reduce the population of resident Canada geese and it is therefore proposed as part of the preferred alternative (alternative B).

Additionally, the NPS believes it has presented and fully analyzed a suite of options, including non-lethal tools, both in the context of the preferred alternative as well as the other action alternatives. For example, both Alternative A (No Action Alternative) and Alternative E provide non-lethal options that the NPS considered in detail, and the remaining alternatives include a combination of both non-lethal and lethal measures. Non-lethal options are also an important tool available throughout the life of the plan/EIS under the preferred alternative, as described in Chapter 2, Alternative B of the Final plan/EIS. Ultimately, monitoring and adaptive management would be used to assess the appropriate combination of techniques to meet the objectives and desired conditions throughout the life of the plan/EIS.

Also, in regards to the enjoyment of resident Canada geese, the NPS has made it clear in several sections of the plan/EIS that the intent is to manage a population of, and not eradicate, the resident Canada geese, and recognizes the Canada goose population as beneficial to visitor experience and aesthetics. This is noted in the discussion of objectives (see Chapter 1, “Objectives in Taking Action” of the Final plan/EIS), desired conditions (see Chapter 1, “Anacostia Park Purpose, Significance, and Mission Goals” of the Final plan/EIS), and in the analysis of impacts to resident Canada geese.

In Chapter 4 of the Final plan/EIS it is stated, it is important to note that although a percentage of the resident Canada goose population would be removed as a result of this plan/EIS, some Canada geese would remain in the park and would include both resident and migratory Canada geese. The effort to help restore the freshwater tidal ecosystem and manage the resident Canada goose population would allow wetlands to reach the desired condition of predominantly self-sustaining systems (containing advanced seral-stage habitat conditions) and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. This would have benefits for migratory Canada geese which are a natural part of this ecosystem, and for visitors who wish to experience more natural fluctuations of geese populations at the park.

See response to Concern ID: 34537 regarding incorporating an IPM approach. NPS has the authority to manage wildlife in Anacostia Park to avoid damage to natural resources and does not require strict adherence to an IPM approach. NPS Management Policies 2006 (section 4.4.5.2) requires an approved park management or IPM plan when dealing with pests and after reviewing the 11-step process, the NPS feels this plan essentially followed this recommended approach.

AL4300 - ALTERNATIVE ELEMENTS: SCARE TACTICS

Concern ID: 34546

CONCERN STATEMENT: Scare tactics including objects that move in wind, noise deterrents, and dogs should be implemented in the spring to deter nesting of resident Canada geese.

Representative Quote(s): **Corr. ID:** 4 **Organization:** People for the Ethical Treatment of Animals (PETA)

Comment ID: 235699 **Organization Type:** Unaffiliated Individual

Representative Quote: Employ scare tactics (i.e., kites shaped like predators, remote control boats/planes, flashing lights) in the spring to deter nesting. Statues of dogs/coyotes and flags, Mylar streamers, and other items that move in the wind,

	as well as noise/sonic deterrents (i.e., air horns, Bird-X GooseBuster), also work great to keep geese away.
Response:	This plan/EIS provides detailed techniques for wetland management and goose management that can be applied, in most cases, in combination to meet the goals and objectives of this plan/EIS for the park. Scare and harassment techniques to manage resident Canada geese at the park are included under the preferred alternative (alternative B), as well as alternatives C and E as described in the Response to Concern ID 34533. Detailed discussions of these techniques, which include visual deterrents such as mylar tape, flags, balloons, and dogs to scare and harass the resident Canada geese can be found in Chapter 2, Alternative B of the Final plan/EIS. The Draft plan/EIS described that dogs could be used both on land and in the water in late spring and summer for scare and harassment but other techniques did not specifically mention a season for implementation. The text in the plan/EIS was updated to describe that scare and harassment techniques would be implemented in the spring to deter resident Canada geese from nesting at the park. Additional scare and harassment techniques may be implemented as new innovative technologies become available. In Chapter 2 of the Final plan/EIS, other harassment techniques that were considered for the alternatives but were dismissed during the process of alternative formulation are discussed and include the use of pyrotechnics, propane cannons, distress calls, and lasers. Pyrotechnics, propane canons, and distress calls were dismissed because they conflict with an existing park plan, statement or purpose and significance, or other policy, such that a major change in the plan or policy would be required to implement the elements. Specifically, the use of soundmaking devices does not assist the park in protecting natural sounds and the use of lasers and hazing with water spray would cause unnecessary environmental impacts.

AL4600 - EGG ADDLING

Concern ID:	34548	
CONCERN STATEMENT:	Commenters recommended using trained professionals to oil eggs.	
Representative Quote(s):	**Corr. ID:** 4	**Organization:** People for the Ethical Treatment of Animals (PETA)
	Comment ID: 235701	**Organization Type:** Unaffiliated Individual
	Representative Quote: Eggs should be oiled by trained professional.	
Response:	The use of trained professionals for egg oiling was acknowledged in the Draft plan/EIS. The relevant text, which reads as follows, can be found in Chapter 2, Alternative A of the Final plan/EIS: “Egg oiling has been performed according to a protocol specified by the Humane Society and under permit by the USFWS (HSUS 2004a). There have been a number of partners involved in this management activity, including the District, USGS Patuxent Wildlife Research Center, the Prince George’s Maryland -National Capital Park and Planning Commission, and the AWS. All the groups, including the NPS, were trained by Wildlife Services branch of the USDA, and all groups are included under the USFWS permit.”	

AL4900 - GOOSE NEST DESTRUCTION

Concern ID:	34549	
CONCERN STATEMENT:	The NPS should be aware that a Federal permit for nest destruction is no longer required; however, treatment locations do have to be registered with the US Fish and Wildlife Service.	
Representative Quote(s):	**Corr. ID:** 5	**Organization:** The HSUS, ASPCA, & City Wildlife
	Comment ID: 235717	**Organization Type:** Unaffiliated Individual
	Representative Quote: NPS is still under the impression that it is necessary to	

obtain Federal permits for nest destruction and removal (DEIS: 106) something which is not the case any longer, and which we attempted to bring to your attention in previous comments. You should be aware that effective in September 2006 the federal US Fish and Wildlife Service removed the permit requirement for resident Canada goose nest and egg treatment. The NPS must merely register locations where it will treat nests and/or eggs online at the Service's website.

Response: The NPS contacted the USFWS Branch of Permits and Coordination, and confirmed there is no longer a permit requirement for resident Canada goose nest and egg treatment. However, landowners and local governments who intend to oil eggs or destroy nests must register and log these activities on the USFWS website, and registration must be completed before egg oiling and nest destruction activities are undertaken. Egg oiling and nest destruction can only be completed after registration between March 1 and June 30. Additionally, participants in the program must return to the USFWS website by October 31 to report the number of nests and eggs destroyed, even if no eggs or nests were destroyed. Registration is only valid for one season, and must be renewed each year before nests and eggs may be destroyed. The NPS has revised the text to document the current requirements (see Chapter 2, "Techniques Dismissed From Further Consideration" of the Final plan/EIS.

AL5000 - GOOSE POPULATION GOAL

Concern ID: 34550

CONCERN STATEMENT: The park's resident Canada Goose density goals should be based on more than one data point collected at Jug Bay Regional Park.

Representative Quote(s): **Corr. ID:** 6 **Organization:** *Not Specified*

Comment ID: 235725 **Organization Type:** Unaffiliated Individual

Representative Quote: The goal for the goose population should be based on more than one data point. Greg Kearns of the Jug Bay Regional Park is the source for your density goal. I have heard Greg speak on goose management and have met him several other times. I am sure he is a good wildlife biologist and that Jug Bay is a similar habitat to the park. However, a multimillion plan needs to be built on more than one data point.

Response: Section 4.4.2 of NPS Management Policies 2006 states that whenever NPS identifies a possible need for reducing the size of a park plant or animal population, the decision would be based on scientifically valid resource information that has been obtained through consultation with technical experts, literature review, inventory, monitoring, or research (NPS 2006, sec. 4.4.2.1). The Science Team, described in Chapter 1, "Successful Management of Resident Canada Geese" of the Final plan/EIS, was assembled to complete this task. As described in the Final plan/EIS, the resident Canada goose population goal is an initial goal recommended for Anacostia Park by members of the Science Team convened for this project. As described in Chapter 1, "Successful Management of Resident Canada Geese" of the Final plan/EIS, the Science Team, which was made up of university professors, wildlife biologists, wetland specialists, Canada goose experts, and resource management specialists was engaged to provide technical information on wetland and resident Canada goose management. Team members reviewed and provided available research and data pertaining to wetland and resident Canada goose management and provided technical and scientific input on resident Canada goose management and monitoring. Based on information from the Science Team, the park intends to manage the resident Canada goose population based on the thresholds related to vegetative monitoring as well as adaptive management.

Although data may have been limited for setting an initial resident Canada goose population goal to meet the vegetative thresholds, the Science Team recommendation of 54 resident Canada geese was developed specifically for Anacostia Park, taking into account the unique conditions at the park. The details of how this goal was identified are available in Chapter 1, "Successful Management of Resident Canada Geese" of the Final plan/EIS. It is important to note that this goal may be adjusted to meet management goals based on the results of vegetation and goose population monitoring that would be conducted as part of implementing this plan/EIS.

CC1100 - EFFECTS OF CLIMATE CHANGE

Concern ID: 34551

CONCERN STATEMENT: The EIS needs to include long-term planning of reconstructed wetlands including how sea level rise would impact the wetlands and be managed in the future.

Representative Quote(s):

Corr. ID: 2 **Organization:** USGS Patuxent Wildlife Research Center

Comment ID: 235690 **Organization Type:** Unaffiliated Individual

Representative Quote: Should I suspect that 'non-mention' of the impacts from sea level rise was deliberate? Thinking long term - As part of Wetland Management responsibility I believe the reconstructed wetlands, or portions thereof, should be part of a long term monitoring program (including the Sediment Elevation Tables = SETs). These reconstructed wetlands present the opportunity to track a habitat from scratch (its beginnings) which is not a prevalent situation (and data has been collected from the beginning, even before……..)

Corr. ID: 3 **Organization:** former Anacostia Watershed Society staff

Comment ID: 235693 **Organization Type:** Unaffiliated Individual

Representative Quote: Oceans rising will have an effect on our tidal river. Long-time Patuxent River naturalist Greg Kearns believes the tidal Patuxent in Prince George's County is rising at the rate of one-eighth of an inch per year. If that is true, it makes sense to assume that the Anacostia should be rising at about the same rate---and will rise about 2 inches during the 15-year life of this plan.

Since tidal elevations matter---and matter in terms of inches---long-term planning for this scenario would seem to be prudent. I may have missed it, but I didn't see this addressed in the plan/EIS.

Response: The Final plan/EIS was updated to incorporate climate change in accordance with NPS draft interim guidance (April 2009) on climate change for NEPA documents, specifically how climate change affects resources impacted by this project and how impacts to those resources may be influenced by climate change. In Chapter 1, the effects of climate change on applicable resources (hydrology, wetlands, and resident Canada geese) are considered and discussed under these resources (see Chapter 1, "Impact Topics Included in Detailed Analysis" of the Final plan/EIS). Also in Chapter 1 under the topic "Energy Resources and Climate Change", the contribution of wetland and goose management actions to climate change through greenhouse gas emissions was dismissed from further analysis. The known and predicted effects of climate change on park resources (hydrology, wetlands, and resident Canada geese) cannot be avoided and were considered in the plan/EIS. Issues associated with the impact of climate change on some physical/natural resources (hydrology, wetlands, resident Canada geese) are addressed in applicable sections of Chapters 3 and 4. Finally, a discussion concerning how Adaptive Management would be used to manage impacts from climate change was also added to Chapter 2 to describe estimates for future climatic change in the Mid-Atlantic Region.

CR4000 - CULTURAL RESOURCES: IMPACT OF PROPOSAL AND ALTERNATIVES

Concern ID: 34553

CONCERN STATEMENT: Depending on the alternative selected, the potential exists for 'adverse effects' to archeological resources and built environments under Section 106 of the National Historic Preservation Act.

Representative Quote(s):

Corr. ID: 7 **Organization:** DC State Historic Preservation Office
Comment ID: 235732 **Organization Type:** State Government

Representative Quote: Historic Built Environment:
Based upon our review of the various alternatives described in DEIS, we agree with the National Park Service (NPS) that there is potential for some of the actions currently being evaluated to constitute an "adverse effect" on the historic built environment. Most notably, installing "seawall breaks" in the National Register-eligible Anacostia Seawall could diminish the integrity of this resource. If one of the alternatives that propose this type of action is selected, the NPS should notify our office and provide additional information about the exact location of the proposed breaks and the existing conditions of the seawall in these specific areas. Once that information is provided, we will consult further with the NPS to make a determination of effect and to continue the Section 106 process.

Corr. ID: 7 **Organization:** DC State Historic Preservation Office
Comment ID: 235733 **Organization Type:** State Government

Representative Quote: Archaeology:
Based upon our review of the various alternatives described in DEIS, we agree with the National Park Service (NPS) that there is potential for some of the actions currently being evaluated to constitute an "adverse effect" on potential archeological resources. Once an alternative is selected, the NPS should notify our office and provide the proposed locations of ground-disturbing activities. After that information is provided, we will consult further with the NPS to make a determination of effect and to continue the Section 106 process as described on page 261.

Response: The NPS agrees some actions called for in the plan/EIS have the potential for “adverse effects” and has noted the need for additional planning and compliance, including consultation and coordination under section 106, prior to undertaking any such actions. However, in regard to those actions where NPS has determined “no adverse effect,” the NPS has continued coordination with the State Historic Preservation Office (SHPO) to get their concurrence. The SHPO has agreed on a Conditional No Adverse Effect on historic resources with the following conditions: 1) continued Section 106 consultation on the proposed ground disturbing activities’ effects on archeological resources; 2) archeological identification survey, and /or geoarcheological survey if warranted; 3) mitigation of adverse effects if such cannot be avoided; and 4) reporting of archeological investigations following NPS and District guidelines. Record of this consultation has been included in appendix A and the Final EIS has been updated accordingly.

DE1100 - DOCUMENT EDITS

Concern ID: 34554

CONCERN STATEMENT: Discussion on the New York City airplane crash should be omitted from the document since migratory Canada geese were responsible for the incident not resident Canada geese.

Representative Quote(s):

Corr. ID: 6 **Organization:** *Not Specified*

Comment ID: 235728 **Organization Type:** Unaffiliated Individual

Representative Quote: The section about the jet crash in the Hudson River in 2009 should be omitted. The Smithsonian Institution determined that crash was caused by migratory Canada geese (http://smithsonianscience.org/2009/07/scientists-determine-geese-involved-in-hudson-river-plane-crash-were-migratory/). The plan/EIS acknowledges that fact (p. 28), but has a long discussion of the crash and geese, which appears designed to scare people. Do resident geese in the park really fly at 2,900 feet? This section should be removed

Corr. ID: 13 **Organization:** *Not Specified*

Comment ID: 235902 **Organization Type:** Unaffiliated Individual

Representative Quote: This is pretty minor, but you had talked once about the airplane crash in New York City. Well, I spent about two minutes on Google and it turns out the Smithsonian found out that those were not resident geese. Those were migratory geese. So, all this concern about airplane crashes I think is not relevant.

Response: The NPS agrees and removed the discussion concerning the New York City airplane crash from the Final plan/EIS. The park has also confirmed that although the U.S. Park Police Aviation Unit is located within the park, resident Canada geese are not a concern for helicopter flight operations. The downwash of the blades, overall noise, and hovering ability causes resident Canada geese to retreat from the immediate area occupied by a helicopter. The “Visitor and Employee Health and Safety” discussion of Chapter 1 was updated to reflect this statement.

Concern ID: 34555

CONCERN STATEMENT: Commenters would like the DEIS to be more consistent with nomenclature, acreages, maps, tables, and photograph identifications and labels.

Representative Quote(s):

Corr. ID: 2 **Organization:** USGS Patuxent Wildlife Research Center

Comment ID: 235688 **Organization Type:** Unaffiliated Individual

Representative Quote: A major area of inconsistency has to do with the nomenclature, acreages, maps and photograph identifications/labels. For example, in some places Kingman Area 1 and 2 are used, while others mention Kingman North and South. Some maps include Heritage Marsh, Fringe Marsh, PEPCO Marsh, others don't. Some places use the term Kingman Marsh inclusively with Heritage Marsh as a unit. The photograph on p. 41 is labeled Kingman Marsh but is really mostly Heritage Marsh. I would lay the responsibility on NACE to provide a better set of nomenclature that would be satisfactory to NPS. After all, the current situation is confusing. Just like Kenilworth is comprised of two major separate pieces (Mass Fill 1 and 2 - oy!!), so is Kingman. The northern piece (Kingman Area 1) and the southern piece (Kingman Area 2) were reconstructed in 2000. Kingman Area 2 is comprised of 8 acres and lies against the west bank of Heritage Island. However, Heritage Marsh was reconstructed (different authorization) in 2006 and occurs within the same piece of water as Kingman Area 2 BUT is separated from Area 2 by the dredged channel and lies along the east bank of RFK Stadium in three separate pieces (separated by design by two pre-existing stormwater outfall runs). So, technically Heritage Marsh is NOT part of Kingman Marsh (and…..Heritage Marsh is NOT connected to Heritage Island). Point remains there is terrible inconsistency throughout the EIS especially in the section of marsh descriptions with acreages (Chapt. 3: Affected Environment….and e.g. p 214 PP3). There is even other confusion on p. 4 #1 where it should say Kingman Island instead of Kingman Marsh. To take this in the extreme (ultimate nit pic just to make the point) it doesn't look to me like the Fringe Marsh or Heritage Marsh (this time labeled BUT doesn't show Kingman Area 2 as part of Kingman Marsh) or Kingman Marsh Area 2 shaded…….By the way (p. 145) highlights RFK shoreline without mentioning Heritage Marsh and claims it is within Kingman Marsh. Also, where from did the notion of cattail planting come? It (they = 2-3 types of Typha there) is purely a volunteer, i.e., not planted. And perhaps Typha angustifolia is not native (presumably came from Europe)……

Corr. ID: 3 | **Organization:** former Anacostia Watershed Society staff

Comment ID: 236291 | **Organization Type:** Unaffiliated Individual

Representative Quote: Page 2-The photo caption, I believe, is erroneous. The "denuded" wetland landscape is due to the time of year---early Spring. Only a few of the trees have leafed out in this photo. The perennial and annual wetland plants have not emerged from the mud yet because it hasn't warmed up enough, not due to goose herbivory. Goose herbivory follows when there's something to eat.

Page 296---Unless I have a long-lost brother, separated at birth, I think the third citation from the top should be Steve, not "Tom" McKindley-Ward.

Corr. ID: 6 | **Organization:** *Not Specified*

Comment ID: 235730 | **Organization Type:** Unaffiliated Individual

Representative Quote: 2. The plan/EIS would be greatly improved if it had more analysis and less repetitive verbiage.

3. The plan/EIS needs to be better proofread. As an example, the tables are not consecutively numbered and don't match the "List of Tables" on p. ix.

Response: The NPS has updated the Final plan/EIS to resolve issues associated with naming inconsistencies. The other editorial changes suggested in this comment have also been made.

Concern ID: 34556

CONCERN STATEMENT: The 2006 DC Comprehensive Plan, and Action E-1.5A: Implementation of the Wildlife Conservation Plan should be considered as a related document in chapter 1 of the plan/DEIS.

Representative Quote(s): **Corr. ID:** 3 | **Organization:** former Anacostia Watershed Society staff

Comment ID: 235692 | **Organization Type:** Unaffiliated Individual

Representative Quote: Page 31---This page has a list of relevant District of Columbia documents and policies. Left out, however, is the 2006 DC Comprehensive Plan. Under its broad category "Citywide Elements" is an "Environmental Elements" section, and inside this section, at the top of page 6-13, there is a specific mention of the need to control Canada geese. (Action E-1.5.A: Implementation of the Wildlife Conservation Plan. Implement the 2005 Wildlife Management Plan for the District of Columbia, including programs to control the white-tailed deer and Canada goose population, and to improve water quality and habitat in the Anacostia River.) This might be helpful to include.

Response: NPS added a discussion of The Comprehensive Plan of the National Capital to the Final plan/EIS (see Chapter 1, “Other Related Documents, Policies, and Actions” of the Final plan/EIS). The District Elements that are part of this plan provide goals, objectives and policies for land use issues that impact the city, including the relevant "Environmental Elements" section. This section specifically mentions the need to control Canada geese under Action E-1.5.A: Implementation of the Wildlife Conservation Plan (2005), which states that the District of Columbia implement programs to control the white-tailed deer and Canada goose population and to improve water quality and habitat in the Anacostia River (DC OP 2006).

Also, the NPS did discuss the District of Columbia Wildlife Action Plan (dated 2006) in the Draft plan/EIS under the heading "Other Related Documents and Policies". The NPS has added a statement from the 2006 Wildlife Action Plan for the District of Columbia in the Final plan/EIS (see Chapter 1, "Other Related Documents, Policies, and Actions" of the Final plan/EIS) which specifically notes that programs would be implemented to control the Canada goose population, since it has been determined that "locally, one of the top five threats to emergent tidal wetlands is overbrowsing by resident Canada Goose populations; the geese eat the wild rice and other native vegetation, which diminishes the habitat for other animal species and increases opportunities for non-native invasive plant species."

GA1000 - IMPACT ANALYSIS: IMPACT ANALYSES

Concern ID: 34557

CONCERN STATEMENT: Commenters feel the potential risks of human exposure to resident Canada geese used for consumption must be addressed in the final EIS.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 237692 **Organization Type:** Unaffiliated Individual

Representative Quote: The issue of potential human exposure (e.g. Amundson 1988) to environmental hazards should geese by processed for food must also be addressed in the Final EIS.

Response: The Draft plan/EIS discussed donating the meat from captured resident Canada geese and the toxicity testing that would be required prior to consumption. This text can be found in the "Resident Canada Goose Management" Section of Chapter 2 of the Final plan/EIS:

"The meat from the resident Canada geese captured during the round-ups would be donated to local food banks in the District area. Only the breast meat would be donated which reduce the chances of contamination. Toxicity tests would be performed on approximately 10 percent of the captured birds prior to donating the meat to the local food banks. Toxicity testing would follow APHIS standard operating procedures. If donation were not possible, the euthanized birds would be deposited in a landfill."

Concern ID: 34697

CONCERN STATEMENT: The analysis in the Final EIS must address how fragmentary remnants of the original tidal marsh will function as a system, and how restored fragments will withstand compromising environmental events.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 237712 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS fails to adequately address issues of scale and land use
NPS notes (DEIS: 214) that originally the area of concern along the Anacostia River was flanked by 2500 acres of tidal marsh, of which less than 100 are involved in the current restoration effort at four locations (DEIS: 8). Thus approximately 4% of the original system is being retained, in parcels that range in relative sizes from 0.02% to 1.6% of what formerly existed within this system. The Final EIS must address how such fragmentary remnants of the original tidal marsh can function as it argues wetlands in the Anacostia will, especially to "…improve water quality in the Anacostia River…"(DEIS: 8). It must also demonstrate that restored fragments of this order can sustainably withstand any of the potentially compromising environmental events (e.g., floods, sewage discharge, pollution from runoff, herbivory by geese or other animals, etc.) that can be expected to occur into the future.

Response: The NPS feels the plan/EIS addresses both concerns raised by the commenter. In regards to concerns about fragmentary remnants functioning as a system, it is important to note that the desired conditions of the plan/EIS as stated in Chapter 1, "Desired Conditions" of the Final plan/EIS, do not include undertaking wetland restoration of the Anacostia to pre-development conditions, but rather include "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." The functionality of fragmented wetlands is not discussed in one place, but rather is included in discussions of wetland areas under each alternative. The Draft plan/EIS included a discussion of how the implementation of proposed measures under each alternative would aid in lessening issues that currently limit the functionality of various wetland areas; this discussion can be found in Chapter 4, "Wetlands" of the Final plan/EIS.

In regards to impacts from other environmental events, a detailed discussion of impacts related to wetlands was included in the Draft plan/EIS, and can be found in Chapter 4, "Wetlands" of the Final plan/EIS. This analysis includes an assessment of cumulative impacts, which are those impacts to wetlands from other sources, including many noted by the commenter. These cumulative impacts are discussed in detail after the impacts analysis for each alternative in Chapter 4 of the Final plan/EIS.

Concern ID: 39634

CONCERN STATEMENT: Commenters felt potential risks to health and safety (both human and wildlife) from resident Canada geese are overstated or incorrect.

Representative Quote(s):

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235712 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS makes claims concerning health and safety that are incomplete and could be misleading
The claims made in the DEIS that geese will affect the water quality of the Anacostia River (e.g., "The water quality of the Anacostia River is being affected by the resident Canada geese due to herbivory on wetland plants and as a result of fecal droppings." DEIS: 128 and "The water quality of the Anacostia River is being affected by the resident Canada geese due to fecal droppings…" DEIS: 202) are not substantiated. These statements set up inappropriately negative imagery concerning geese and their impacts that is not mitigated by NPS also saying that impacts from goose feces are almost certainly negligible. If an impact is negligible, then why is it mentioned at all?

The fact is that (at a minimum, by estimates in the DEIS) hundreds of millions of gallons [our emphasis] of combined human sewage and runoff affect the Potomac and Anacostia rivers 75 times a year (on average). It does no honor to NPS' credibility that statements about goose feces and the pathogens that might or might be harbored in their droppings are being made in this document. No credible sourcing is mentioned. With respect to the laundry list of pathogens enumerated, it is not mentioned that they are seldom, if ever, all found in the same population of geese (cf. Bedard, & Gauthier 1986, Converse et al. 2001). NPS also argues that resident geese "may threaten" (DEIS: 235) other wildlife, especially waterfowl through influenza A viruses and avian tuberculosis, but presents nothing by way of evidence that such events have ever happened, much less happened on the Anacostia River. Finally, NPS brings the question of aircraft safety obliquely into the discussion (DEIS 27-28) before suggesting that it is probably not an issue along the Anacostia River at all. The Final EIS must establish exactly what the public health and safety, as well as wildlife health, risks are including how they are measured, estimated, evaluated, and determined. Documentation of the presence and/or potential for risk must be presented rather than vague and oblique comments about how various risks might present themselves.

Response: In regards to concerns that potential health and safety risks are overstated, it should be noted that the NPS did dismiss the resource Visitor and Employee Health and Safety from further analysis because: "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). 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." (see Chapter 1, "Other Issues Considered But Dismissed From Further Consideration Following Detailed Analysis" of the Final plan/EIS).

Review of scientific literature sources such as USFWS (2005) and McCoy (2000) indicates that concentrated resident Canada geese populations may threaten the health of other wildlife, especially waterfowl and that influenza A viruses and avian tuberculosis outbreaks are exacerbated by dense populations of waterfowl, including Canada geese (McCoy 2000). In addition, fecal droppings from Canada geese concentrate in pools of water created during impoundment drawdowns, and thereby degrade overall water quality and increase the potential for human and avian diseases transmitted by fecal material (USFWS 1999). Other studies (as suggested by the commenter) show that the low frequency of positive cultures indicates that the risk of humans to disease through contact with Canada goose feces appeared to be minimal at sites studied by Converse et al. (2000). Therefore, some literature has demonstrated that disease transmission from Canada geese is possible under certain conditions, but this correlation has not been measured at Anacostia Park. Specific effects to health and safety as a result of resident Canada geese have not been demonstrated or studied at Anacostia Park and this is openly stated in the plan/EIS. This resource was dropped from further analysis due to negligible impacts. The impacts of fecal matter on water quality are discussed under cumulative impacts in chapter 4 "Water Quality".

To address specific comments made on health and safety, the NPS has added information to the affected environment discussion where pathogens are noted (see the Water Quality Section in Chapter 3 of the Final plan/EIS). Upon review of the suggested sources Bedard and Gauthier (1986) and Converse et al. (2001) additional text was added to explain that fecal matter from geese has not been demonstrated to affect water quality or human health at Anacostia Park. Fecal matter is described as a contributing factor to water quality in combination with other factors such as effects of goose herbivory. Additionally, the impact of this fecal matter has not been studied at Anacostia Park, and it is likely that the contribution of fecal droppings from resident Canada geese is small when compared to other sources of pollution. The text regarding potential avian diseases in the analysis of impacts to other wildlife (see Chapter 4, "Wildlife" of the Final plan/EIS), has also been further clarified to indicate that such effects have not been documented at Anacostia Park.

LU1100 - LAND USE

Concern ID: 34558

CONCERN STATEMENT: Changes to existing recreational land uses should be considered in alternatives for achieving the objectives of the plan/EIS.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235713 **Organization Type:** Unaffiliated Individual

Representative Quote: As we noted in our comments of August 9, 2007, on the scope of the analysis, land use is both a potentially effected element of the environment and a significant contributor to the issues this Plan/EIS seeks to address. The Plan/EIS Alternatives must include consideration of land use because these uses play a significant role in attracting resident geese to the area around the artificial wetlands. This is particularly true at the Kingman Island site; right next to a golf course and other open grassy public areas. The Park's goal of creating artificial wetlands, admirable as it is, is in serious conflict with the Park's goal of providing the specific recreation opportunities that constitute a magnet for Canada geese. It may simply not be realistic to expect any management concept to work in such an environment without a significant and coordinated effort that occurred across different land management units.

The Final EIS should explicitly include steps to examine land use and consider changes to current and planned land use that could achieve the objectives of the DEIS. Both Council on Environmental Quality (CEQ) regulations (§1502.14(c)) and judicial review have long made it clear that the entire range of reasonable alternative ways to substantially achieve the stated project objectives, including actions the responsible agency itself cannot implement alone as well as action it may not prefer, must be analyzed

Response: The Purpose Statement for Anacostia Park was developed from the establishing legislation for the park as described in Chapter 1, "Anacostia Park's Purpose, Significance, and Mission Goals" of the Final plan/EIS: "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." Therefore, providing recreation opportunities has been and would continue to be an important purpose of Anacostia Park. As a result, changing the existing land use of the park was not considered as part of the alternatives.

Land Use as an impact topic was analyzed in detail while developing the Draft plan/EIS, and was ultimately dismissed from further consideration because the alternatives proposed would not alter land use (see Chapter 1, "Other Issues Considered But Dismissed from Further Consideration Following Detailed Analysis" of the Final plan/EIS for additional information). Additionally, because the NPS recognizes the challenges created by mixed land uses, the Draft plan/EIS took into account the land use and habitat types in the development of the desired conditions and population objectives, as described in Chapter 1, "Other Issues Considered But Dismissed from Further Consideration Following Detailed Analysis" of the Final plan/EIS.

MP1100 - MONITORING PROTOCOL

Concern ID: 34559

CONCERN STATEMENT: Monitoring protocols and their purpose, as described in Appendix C, are unclear and should be clarified.

Representative Quote(s): **Corr. ID:** 2 **Organization:** USGS Patuxent Wildlife Research Center

Comment ID: 235689 **Organization Type:** Unaffiliated Individual

Representative Quote: Appendix C: Preliminary Monitoring Protocol……

It was really unclear to me whether this was a projected protocol for future monitoring or whether it refers to the one that is already in place and has been used for two years, OR maybe both!!! The indicated purpose was also fuzzy or even incorrect - or was this component written awhile ago and just not made current. At

	any rate the protocol pretty much as described was designed not so much to monitor the impacts of herbivory at Kingman Area 1 (p. 339) but to document and try to single out that the primary herbivory was due to resident Canada geese that were to be excluded from the fenced treatment plots (should sustain vegetation even when letting in other herbivores than the geese) as opposed to the exposed control plots which likely would be grazed. Whereas, and this is important, the selection of Alternate B mandates/essentially requires monitoring (of various types) for a number of indicators (especially vegetation) to determine to what extent the elected goose management actions allowed the wetlands to respond/restore. It would seem that this same plot design/set-up of 16 modules randomly located could be used with the primary determination being how well over time the exposed control plots become statistically similar to the exclosed plots. In other words there would be a switch with the current exclosed plots effectively becoming the control while the 'old' /prior exposed control plots become in effect the treatment………..
Response:	Current monitoring is based on the Preliminary Monitoring Protocol, included as Appendix C of the plan/EIS. Subsequent monitoring reports would document any changes resulting from adaptive management decisions made over the course of the study. The Anacostia Park Wetlands and Resident Goose Management Plan/Environmental Impact Statement requires monitoring of the impacts of herbivory on vegetation at Kingman Area 1. The experimental design described in the Preliminary Monitoring Protocol was chosen as the best way to accomplish this. The chosen design provides quantitative data showing how the vegetation is being impacted by herbivory, addresses what is causing the impacts, and provides the ability to determine to what extent the elected goose management actions allow the wetlands to recover over time. The plot design/set-up of 16 modules randomly located would be used to determine how well over time the exposed (unfenced) control plots become statistically similar to the exclosed (fenced) plots. The paired plot design looks at the difference between a control and a treatment plot. Statistically, it does not matter which of the plots are the control and which are the treatment plots because it is the differences between the two that would be documented through data collection.

PC1100 - PROJECT COSTS

Concern ID:	34560
CONCERN STATEMENT:	Commenters are concerned the National Park Service will not obtain all the funds described in the plan/DEIS. Budget priorities need to be established along with explanation of one-year cost estimates.
Representative Quote(s):	**Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife **Comment ID:** 235716 **Organization Type:** Unaffiliated Individual **Representative Quote:** Economic projections need to be better explained The lethal control of geese is cost-estimated for only one year under all alternatives presented, creating a potentially misleading impression that expenses will not be great. The Final EIS should explain and defend why one-year estimators are used here but not for other actions.
	Corr. ID: 6 **Organization:** *Not Specified* **Comment ID:** 235729 **Organization Type:** Unaffiliated Individual **Representative Quote:** The cost of $16.3 million for Alternative B is unrealistic, given the tough budget climate for federal agencies for the next few years. NPS is likely to have flat budgets, as least in real terms, for the next five years. The plan/EIS should set clear budget priorities within Alternative B.
	Corr. ID: 12 **Organization:** Anacostia Watershed Society **Comment ID:** 235909 **Organization Type:** Conservation/Preservation **Representative Quote:** Only one concern that we have is the cost. How, you know, the National Park Service is going to, you know, get this money? This $60 million.

Right. Fifteen years.

Response: The plan/EIS attempts to present the entire suite of possible techniques for wetland management and for goose management regardless of constraints such as costs as stated in Chapter 2, "Alternatives Development Process" of the Final plan/EIS. Once the plan is approved for implementation (i.e., a Record of Decision is signed), the NPS would not necessarily be required to implement each of the techniques presented; techniques listed under each alternative would be implemented on an "as needed" basis and as funds are available.

PN1100 - PURPOSE AND NEED: METHODS AND ASSUMPTIONS

Concern ID: 34561

CONCERN STATEMENT: The need for the wetland and resident Canada goose management plan needs to be strengthened by better describing the current conditions in the DEIS.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235705 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS fails to document current conditions well enough to establish a need for action. Damage to aquatic plants and other environmental impacts not sufficiently described.

The DEIS does not rise to the level of documentation required to establish a need to kill geese-a native, protected species of bird for whom the NPS has a strict protective mandate. The shortcomings are numerous. Perhaps most significantly the DEIS notes (pg. 13) that study began in 2009 to "…determine the impact of herbivory by resident Canada geese on Kingman Marsh," citing a report from that first year that indicates that geese are "inflicting damage" to wetland vegetation there. Following this highly vague and casual problem identification and delineation, NPS goes on to note that the second year of study will be included [our emphasis] in the Final EIS. This is a tacit admission that NPS is proposing to manage geese first and then ask questions about properly documenting their impacts later.

Response: The "Need for Action" section in Chapter 1 was also enhanced to communicate the necessity for resident Canada goose management at the park. Conclusions from the 2009-2011 herbivory studies were added to the "Need for Action" section and to the "Background on Wetlands Restoration and Resident Canada Goose Management" section in Chapter 1 of the Final plan/EIS to demonstrate the need for reducing the population of resident Canada geese within the park. Additional data on existing conditions have been added to the plan/EIS. Specifically, the 2010 and 2011 goose count data have been added to the plan/EIS to further describe current conditions at the park. Please see the "Resident Canada Geese" section of Chapter 3, Affected Environment of the Final plan/EIS.

PN1600 - OTHER PARK GOALS AND MANAGEMENT PLANS

Concern ID: 34562

CONCERN STATEMENT: Commenters are concerned about management of resident Canada geese in the absence of an approved General Management Plan for Anacostia Park, and that "Desired Conditions" are not fully articulated management goals and objectives.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235707 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS fails to adequately articulate park goals.

The DEIS notes that the park has yet to settle on its management goals through approval of a General Management Plan (GMP) (DEIS: 8-9). This is not an appropriate point of departure for any management program, much less one that calls for killing hundreds of wild, native animals. The vagueness inherent in statements such as "The park staff believes that park wetlands are integral to the functioning of all wetlands within the watershed." (DEIS: 17) and "For this plan, a manageable resident Canada goose population is defined as one that allows restored wetlands within the park to function as wetlands systems."(DEIS: 17) further dilute the credibility NPS must establish to justify any management program.

The "Desired Conditions" articulated by NPS (DEIS: 17) are an apparent place holder for fully articulated management goals and objectives. They are not well explained or defended with respect to other objectives statements scattered throughout the document. The desired conditions further do not relate well to the six articulated priority watershed goals. Nor are they explained well with respect to their standing as NPS policy formulations that would endow authority to manage either wetlands or geese. The Final EIS must explain how, in the absence of an approved GMP, the "Desired Conditions" can assume the power of a mandate to manage Canada geese, especially to manage resident but not migratory geese.

Response: Although the General Management Plan for Anacostia Park has been dropped in favor of a Park Foundation Document, the NPS has full discretion to prepare and implement plans such as this one in the absence of a Final GMP. A new section titled "Authority to Manage Resident Canada Geese" of the Final plan/EIS has been added to Chapter 1. Additionally in Chapter 1, "A Functional Wetland System", the six priority watershed goals are referred to and integrated into the plan/EIS: "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)."

PSAE010 - WETLAND RESTORATION

Concern ID: 34564

CONCERN STATEMENT: Previous wetland restoration along the Anacostia River should be analyzed in the final EIS.

Representative Quote(s): **Corr. ID:** 6 **Organization:** *Not Specified*
Comment ID: 235722 **Organization Type:** Unaffiliated Individual
Representative Quote: An analysis of previous wetland restoration efforts in the park should be included in the final plan/EIS. NPS and other government agencies have spent a great deal of time, effort and money on wetland projects along the Anacostia River. A number of studies have been done of those projects.

Response: Previous wetland restoration activities were described in detail in the Draft plan/EIS, beginning in Chapter 3 under the section titled "Wetland Restoration Efforts." However, this section may have been hard to find in that location and was renamed "Previous Wetland Restoration Efforts" and moved to follow the section titled "History of Anacostia Wetlands" in Chapter 3, "Affected Environment", of the Final plan/EIS.

PSAE040 - WETLAND FUNCTIONS

Concern ID:	34565		
CONCERN STATEMENT:	Commenters would like more characterization of the freshwater tidal wetlands and more emphasis on submersed aquatic vegetation.		
Representative Quote(s):	**Corr. ID:** 2	**Organization:** USGS Patuxent Wildlife Research Center	
	Comment ID: 235687	**Organization Type:** Unaffiliated Individual	

Representative Quote: Besides quoting the classic definitions of wetlands (Cowardin, USACE) the EIS does not do full justice to the characterizations of the tidal wetlands. It should be clearly noted:

Freshwater tidal wetlands are an integrated system containing a balance of relatively deep open water, shallow waters (sufficient to support submersed aquatic vegetation = SAV), intertidal mudflats, emergent wetlands, wet meadows, swamp forest, etc. All these components are especially valid for the Anacostia. (Thus the description of General Vegetation and Habitat on p. 150 is incomplete). Therefore, while emphasis on emergent wetlands (vegetation) is fine, the roles of other components should be brought out along with the need for NPS to manage them correctly. The whole interrelated/integrated system needs to be protected, maintained and enhanced (involves significant restoration). This is particularly true now when open water systems predominate. It is also important that zeal for restoring wetlands does not just focus on emergent vegetation but also, for example, includes mud flats. Yes, there is a paragraph on SAV (p. 25). It should be noted there how important a component SAV was in the mid 1800s. SAV needs emphasis (leadership) as part of restoring the Anacostia. Even small efforts, despite excess turbidity, can promote 'mini pools' in which pockets of SAV can survive in the Anacostia. Also, for the record I/we have noted limited SAV at Kingman Marsh Area 1 over the past several years. The point is SAV restoration should not be written off as a poor bet.

Response:

In response to this comment, text has been added to the “Tidally-influenced Freshwater Wetlands” section in chapter 3 to describe the interrelated/integrated nature of these wetlands, including submerged aquatic vegetation (SAV) and mudflats (see Chapter 3, “Tidally-influenced Freshwater Wetlands” of the Final plan/EIS). This section also now references back to the discussion of SAV in chapter 1, which has been updated to note the small areas of SAV in Kingman Lake per the comment received (see Chapter 1, “Other Issues Considered but Dismissed From Further Consideration Following Detailed Analysis” of the Final plan/EIS). However, as noted in the dismissal of SAV as an impact topic (see Chapter 1), the NPS does not believe that removal of resident Canada geese and improvements to wetlands and thus water quality (expected from both alternatives B and C) would cause a perceptible or observable change in extent or distribution of SAV.

While the commenter expressed concerns the NPS has focused only on management of the emergent wetland vegetation and not the other components of freshwater tidal wetlands, including SAV, it should be noted that the focus of this plan/EIS is on protecting and managing previously and future restored wetlands in the park. The creation of any new wetlands, including those which support SAV, is outside the scope of this plan/EIS and would require additional NEPA compliance; however, as appropriate, the concepts presented in this plan/EIS would apply to previously restored wetlands and any wetlands restored in the future at Anacostia Park. The NPS updated the Final EIS to be clearer about the scope of this plan (see Chapter 1, “Purpose Of and Need For Action” of the Final plan/EIS), and new text was added to clarify this in the “Tidally Influenced Freshwater Wetlands” of Chapter 3 of the Final plan/EIS.

PSCA001 - NON-GOOSE IMPACTS ON WATER QUALITY

Concern ID: 34566

CONCERN STATEMENT: Commenters feel resident Canada geese herbivory and goose droppings are not the problem for poor water quality within the Anacostia River, and the final EIS should discuss how human sewage, runoff, and chemical loads from chicken farms impact water quality.

Representative Quote(s):

Corr. ID: 1 **Organization:** *Not Specified*

Comment ID: 235683 **Organization Type:** Unaffiliated Individual

Representative Quote: it is clear that the problem in the river water is far more about mans toxic chicken farms in the area than the geese. it is about man's toxic chemical load.

Response: The NPS agrees with the commenters with respect to concerns that other pollution sources contribute greater impacts to water quality than resident Canada geese, as evidenced by the information presented in chapters 3 and 4 (cumulative impacts analysis) of the Draft plan/EIS. For example, chapter 4 of the plan/EIS acknowledges that the combination of resident Canada goose herbivory plus goose fecal matter can contribute to water quality impacts in one paragraph compared to more than 2 pages of discussion regarding other sources of pollution that cumulatively contribute to water quality impacts of the Anacostia River, including the Blue Plains Wastewater Treatment Plant (see Chapter 4, "Water Quality" of the Final plan/EIS). Also in chapter 4, other pollution sources were described in the initial description of actions contributing to cumulative impacts on water quality under the no action alternative in chapter 4 (see Chapter 4, "Water Quality" of the Final plan/EIS), and were also incorporated in the analysis of cumulative impacts under other alternatives. In this analysis of cumulative impacts, the NPS acknowledges that the impacts from resident Canada geese fecal droppings and overgrazing (which are not exactly known) are small when compared to other pollutant sources. Additional language has been added to the cumulative impacts water quality section to refine this point.

The text in the plan/EIS was clarified to state that fecal matter from resident Canada geese generally influences water quality in situations where the waterbodies are characterized as stagnant or standing water as cited by such sources as (USFWS 1999) and Rutgers (2004). Canada goose fecal matter can also lead to eutrophication (excessive richness of nutrients in a body of water) of small water bodies, especially those that have restricted circulation and flow-through, which in turn may stimulate algae and weed growth (French 2001). Even though the Anacostia River does have backwater conditions that could be considered stagnant during certain tidal cycles, fecal matter from resident Canada geese at Anacostia Park has not been demonstrated to affect water quality or human health. Fecal matter is described as a contributing factor to water quality in combination with other factors such as effects of goose herbivory. It is known and stated that resident Canada goose herbivory reduces areal coverage of wetland vegetation. This reduces the potential for wetland areas to trap sediment (and associated pollutants binding to sediment), and creates bare areas in the wetlands.

NPS Director's Order 12 Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making, states that it is appropriate to include qualitative impact analyses with experts' testimony. Specific effects to water quality as a result of fecal contamination by resident Canada geese have not been studied at Anacostia Park and this is openly stated in the plan/EIS. It is unknown whether the water quality in the Anacostia River is measurably affected by fecal droppings from the resident Canada goose population in the park due to the large size of the Anacostia River. The lack of site-specific data is acknowledged as required in CEQ (1502.22) and NPS Director's Order 12 Handbook, Conservation Planning, Environmental Impact Analysis, and Decision Making (NPS 2001). In chapter 4 of the Draft plan/EIS, under the analysis of the impacts on water quality from the no action alternative, the NPS cites sources such as USFWS 2005 when describing impacts from fecal contamination or erosion from overgrazing by geese, notes that exact contributions to water quality impacts are unknown at Anacostia Park, but that they contribute, along with increased erosion from excessive grazing, to minor adverse impacts on water quality (i.e., impacts that would be detectable but not large enough to cause substantial local changes). Additional information has been updated and provided in Chapter 4, "Water Quality" of the Final plan/EIS as discussed in the text above.

PSCA010 - OTHER STRESSORS ON RESTORED WETLANDS

Concern ID: 34567

CONCERN STATEMENT: Commenters stated that the DEIS does not adequately relate impacts from anthropogenic factors in Anacostia wetlands to impacts from resident Canada geese. Influences such as fluctuating water level, mechanical erosion, sedimentation, pollution, and other factors on wetland restoration need to be compared to the relative impacts on wetlands from goose herbivory.

Representative Quote(s): **Corr. ID:** 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235704 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS conflates management strategies and fails to clearly delineate management alternatives.

The DEIS conflates information about anthropogenic impacts with impacts attributed to geese in a manner that submerges the relatively minor issues associated with geese within a much larger domain of human-caused problems. Thus, it tends to overstate the case it tries to make against geese and understate the case for hydrogeomorphic and other influences on the potential for wetlands restoration. We feel by combining these two very different management issues into this DEIS, NPS implicitly acknowledges that the case against geese is too weak to stand on its own. NPS itself notes the complex hydrological and ecological factors that go in to the establishment and maintenance of artificial wetlands and the dominant role hydrology plays in plant survival (DEIS: 16). The Final EIS must clearly relate the impacts from anthropogenic factors in Anacostia wetlands to impacts from Canada geese. NPS must demonstrate the role that anthropogenic influences such as fluctuating water level, mechanical erosion, sedimentation, pollution, and other factors play with respect to wetland planting success and failure, and then compare these relative to the potential impact from goose herbivory.

Response: The NPS feels the Draft plan/EIS includes discussion of other factors potentially impacting resources, particularly wetlands, as a result of human actions. For example, the use of sheet piling in the Fringe Wetlands, and the presence of impervious surfaces in upland areas, are two human related issues discussed as challenges to wetland restoration (see Chapter 3, "Water Quality" of the Final plan/EIS). In the wetlands impacts analysis section (see Chapter 4, "Wetlands" of the Final plan/EIS), other factors impacting successful wetland restoration are described, including planting at incorrect hydrologic regimes, engineered marsh soils, and issues with invasive plant species. In addition, the impacts analysis includes an assessment of cumulative impacts, which are those impacts to resources, including wetlands, from other sources. The NPS feels this analysis addresses many of the past, present, and future actions that have anthropogenic influences on wetlands noted by the commenter, including issues associated with combined sewer overflows (CSOs) and the effluent from Blue Plains Advanced Wastewater Treatment Plant, located less than one mile downstream from

Anacostia Park. See Chapter 4, "Cumulative Impact Analysis Method" of the Final plan/EIS for the initial discussion of cumulative impacts under the no action alternative, which were also incorporated in the analysis of cumulative impacts under other alternatives. In addition, in response to other comments received, a more detailed section on "Climate Change" has been added to both Chapters 3 and 4 of the plan/EIS to address the potential for pressures exerted by sea level rise, increased storm events, and increased drought events (see Chapter 3 and 4, "Climate Change" of the Final plan/EIS).

PSSM002 - NEED FOR ADDITIONAL DATA/SCIENCE

Concern ID: 34568

CONCERN STATEMENT: Commenters feel that more science and data on the biology and ecology of resident Canada geese, as well as effective management strategies, should be incorporated into the wetland and resident Canada goose management plan. The plan/EIS should also include an analysis of where the resident Canada geese congregate within the park to guide habitat modification in these areas.

Representative Quote(s):

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235711 **Organization Type:** Unaffiliated Individual

Representative Quote: Lack of good science and incomplete consideration of available information

The DEIS relies on information contained in reports, technical brochures, and unpublished materials (and even omits from the bibliography authorities cited in text, such as Bates 2010a) that suggest it was prepared with only casual scholarship. It misses or ignores important factors relating to both the biology and ecology of Canada geese as well as effective nuisance abatement strategies that call to question whether the understanding of goose biology or ecology is sufficient to have planned for management at all. We can only conclude that it was not.

The DEIS (pg. 245) claims that resident geese stay within a 5 to 10 miles radius during non-breeding and 0.25 to 0.50 mile radius during the breeding season, citing itself (NPS 2010a) again with a source that does not appear in the bibliography. No mention is made of the phenomenon of molt migration, despite literature demonstrating that significant proportions of "resident" goose populations will undertake migratory movements when their nests fail (Luukkonen et al. 2008, Dieter & Anderson 2009). In our many years of direct experience with Canada goose programs we have found that egg and nest destruction, combined with harassment such as by trained dogs (Castelli & Sleggs 2000), can be highly successful in eliminating Canada goose problems when timed and applied correctly.

Beyond the previously mentioned study of goose herbivory on wild rice (Haramis & Kearns 2007), the DEIS contains only one mention of a peer review article on goose herbivory (Conover 1991; cited in the DEIS as Conover 1999), where numerous others (e.g., Bushbaum et al. 1987, Buchsbaum & Valiela 1987) would have been within range of even a modest literature review. The same holds for nuisance abatement strategies (e.g., Aguliera et al. 1999, Conover 1985, 1992, Fairaizl 1992, Heinrich & Craven 1990, Whitford 2002, 2008). They simply are not reviewed or analyzed sufficiently and the literature covered is almost wholly from secondary rather than primary sources, with little useful information incorporated into the development of alternatives.

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235706 **Organization Type:** Unaffiliated Individual

Representative Quote: There is little evidence established in the DEIS for goose impacts, other than the anecdotal visual monitoring and preliminary exclusion studies cited. Beyond that, the DEIS fails to establish sufficiently the extent, timing, nature, and variability in damage caused or said to be caused by Canada geese throughout the Anacostia restored wetlands. It does say that "…some wetland planting areas in Kingman March….have been nearly destroyed…" [emphasis added], but this hardly suffices as justification to kill hundreds of geese and then kill even more (DEIS: 43) if as-yet-to-be-defined objectives are not met.

A single peer-review research paper is cited about goose impacts to aquatic plantings, this concerning the effects of goose herbivory on wild rice (Zizania aquatica) in the Patuxent River (Haramis & Kearns 2007). This is suggestive of the potential for geese to impact aquatic plantings, but the DEIS itself and supporting literature (e.g., Buschbaum et al. 1984, Buschbaum & Valiela 1987, Connover 1991) note there is considerable variability in the palatability of plants to geese and other herbivores. The DEIS repeatedly makes vague (e.g., reduction of the goose population would "…result in indirect improvements to wetland vegetation as well as terrestrial vegetation." DEIS: 193) and unsubstantiated ("Currently, resident Canada goose herbivory is reducing aerial coverage of wetland vegetation." DEIS: 191) claims. The Final EIS must deal with the many inconsistencies inherent in such statements as well as address the issue of preference and palatability by examining thoroughly the option of wetlands plantings that would naturally resist goose herbivory while functionally serving the purposes NPS seeks. This is especially critical in light of the many other factors that would tend to impede wetlands sustainability in this system.

Corr. ID: 6 **Organization:** *Not Specified*

Comment ID: 235724 **Organization Type:** Unaffiliated Individual

Representative Quote: The plan/EIS should include an analysis of where the resident geese congregate within the park and the factors that makes those habitats attractive to geese. NPS has records of the location of goose nests (p. 45). That data along with the goose count data in the tables on pp. 162-163 should be analyzed to identify where the geese are. Those habitants should be evaluated to identify the key factors that make them desirable to geese. Wildlife biologists have extensively studied the habitat factors that affect resident geese populations. A summary of that literature should be a part of the management plan. More discussion of habitant modification at goose congregation sites within the park should be in the plan.

Response: The NPS obtained and reviewed the suggested data/resources and incorporated information from these sources into the Final plan/EIS, where applicable (see the “Resident Canada Geese” section of Chapter 3 and 4 in the Final plan/EIS). The Conover 1999 reference was changed to Conover 1991 and the Bates 2010a and NPS 2010a references were resolved. The NPS acknowledges that more data are available every year and there is some uncertainty since impacts are observational, but the integration of Adaptive Management as part of the plan/EIS aims to resolve these uncertainties in the future. Also, in response to Concern ID 34531, the NPS has added a discussion regarding the behavioral differences that distinguish resident Canada geese from migratory Canada geese in Chapter 3, “Resident Canada Geese” of the Final plan/EIS.

Additional data on existing conditions have been added to the Final plan/EIS. Specifically, the 2010 and 2011 goose count data have been added to the “Resident Canada Geese” section of Chapter 3 of the Final plan/EIS to further describe current conditions at the park. The “Need for Action” section in Chapter 1 was also enhanced to communicate the necessity for resident Canada goose management at the park. The results of the most recent herbivory studies were added to the Final plan/EIS to demonstrate the need for reducing the population of resident Canada geese within the park. This information was also added to the “Background on Wetlands Restoration and Resident Canada Goose Management” section in Chapter 1.

Information on the location of resident Canada geese within the park was included in the Draft plan/EIS, and can be found in Chapter 3, “Resident Canada Geese”, as well as in Tables 5 and 6, of the Final plan/EIS. In response to the comments, the reasoning behind why geese prefer certain areas of the park was enhanced in this section, however, habitat modification to address impacts from resident Canada geese is already addressed in the plan where it would be consistent with park purpose, significance, and mission goals (see response to concern ID 34533).

Concern ID: 34569

CONCERN STATEMENT: The plan/EIS should include results from water quality tests within the Anacostia River.

Representative Quote(s):

Corr. ID: 1 **Organization:** *Not Specified*

Comment ID: 235685 **Organization Type:** Unaffiliated Individual

Representative Quote: where are the water quality tests and why are they not part of the eis?

Response: Water quality sampling and data collection were not conducted for this plan/EIS. A general discussion of Anacostia River water quality had already been included in the plan/EIS from previous studies that collected water quality data in the vicinity of the park. Please see Chapter 3, “Water Quality” of the Final plan/EIS for a discussion of water quality and Chapter 4, “Water Quality” of the Final plan/EIS for a cumulative impacts analysis of water quality.

VE4000 - VISITOR EXPERIENCE: IMPACT OF PROPOSAL AND ALTERNATIVES

Concern ID: 34570

CONCERN STATEMENT: Commenters feel that the experiences of losing resident Canada geese from the park and the humaneness of the action have not been addressed thoroughly in the document.

Representative Quote(s):

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235714 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS does not adequately address the human environment. Humaneness not considered.
One of the objectives of the NEPA process is to address concerns emanating from the values and beliefs people hold concerning the environment, and to take into account how the public at large regards proposed federal actions. The DEIS addresses what it calls the "visitor experience" or "natural recreation experience" in several places, but largely in a way that dismisses any notion that individuals or groups will experience any sense of loss if geese are killed. The controversies surrounding lethal control of resident geese are well known and have been addressed (e.g., Loker et al. 1999, Swift 2000) in ways that should have made it clear to the preparers of this DEIS that a close look at the issue of valuation of geese was mandatory. The FEIS must fully account for the human dimension in managing conflicts with geese, addressing this issue far more substantively than has been done.

Corr. ID: 5 **Organization:** The HSUS, ASPCA, & City Wildlife

Comment ID: 235715 **Organization Type:** Unaffiliated Individual

Representative Quote: The methodologies NPS proposes for lethal removal of geese must also be critically examined and their humaneness evaluated. Where geese are frequently referred to as a nuisance (e.g. DEIS: 62) virtually no mention, and clearly no analysis, is made concerning the value they may have for individuals or groups. The Final EIS must address these factors and it must describe in far greater detail the extent to which geese will suffer during the process of removal and killing and the humaneness of the killing methods.

Response: In regards to concerns over the impact that the loss of resident Canada geese would have on park visitors, the NPS feels it has adequately addressed this concern in the discussion of objectives, desired conditions, and in the analysis of impacts to resident Canada geese, as well as the "Visitor Experience" and "Aesthetics" sections of Chapter 4 (see Chapter 4, "Visitor Use and Experience" of the Final plan/EIS for a discussion of these benefits). As noted in response to **concern ID 34545**, the NPS made it clear in several sections of the plan/EIS that the park would manage a population of, and not eradicate Canada geese. Even though a percentage of the resident Canada goose population would be removed as a result of implementing this plan/EIS, some Canada geese would remain in the park, including both resident and migratory Canada geese. The combined wetland and resident Canada goose management would allow wetlands to reach the desired condition of predominantly self-sustaining wetland systems and would enhance habitat for migratory Canada geese that use the park on a seasonal basis. This would have benefits for migratory Canada geese which are a natural part of this ecosystem, and for the aesthetics of the park and experience of visitors who enjoy more natural fluctuations of geese populations.

The "Visitor Use and Experience" section of the plan/EIS thoroughly analyzed three groups of users at the park to equally consider the feelings of all visitors, including not only visitors who enjoy seeing resident Canada geese at the park, but also 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. Each of the different users of the park had varying expectations and impacts as a result of the no action alternative and management alternatives. For some users, resident Canada geese are recognized as providing a number of public benefits and these benefits are adequately described in the plan/EIS. For example, the benefits of a resident Canada goose population in urban areas such as Anacostia Park include the aesthetic value of the presence of these birds. For some park users, the resident Canada goose population at Anacostia Park may mark the only opportunity to view wildlife. The presence of these geese therefore, provides a positive park experience for this group of users. These visitors would be pleased to see and observe goslings and adult resident Canada geese year round in large numbers. Impacts to this user group would continue to be beneficial since visitors could continue to view goslings and adult resident Canada geese year round within the park, but the population would be reduced under the preferred alternative (alternative B).

The NPS also believes humaneness was thoroughly considered and addressed in the Draft plan/EIS. As was stated, the NPS would conduct any lethal management actions in accordance with the American Veterinary Medicine Association guidance (AVMA 2007), to ensure actions are conducted as humanely as possible to minimize goose suffering (see Chapter 2, "Resident Canada Goose Management" of the Final plan/EIS). Additionally, the NPS would conduct population reduction strategies in a controlled manner and mitigation is described in detail and would be employed to minimize goose suffering (see Chapter 2, "Resident Canada Goose Management" of the Final plan/EIS). As stated in the plan/EIS, sedated resident Canada geese would only be captured by trained wildlife officials and would be taken off-site to be euthanized. If shooting is required for isolated incidences only, this activity would only be undertaken by qualified federal employees that are trained, experienced, and licensed to use a firearm. Additional text was incorporated into the Final plan/EIS concerning impacts of lethal removal (see Chapter 2, "Resident Canada Goose Management" of the Final plan/EIS). Text was updated to state that the captured resident Canada geese during round-ups would only include mature geese and self-sufficient young-of-the-year geese. Goose round-ups would occur during the summer months when adult geese are molting and flightless (starting June 15 in the Mid-Atlantic) and when young-of-the-year (juveniles less than 1 year old) are considered self-sufficient but unable to fly. Therefore, young-of-the-year geese that remain in the park after the roundups would be expected to survive on their own.

WF1100 - WILDLIFE FEEDING

Concern ID:	34571	
CONCERN STATEMENT:	Wildlife feeding should be prohibited and enforced at Anacostia Park.	
Representative Quote(s):	**Corr. ID:** 4	**Organization:** People for the Ethical Treatment of Animals (PETA)
	Comment ID: 235702	**Organization Type:** Unaffiliated Individual
	Representative Quote: Most importantly, implement and enforce a wildlife feeding prohibition.	
Response:	As noted in the "Management Techniques Common to all Action Alternatives (B through E)" in the Final plan/EIS, wildlife feeding in National Park Units is prohibited under 36 CFR 2.2. Additionally, this section notes the specific steps the NPS has committed to for communicating and enforcing this prohibition. See Chapter 2, "Management Techniques Common to all Action Alternatives (B through E)" of the Final plan/EIS for a detailed discussion.	

WH1100 - WILDLIFE AND WILDLIFE HABITAT

Concern ID:	34572	
CONCERN STATEMENT:	The impacts on other wildlife throughout the park from implementing visual deterrents as a control measure for resident Canada geese should be analyzed in the plan/EIS.	
Representative Quote(s):	**Corr. ID:** 6	**Organization:** *Not Specified*
	Comment ID: 235727	**Organization Type:** Unaffiliated Individual
	Representative Quote: Visual deterrents such as Mylar tape, flags, balloons and dogs are mentioned as control measures (p. 65). What would be the impact on other wildlife, such as ospreys and bald eagles?	
Response:	The NPS has updated the Final plan/EIS to address this concern under the Vegetation and Wildlife Impacts section of Chapter 4. Although the bald eagle was removed from the list of threatened and endangered species in 2007, the eagle is still protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act (as are ospreys). The use of scare and harassment techniques to manage resident Canada geese at the park would not be likely to affect either the bald eagle or the osprey, that utilize the shorelines of the Anacostia River. Visual deterrents such as mylar tape, flags, balloons, and dogs may cause bald eagles or ospreys to temporarily avoid that particular area during the use of these scare and harassment techniques. However, both the bald eagle and osprey are using "airspace" over or immediately adjacent to the shorelines which would not be expected to overlap with the areas where scare/harassment techniques are being applied. These techniques would have a negligible impact on bald eagles and ospreys at the immediate area disturbed, but only during the period of scare/harassment activities. There are bald eagle nests along the Anacostia River in the park (along Shepherd Parkway), but this area is not proposed for visual deterrents. If necessary in the future, coordination with the USFWS would occur prior to implementing scare/harassment techniques.	

WQ4000 - WATER RESOURCES: IMPACT OF PROPOSAL AND ALTERNATIVES

Concern ID:	34573
CONCERN STATEMENT:	Commenters suggested avoiding impacts to existing wetlands and if wetland impacts cannot be avoided, proper permits must be obtained.
Representative Quote(s):	**Corr. ID:** 8 **Organization:** USEPA Region III **Comment ID:** 235734 **Organization Type:** Federal Government **Representative Quote:** EPA recommends avoiding and minimizing impacts to existing wetlands. If impacts to aquatic resources are to occur the proper permits must be obtained.
Response:	The NPS would obtain any required permits, as stated in Chapter 4 of the Draft plan/EIS (please see Chapter 4, “Wetlands” of the Final plan/EIS for these discussions).

INDEX BY ORGANIZATIONS

Note: In many instances, the organization type was not defined by the commenter; therefore, organizations were listed as "Unaffiliated Individuals". N/A represents individuals who did not submit their first or last name.

Organization	Corr. ID	Code	Description
Conservation/Preservation			
Anacostia Watershed Society\	12	AL1300	Alternatives: New Elements
		AL1500	Alternative B: Supports Alternative
		PC1100	Project Costs
Federal Government			
DC State Historic Preservation Office	7	CR4000	Cultural Resources: Impact Of Proposal And Alternatives
USEPA Region III	8	WQ4000	Water Resources: Impact Of Proposal And Alternatives
State Government			
Maryland Historical Trust	9	CR4000	Cultural Resources: Impact Of Proposal And Alternatives
Unaffiliated Individual			
People for the Ethical Treatment of Animals (PETA)	4	AL1300	Alternatives: New Elements
		AL1900	Vegetative Buffers
		AL2800	Alternative E: Supports Alternative
		AL4200	Lethal Control
		AL4300	Alternative Elements: Scare Tactics
		AL4600	Egg Addling
		WF1100	Wildlife Feeding
The HSUS, ASPCA, & City Wildlife	5	AE12000	Affected Environment: Wildlife And Wildlife Habitat
		AL1300	Alternatives: New Elements
		AL3900	Alternative D: Supports Alternative
		AL4000	Alternative Elements: Supports Non-Lethal Measures
		AL4200	Lethal Control
		AL4210	Oppose Lethal Control
		AL4900	Goose Nest Destruction
		GA1000	Impact Analysis: Impact Analyses
		LU1100	Land Use
		PC1100	Project Costs
		PN1100	Purpose and Need: Methods and Assumptions
		PN1600	Other Park Goals and Management Plans
		PSCA001	Non-goose impacts on water quality
The HSUS, ASPCA, & City Wildlife (continued)		PSCA010	Other stressors on restored wetlands
		PSSM002	Need for Additional Data/Science

Organization	Corr. ID	Code	Description
		VE4000	Visitor Experience: Impact Of Proposal And Alternatives
USGS Patuxent Wildlife Research Center	2	AL1300	Alternatives: New Elements
		CC1100	Effects of Climate Change
		DE1100	Document Edits
		MP1100	Monitoring Protocol
		PSAE040	Wetland functions
former Anacostia Watershed Society staff	3	AL1500	Alternative B: Supports Alternative
		CC1100	Effects of Climate Change
		DE1100	Document Edits
N/A	1	AL1300	Alternatives: New Elements
		AL4210	Oppose Lethal Control
		PSCA001	Non-goose impacts on water quality
		PSSM002	Need for Additional Data/Science
	6	AL1300	Alternatives: New Elements
		AL1500	Alternative B: Supports Alternative
		AL4200	Lethal Control
		AL5000	Goose Population Goal
		DE1100	Document Edits
		PC1100	Project Costs
		PP1100	Public Participation
		PSAE010	wetland restoration
		PSSM002	Need for Additional Data/Science
		WH1100	Wildlife and Wildlife Habitat
	10	AL4000	Alternative Elements: Supports Non-Lethal Measures
		AL4210	Oppose Lethal Control
	11	CC1100	Effects of Climate Change
	13	AL1300	Alternatives: New Elements
		AL1500	Alternative B: Supports Alternative
		AL4200	Lethal Control
		AL5000	Goose Population Goal
		DE1100	Document Edits
		PC1100	Project Costs
		PSAE010	wetland restoration
		PSSM002	Need for Additional Data/Science

INDEX BY CODE

Note: Those correspondences identified as N/A represent unaffiliated individuals.

Code	Description	Organization	Corr. ID
AE12000	Affected Environment: Wildlife And Wildlife Habitat	The HSUS, ASPCA, & City Wildlife	5
AL1300	Alternatives: New Elements	Anacostia Watershed Society	12
		People for the Ethical Treatment of Animals (PETA)	4
		The HSUS, ASPCA, & City Wildlife	5
		USGS Patuxent Wildlife Research Center	2
		N/A	1
			6
			13
AL1500	Alternative B: Supports Alternative	Anacostia Watershed Society	12
		former Anacostia Watershed Society staff	3
		N/A	6
			13
AL1900	Vegetative Buffers	People for the Ethical Treatment of Animals (PETA)	4
AL2800	Alternative E: Supports Alternative	People for the Ethical Treatment of Animals (PETA)	4
AL3900	Alternative D: Supports Alternative	The HSUS, ASPCA, & City Wildlife	5
AL4000	Alternative Elements: Supports Non-Lethal Measures	The HSUS, ASPCA, & City Wildlife	5
		N/A	10
AL4200	Lethal Control	People for the Ethical Treatment of Animals (PETA)	4
		The HSUS, ASPCA, & City Wildlife	5
		N/A	6
			13
AL4210	Oppose Lethal Control	The HSUS, ASPCA, & City Wildlife	5
		N/A	1
			10
AL4300	Alternative Elements: Scare Tactics	People for the Ethical Treatment of Animals (PETA)	4
AL4600	Egg Addling	People for the Ethical Treatment of Animals (PETA)	4
AL4900	Goose Nest Destruction	The HSUS, ASPCA, & City Wildlife	5
AL5000	Goose Population Goal	*N/A*	6
			13

Code	Description	Organization	Corr. ID
CC1100	Effects of Climate Change	USGS Patuxent Wildlife Research Center	2
		former Anacostia Watershed Society staff	3
		N/A	11
CR4000	Cultural Resources: Impact Of Proposal And Alternatives	DC State Historic Preservation Office	7
		Maryland Historical Trust	9
DE1100	Document Edits	USGS Patuxent Wildlife Research Center	2
		former Anacostia Watershed Society staff	3
		N/A	6
			13
GA1000	Impact Analysis: Impact Analyses	The HSUS, ASPCA, & City Wildlife	5
LU1100	Land Use	The HSUS, ASPCA, & City Wildlife	5
MP1100	Monitoring Protocol	USGS Patuxent Wildlife Research Center	2
PC1100	Project Costs	Anacostia Watershed Society	12
		The HSUS, ASPCA, & City Wildlife	5
		N/A	6
			13
PN1100	Purpose and Need: Methods and Assumptions	The HSUS, ASPCA, & City Wildlife	5
PN1600	Other Park Goals and Management Plans	The HSUS, ASPCA, & City Wildlife	5
PP1100	Public Participation	*N/A*	6
PSAE010	wetland restoration	*N/A*	6
PSAE040	Wetland functions	USGS Patuxent Wildlife Research Center	2
PSCA001	Non-goose impacts on water quality	The HSUS, ASPCA, & City Wildlife	5
		N/A	1
PSCA010	Other stressors on restored wetlands	The HSUS, ASPCA, & City Wildlife	5
PSSM002	Need for Additional Data/Science	The HSUS, ASPCA, & City Wildlife	5
		N/A	1
			6
			13
VE4000	Visitor Experience: Impact Of Proposal And Alternatives	The HSUS, ASPCA, & City Wildlife	5
WF1100	Wildlife Feeding	People for the Ethical Treatment of Animals (PETA)	4
WH1100	Wildlife and Wildlife Habitat	*N/A*	6
WQ4000	Water Resources: Impact Of Proposal And Alternatives	USEPA Region III	8

COMMENT LETTERS

GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICER

September 27, 2011

Mr. Alexey Romero
Superintendent, National Capital Parks-East
National Park Service
1900 Anacostia Drive, SE
Washington, DC 20020

RE: Draft Environmental Impact Statement (DEIS) for Anacostia Park Wetlands Management Plan with Resident Goose Management Strategies, Anacostia Park

Dear Mr. Romero:

Thank you for providing the DC State Historic Preservation Office (SHPO) with the above-referenced document. We have reviewed the DEIS information in accordance with Section 106 of the National Historic Preservation Act and are writing to provide our comments regarding effects on historic properties.

Historic Built Environment:

Based upon our review of the various alternatives described in DEIS, we agree with the National Park Service (NPS) that there is potential for some of the actions currently being evaluated to constitute an "adverse effect" on the historic built environment. Most notably, installing "seawall breaks" in the National Register-eligible Anacostia Seawall could diminish the integrity of this resource. If one of the alternatives that propose this type of action is selected, the NPS should notify our office and provide additional information about the exact location of the proposed breaks and the existing conditions of the seawall in these specific areas. Once that information is provided, we will consult further with the NPS to make a determination of effect and to continue the Section 106 process.

Archaeology:

Based upon our review of the various alternatives described in DEIS, we agree with the National Park Service (NPS) that there is potential for some of the actions currently being evaluated to constitute an "adverse effect" on potential archeological resources. Once an alternative is selected, the NPS should notify our office and provide the proposed locations of ground-disturbing activities. After that information is provided, we will consult further with the NPS to make a determination of effect and to continue the Section 106 process as described on page 261.

If you should have any questions or comments regarding this matter, please contact me (for historic built environment) at andrew.lewis@dc.gov or 202-442-8841 or Ruth Trocolli (for archaeology) at ruth.trocolli@dc.gov or 202-442-8836. Otherwise, thank you for providing this opportunity to review and comment. We look forward to consulting further with the NPS on this project.

Sincerely,

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

09-412

1100 4th Street, SW, Suite E650, Washington, DC 20024 Phone: 202-442-7600, Fax: 202-442-7638

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

September 26, 2011

Alexcy Romero, Superintendant
National Capitol Parks-East
1900 Anacostia Drive, SE
Washington D. C. 20020

09/30/11

RE: Wetlands and Resident Canada Geese Management Plan/ Draft Environmental Impact Statement, Anacostia Park, June 2011 CEQ # 20110238

Dear Superintendent Romero:

In accordance with the National Environmental Policy Act (NEPA) of 1969, and Section 309 of the Clean Air Act, the Environmental Protection Agency (EPA) has reviewed the Wetland and Resident Canada Geese Management Plan Draft Environmental Impact Statement (DEIS), Anacostia Park. The park occupies 1, 300 acres along 5 miles of the Anacostia River shoreline within Washington D.C. and Maryland. According to the DEIS, 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. Currently, some restored wetlands at the park are being damaged by grazing resident Canada geese resulting in: adverse change 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 in the river; and potential adverse effects on wildlife and fisheries habitat and the natural distribution, abundance, and diversity of native plant species. A population goal of 54 geese has been established for Anacostia Park.

According to the DEIS, the alternatives evaluated in this document rely on adaptive management to guide the implementation of the preferred alternative. This document is a general plan for the management of wetlands and resident geese within the park and evaluates the impacts at a programmatic level. Additional NEPA analysis may be required for some future management projects prior to construction or implementation of these projects. Should the evaluation of monitoring data indicate the need for action, NPS will select a management option from those available within the preferred alternative that best responds to the conditions documented by monitoring. The Alternatives evaluated in the DEIS include:

- Alternative A (No action)

-Alternative B (Preferred Alternative) - provides the highest level of wetlands and goose management. Also considers new wetland restoration options (lethal and non lethal controls).

-Alternative C - includes moderate wetlands management with moderate goose management. This alternative assumes that more intensive wetland management would be needed to counteract the resident goose population that would remain in the area.

-Alternative D - low wetlands management and low goose management. Lethal goose management only one time during the plan and only as a last resort.

-Alternative E - most aggressive wetlands management techniques with intensive non-lethal goose management. This alternative would consider new wetland restoration options as well.

Based on our review, this DEIS is rated "LO" (Lack of Objections). A description of our rating system can be found at: http://www.epa.gov/compliance/nepa/comments/ratings.html.

EPA recommends avoiding and minimizing impacts to existing wetlands. If impacts to aquatic resources are to occur the proper permits must be obtained. We look forward to working with you as the project continues to move forward through any additional potential NEPA and Clean Water Act Section 404 permit process.

Thank you for the opportunity to offer these comments. If you have any questions, please contact Ms. Barbara Okorn at (215) 814-3330.

Sincerely,

Barbara Rudnick
NEPA Team Leader
Office of Environmental Programs

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NPS
ESC/JES

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Parks-East
1900 Anacostia Drive SE
Washington, D.C. 20020

RECEIVED
JUL 25 2011
BY:

Dear Sir or Madam:

PR Co.

The National Park Service (NPS), announces the availability of the Draft Anacostia Park Wetland and Resident Goose Management Plan and Draft Environmental Impact Statement (DEIS) for public review and comment.

The purpose of this Draft Plan/EIS is to guide and direct the actions of the NPS in the management of wetlands and resident Canada geese at Anacostia Park. It seeks to provide an integrated tool designed to allow for long-term planning and management for both wetlands and resident Canada geese, including strategies to facilitate the success and functionality wetland restoration activities at the park.

Five alternatives are analyzed in detail in the Draft Plan/EIS: the no action alternative, which represents the continuation of current management activities, and four action alternatives that range in the type, number, and intensity of wetland management techniques and goose management techniques. 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.

This DEIS was prepared in accordance with National Environmental Policy Act (NEPA) of 1969, as amended, and implementing regulations 40 CFR Parts 1500-1508, and NPS Director's Order #12 and Handbook, Conservation Planning, Environmental Impact Analysis, and Decision-Making (DO-12). Compliance with Section 106 of the National Historic Preservation Act of 1966 is occurring in parallel with the NEPA process.

Access to the Document:

Public review copies of the DEIS will be available at the following locations:

Kenilworth Aquatic Gardens Visitor Center
1550 Anacostia Avenue, NE
Washington, D.C. 20019

Langston Golf Course Club House
2600 Benning Road, NE
Washington, D.C. 20002

The Maryland Historical Trust has determined that there are no historic properties affected by this undertaking.

Jonathan Sager Date 8/24/11

*No HP in Maryland

Archeo: IBBC 8/12/2011

JES 8/24

Thank you for your interest and participation in this process.

Sincerely,

for Alexcy Romero
Superintendent
National Capital Parks-East

Correspondence (1)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	Yes
Name:	Kept Private
Organization:	
Organization Type:	I - Unaffiliated Individual
Address:	n/a not available, NJ 00000 USA
E-mail:	Kept Private

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 07/29/2011	**Date Received:** 07/29/2011 12:35 PM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

i do not favor any lethal actions against the geese at this park. it is clear that the problem in the river water is far more about mans toxic chicken farms in the area than the geese. it is about man's toxic chemical load. where are the water quality tests and why are they not part of the eis? eis 20111-0238 needs a new focus. we all like the wildlife. we want it encouraged. we want you to buy a machine, as used on long island, to clean up the pooop. it willpick it up off the ground for deposition to a waste facility. it is time to allow god's creatures to continue to live. i aand a majority of american citizens are sick and tired of the venal, vicious, actions against god's creatures here on earth. co existence is what we need to do. dont you guys in nps have brains so we can find ways to co exist or are you all so brain dead from lead shot that you have no brains left? i know you seem to work for gun mfrs and gunw ackos who murder all species more than the american pubilc these days. i need paper copies of all further actions or public comments on this issue.

Correspondence (2)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	No
Name:	Richard S. Hammerschlag
Organization:	USGS Patuxent Wildlife Research Center
Organization Type:	I - Unaffiliated Individual
Address:	Highland, MD 20777 USA
E-mail:	peachnfrog66@comcast.net

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 08/23/2011	**Date Received:** 08/23/2011 7:48 AM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

In this extensive DRAFT EIS (EIS) document there are many strong points and information drawing to a reasonable determination of Alternative B as the best management option. However, there are some egregious omissions, inconsistencies and outright errors that need to be considered/dealt with in producing the working/FINAL EIS.

Before getting to details I feel compelled to mention, as an obvious concerned party, that the Science Team (P. 287) failed to include any scientists with good familiarity with the Anacostia wetland system. I will be on travel through September 19, 2011 but would gladly make myself available thereafter to go through the EIS with a member(s) of the preparation team in the interest of cleaning up the document. There are far too many items for me to list at this time, but I will mention some of the more important issues.

The third listed objective for wetlands (P. 3) should be more explicit and/or elements considered under wetland restoration should be more comprehensive. Implicit in that third objective should be:
The National Park Service (NPS) saw fit to include Wetland Management in this EIS as one of the two principal elements even though it is overtly directed toward goose management and its repercussions. As the primary manager of almost all the tidal wetlands along the Anacostia in Washington, D.C. and in fact the entire Anacostia estuary, the NPS MUST exert itself consistent with the wetland management responsibilities it is accepting, as the leader (i.e., utilize strong proactive LEADERSHIP) toward achieving restoration of the Anacostia estuary as an integrated system. This then goes beyond the current piecemeal locations of the few reconstructed wetlands and thus among other things needs to include overt support for additional reconstructed freshwater tidal wetlands in the Anacostia……..Nowhere that I could find in the EIS in conjunction with wetland restoration was there mention of actively seeking creation of additional wetlands using placed sediments. (Hidden away p. 192 under Soils, Alternative B it does say………"Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River….thus stabilizing soils adjacent to the Anacostia River ". So, hardly a ringing call for restoration of the river and creating habitat.) For the Anacostia wetland system to be functional as a unit there needs to be a critical mass of

interrelated/interconnected wetlands – especially to be able to attract and support wetland fauna that once flourished there. This important thrust is supported by:

(p. 29) Section 4.6 of NPS Policies 2006:
(1) Provide leadership and take action………

(2) Preserve and enhance………

(P. 28) NPS Management Policies 2006 , Sect. 4.41: NPS will
achieve this (…maintain plants and animals) by "preserving and restoring the natural abundance, diversity, distribution, habitat and behavior…….and ecosystem in which they occur.

(p. 29 and 30) NPS Management Policies 2006 ('Wetlands')…. In addition the NPS will strive (i.e. exert leadership!! – RSH) to achieve a longer term goal…..through restoration of previously degraded or destroyed wetlands…..the Service will to the extent practicable, restore them to pre disturbance conditions.
(P.30 and 135) Under Director's Order #77-1 and Order # 12 (p. 185): 'Where appropriate and practical, the NPS will not simply protect (i.e., maintain – RSH) but will seek to enhance natural wetland values……
The above (a-d) is essentially repeated and emphasized on p. 211
Aspects of the above should also be included under Impact Topics, etc……Wetlands (restoration includes striving to make the Anacostia a functional system including significant additional wetlands), as well as Park Management Operations (leadership responsibilities)
The above are also consistent with and supported by (P. 31 and 32) the District of Columbia Wetland Conservation Plan, the Anacostia Waterfront Initiative, the Anacostia Watershed Restoration Agreement, the USFWS Wetlands Action Plan; (p.12) USACE study (2005). Also see p.17 A Functional Wetland System #s 2 and 4. Also see Aquatic Resources P. 222 and 223, as well as Vegetation p.228.

Besides quoting the classic definitions of wetlands (Cowardin, USACE) the EIS does not do full justice to the characterizations of the tidal wetlands. It should be clearly noted:
Freshwater tidal wetlands are an integrated system containing a balance of relatively deep open water, shallow waters (sufficient to support submersed aquatic vegetation = SAV), intertidal mudflats, emergent wetlands, wet meadows, swamp forest, etc. All these components are especially valid for the Anacostia. (Thus the description of General Vegetation and Habitat on p. 150 is incomplete). Therefore, while emphasis on emergent wetlands (vegetation) is fine, the roles of other components should be brought out along with the need for NPS to manage them correctly. The whole interrelated/integrated system needs to be protected, maintained and enhanced (involves significant restoration). This is particularly true now when open water systems predominate. It is also important that zeal for restoring wetlands does not just focus on emergent vegetation but also, for example, includes mud flats. Yes, there is a paragraph on SAV (p. 25). It should be noted there how important a component SAV was in the mid 1800s. SAV needs emphasis (leadership) as part of restoring the Anacostia. Even small efforts, despite excess turbidity, can promote 'mini pools' in which pockets of SAV can survive in the Anacostia. Also, for the record I/we have noted limited SAV at Kingman Marsh Area 1 over the past several years. The point is SAV restoration should not be written off as a poor bet.

A major area of inconsistency has to do with the nomenclature, acreages, maps and photograph identifications/labels. For example, in some places Kingman Area 1 and 2 are used, while others mention Kingman North and South. Some maps include Heritage Marsh, Fringe Marsh, PEPCO Marsh, others don't. Some places use the term Kingman Marsh inclusively with Heritage Marsh as a unit. The photograph on p. 41 is labeled Kingman Marsh but is really mostly Heritage Marsh. I would lay the responsibility on NACE to provide a better set of nomenclature that would be satisfactory to NPS. After all, the current situation is confusing. Just like Kenilworth is comprised of two major separate pieces (Mass Fill 1 and 2 – oy!!), so is Kingman. The northern piece (Kingman Area 1) and the southern piece (Kingman Area 2) were reconstructed in 2000. Kingman Area 2 is comprised of 8 acres and lies against the west bank of Heritage Island. However, Heritage Marsh was reconstructed (different authorization) in

2006 and occurs within the same piece of water as Kingman Area 2 BUT is separated from Area 2 by the dredged channel and lies along the east bank of RFK Stadium in three separate pieces (separated by design by two pre-existing stormwater outfall runs). So, technically Heritage Marsh is NOT part of Kingman Marsh (and….Heritage Marsh is NOT connected to Heritage Island). Point remains there is terrible inconsistency throughout the EIS especially in the section of marsh descriptions with acreages (Chapt. 3: Affected Environment….and e.g. p 214 PP3). There is even other confusion on p. 4 #1 where it should say Kingman Island instead of Kingman Marsh. To take this in the extreme (ultimate nit pic just to make the point) it doesn't look to me like the Fringe Marsh or Heritage Marsh (this time labeled BUT doesn't show Kingman Area 2 as part of Kingman Marsh) or Kingman Marsh Area 2 shaded…….By the way (p. 145) highlights RFK shoreline without mentioning Heritage Marsh and claims it is within Kingman Marsh. Also, where from did the notion of cattail planting come? It (they = 2-3 types of Typha there) is purely a volunteer, i.e., not planted. And perhaps Typha angustifolia is not native (presumably came from Europe)…….

Appendix C: Preliminary Monitoring Protocol……

It was really unclear to me whether this was a projected protocol for future monitoring or whether it refers to the one that is already in place and has been used for two years, OR maybe both!!! The indicated purpose was also fuzzy or even incorrect – or was this component written awhile ago and just not made current. At any rate the protocol pretty much as described was designed not so much to monitor the impacts of herbivory at Kingman Area 1 (p. 339) but to document and try to single out that the primary herbivory was due to resident Canada geese that were to be excluded from the fenced treatment plots (should sustain vegetation even when letting in other herbivores than the geese) as opposed to the exposed control plots which likely would be grazed. Whereas, and this is important, the selection of Alternate B mandates/essentially requires monitoring (of various types) for a number of indicators (especially vegetation) to determine to what extent the elected goose management actions allowed the wetlands to respond/restore. It would seem that this same plot design/set-up of 16 modules randomly located could be used with the primary determination being how well over time the exposed control plots become statistically similar to the exclosed plots. In other words there would be a switch with the current exclosed plots effectively becoming the control while the 'old' /prior exposed control plots become in effect the treatment………..

5. Should I suspect that 'non-mention' of the impacts from sea level rise was deliberate? Thinking long term - As part of Wetland Management responsibility I believe the reconstructed wetlands, or portions thereof, should be part of a long term monitoring program (including the Sediment Elevation Tables = SETs). These reconstructed wetlands present the opportunity to track a habitat from scratch (its beginnings) which is not a prevalent situation (and data has been collected from the beginning, even before…….)

Thanks for the opportunity to provide comments at this time. As stated earlier there are many, many other 'adjustment'/suggested changes that I'd be glad to go over with somebody later on when convenient.

Dr. Richard S. Hammerschlag
Scientist Emeritus
USGS Patuxent Wildlife Research Center

Correspondence (3)

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Author Information

Keep Private:	No
Name:	Steve McKindley-Ward
Organization:	former Anacostia Watershed Society staff
Organization Type:	I - Unaffiliated Individual
Address:	4112 30th Street Mount Rainier, MD 20712 USA
E-mail:	s.mckindley.ward@gmail.com

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 09/07/2011	**Date Received:** 09/07/2011 11:30 AM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

September 7, 2011

Alex Romero, Superintendent
National Capitol Parks-East
1900 Anacostia Drive, SE
Washington, DC 20020

Testimony of Steve McKindley-Ward
on the Draft Wetlands and Resident Canada Goose Management Plan/EIS

I was glad to learn in July that this draft plan/EIS had been completed. I must say that I was not certain this day would come. But I'm glad it has. My thanks to the National Park Service for seeing the process through.

I like Alternative B, which is the alternative with the most wetland and goose management measures.

I don't have any big comments that would significantly adjust the essential thrust of this document, or Alternative B. It seems good to me. And I'm pleased that Alternative B is NPS's environmentally preferred alternative.

Though I no longer work for the Anacostia Watershed Society, if NPS sees fit to reduce and more closely manage the resident goose population, this will create more incentive, I believe, for public involvement in helping to rebuild DC's largest tidal wetland complex.

If you do so, a feeling I've had will be diminished---the feeling of one step forward/one step backward---that undercutting feeling you get when doing plant restoration work that is likely to be eaten by geese---a feeling I often had while waiting for the NPS decisionmaking process to gear up, and now enter the home stretch. I hope, with aggressive goose management measures, more kids will get an opportunity to transplant arrow arum and pickerelweed plants into the mud (they love it!) and their nonprofit field trip leaders will feel their work has more of a shot of accomplishing something for our home river.

I said I don't have any big comments to recommend. But I do have a few small suggestions---edits really:

Page 2-The photo caption, I believe, is erroneous. The "denuded" wetland landscape is due to the time of year---early Spring. Only a few of the trees have leafed out in this photo. The perennial and annual wetland plants have not emerged from the mud yet because it hasn't warmed up enough, not due to goose herbivory. Goose herbivory follows when there's something to eat.

Page 31---This page has a list of relevant District of Columbia documents and policies. Left out, however, is the 2006 DC Comprehensive Plan. Under its broad category "Citywide Elements" is an "Environmental Elements" section, and inside this section, at the top of page 6-13, there is a specific mention of the need to control Canada geese. (Action E-1.5.A: Implementation of the Wildlife Conservation Plan. Implement the 2005 Wildlife Management Plan for the District of Columbia, including programs to control the white-tailed deer and Canada goose population, and to improve water quality and habitat in the Anacostia River.) This might be helpful to include.

Page 296---Unless I have a long-lost brother, separated at birth, I think the third citation from the top should be Steve, not "Tom" McKindley-Ward.

Finally, a word about global warming and likely rising tides on the Anacostia:

Oceans rising will have an effect on our tidal river. Long-time Patuxent River naturalist Greg Kearns believes the tidal Patuxent in Prince George's County is rising at the rate of one-eighth of an inch per year. If that is true, it makes sense to assume that the Anacostia should be rising at about the same rate---and will rise about 2 inches during the 15-year life of this plan.

Since tidal elevations matter---and matter in terms of inches---long-term planning for this scenario would seem to be prudent. I may have missed it, but I didn't see this addressed in the plan/EIS.

Finally, a word of encouragement for all of us to get more involved in slowing our use of fossil fuels to mitigate the worst outcomes of climate change.

One specific step we can take this fall is to encourage President Obama to live up to his campaign promises for turning to renewable energy and to rebuff the momentum toward building the Keystone XL pipeline from the north Alberta "tar sands" 1,700 miles south to Texas refineries. He will be able to decide the fate of this environmentally disasterous pipeline himself---without Congress. Dr. James Hansen, noted NASA climate scientist, said this summer: "Phase out of emissions from coal is itself an enormous challenge. However, if the tar sands are thrown into the mix, it is essentially game over" for a stable climate.

So, three additional measures for the long-term success of the Anacostia wetlands are:

1.) ride your bike as much as you can,
2.) use clothespins instead of the dryer,
3.) Those two thing and some activism. Demand the change we were promised by Barack Obama.

Thank you.

Steve McKindley-Ward
4112 30th Street
Mount Rainier, MD 20712
s.mckindley.ward@gmail.com

Correspondence (4)

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Author Information

Keep Private:	No
Name:	Jodi Minion
Organization:	People for the Ethical Treatment of Animals (PETA)
Organization Type:	I - Unaffiliated Individual
Address:	501 Front St. Norfolk, VA 23510 Norfolk, VA 23510 USA
E-mail:	jodim@peta.org

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 09/19/2011	**Date Received:** 09/19/2011 3:49 PM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

September 19, 2011

Stephen Syphax
Supervisory Resource Management Specialist
Anacostia Park
1900 Anacostia Dr. SE
Washington, DC 20020

Dear Mr. Syphax:

PETA is an international animal protection organization with more than 2 million members and supporters globally. We understand that the U.S. National Park Service in its "Draft Anacostia Park Wetland and Resident Goose Management Plan and Draft Environmental Impact Statement" (DEIS) is considering the use of lethal methods to control unwanted geese at Anacostia Park. We urge the Service to reject alternatives B, C, and D for this reason and to implement effective humane wildlife control methods instead, as described in Alternative E.

Respectfully, lethal methods never work in the long run to control geese populations, and will actually backfire. When animals are killed/removed from the area, a spike in the food supply results. This causes survivors and newcomers to breed at an accelerated rate, and populations can actually increase. Lethal measures are also very cruel. Setting aside the mode of killing (and the trauma that goes with), when adults are removed, families are torn apart, flock dynamics are disrupted, and vulnerable young are left to starve.

An integrated management program involving habitat modification, exclusion, and repellents as proscribed in Alternative E is vital to meet Service goals. Allow vegetation to flourish on banks to impede the movement of geese (birds will refrain from nesting in areas where predators will be an issue). 18-

inch wire, nylon, or plastic fencing will have a similar effect. Employ scare tactics (i.e., kites shaped like predators, remote control boats/planes, flashing lights) in the spring to deter nesting. Statues of dogs/coyotes and flags, Mylar streamers, and other items that move in the wind, as well as noise/sonic deterrents (i.e., air horns, Bird-X GooseBuster), also work great to keep geese away. Other successful goose deterrent methods include keeping grass at least 6" tall on lawns and spraying goose repellent (i.e., ReJeXiT Migrate) on lawns. Eggs should be oiled by trained professional. Most importantly, implement and enforce a wildlife feeding prohibition.

On behalf of our thousands of members in the District of Columbia, we hope to hear that lethal methods will be taken off the table.

Thank you for your consideration.

Sincerely,

Jodi Minion, Wildlife Biologist
Cruelty Investigations Department
PETA

Correspondence (5)

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Author Information

Keep Private:	No
Name:	N/A N/A
Organization:	The HSUS, ASPCA, & City Wildlife
Organization Type:	I - Unaffiliated Individual
Address:	Washington, DC 20037 USA
E-mail:	

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 09/26/2011	**Date Received:** 09/26/2011 9:56 AM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

Alexcy Romero
Superintendent
Re: Anacostia Wetland and Canada Goose Management Plan DEIS
National Capital Parks-East
1900 Anacostia Drive SE
Washington, DC 20020

Dear Superintendent Romero:

I am writing on behalf of The Humane Society of the United States (HSUS) and our more than 12 million supporters, including more than 32,000 in the District of Columbia and more than 283,000 in Maryland, The American Society for the Prevention of Cruelty to Animals (ASPCA) and our more than 2.5 million supports nationwide, and City Wildlife, an animal-welfare organization committed to helping urban wildlife in Washington, DC. The HSUS, ASPCA, and City Wildlife appreciate this opportunity to comment on the Draft Anacostia Park Wetland and Resident Canada Goose Management Plan/Environmental Impact Statement (DEIS) dated June 2011. As part of the animal welfare and protection community, our organizations have a long history of involvement in human-wildlife conflict resolution. We promote humane, integrated, and comprehensive conflict resolution strategies and oppose the killing of wild animals as solutions to conflicts, most especially prior to the exhaustion of all other feasible means, efforts, and alternatives.

We are happy to have this opportunity to express our admiration for the National Park Service (NPS) and their partners' efforts to restore viable and vital wetlands to the Anacostia River system. We join with you and others in valuing wetlands for the variety of ecological purposes they serve-that benefit both people and wildlife-and agree that wetlands loss is an issue of urgent national concern. Clearly our understanding of the value of wetlands has changed with time. They are no longer considered breeding grounds of pestilence worthy of elimination. Their destruction is no longer defensible; their restoration is an admirable goal.

However, the plan by NPS to kill hundreds of Canada geese as part of its larger wetlands restoration initiative along the Anacostia River is wrong at a number of levels, and it certainly does not rise to the standards necessary to justify lethal control. We are gravely concerned that geese have been targeted for management within this complex system that is impacted by so many anthropogenic factors. We have questions concerning the identification and delineation of impacts, the documentary basis from which statements about geese and their ecological relationships are made, and the effort made to fully consider alternative means of conflict resolution that are more reasonable and more consistent with an integrated pest management (IPM) approach. We argue, with all respect, that NPS has not seriously considered, researched, or evaluated alternatives to killing and has moved on a decision to use lethal control on the basis of incomplete information and misunderstandings about geese. The decision to proceed with lethal control as the preferred alternative has, as we see it, been made prematurely and recklessly. The following explains further our concerns and offers specific comments on the DEIS.

The DEIS conflates management strategies and fails to clearly delineate management alternatives.
The DEIS conflates information about anthropogenic impacts with impacts attributed to geese in a manner that submerges the relatively minor issues associated with geese within a much larger domain of human-caused problems. Thus, it tends to overstate the case it tries to make against geese and understate the case for hydrogeomorphic and other influences on the potential for wetlands restoration. We feel by combining these two very different management issues into this DEIS, NPS implicitly acknowledges that the case against geese is too weak to stand on its own. NPS itself notes the complex hydrological and ecological factors that go in to the establishment and maintenance of artificial wetlands and the dominant role hydrology plays in plant survival (DEIS: 16). The Final EIS must clearly relate the impacts from anthropogenic factors in Anacostia wetlands to impacts from Canada geese. NPS must demonstrate the role that anthropogenic influences such as fluctuating water level, mechanical erosion, sedimentation, pollution, and other factors play with respect to wetland planting success and failure, and then compare these relative to the potential impact from goose herbivory.

The DEIS fails to document current conditions well enough to establish a need for action. Damage to aquatic plants and other environmental impacts not sufficiently described.
The DEIS does not rise to the level of documentation required to establish a need to kill geese-a native, protected species of bird for whom the NPS has a strict protective mandate. The shortcomings are numerous. Perhaps most significantly the DEIS notes (pg. 13) that study began in 2009 to "…determine the impact of herbivory by resident Canada geese on Kingman Marsh," citing a report from that first year that indicates that geese are "inflicting damage" to wetland vegetation there. Following this highly vague and casual problem identification and delineation, NPS goes on to note that the second year of study will be included [our emphasis] in the Final EIS. This is a tacit admission that NPS is proposing to manage geese first and then ask questions about properly documenting their impacts later.

There is little evidence established in the DEIS for goose impacts, other than the anecdotal visual monitoring and preliminary exclusion studies cited. Beyond that, the DEIS fails to establish sufficiently the extent, timing, nature, and variability in damage caused or said to be caused by Canada geese throughout the Anacostia restored wetlands. It does say that "…some wetland planting areas in Kingman March…have been nearly destroyed…" [emphasis added], but this hardly suffices as justification to kill hundreds of geese and then kill even more (DEIS: 43) if as-yet-to-be-defined objectives are not met.

A single peer-review research paper is cited about goose impacts to aquatic plantings, this concerning the effects of goose herbivory on wild rice (Zizania aquatica) in the Patuxent River (Haramis & Kearns 2007). This is suggestive of the potential for geese to impact aquatic plantings, but the DEIS itself and supporting literature (e.g., Buschbaum et al. 1984, Buschbaum & Valiela 1987, Connover 1991) note there is considerable variability in the palatability of plants to geese and other herbivores. The DEIS repeatedly makes vague (e.g., reduction of the goose population would "…result in indirect improvements to wetland vegetation as well as terrestrial vegetation." DEIS: 193) and unsubstantiated ("Currently, resident Canada goose herbivory is reducing aerial coverage of wetland vegetation." DEIS:

191) claims. The Final EIS must deal with the many inconsistencies inherent in such statements as well as address the issue of preference and palatability by examining thoroughly the option of wetlands plantings that would naturally resist goose herbivory while functionally serving the purposes NPS seeks. This is especially critical in light of the many other factors that would tend to impede wetlands sustainability in this system.

The DEIS fails to adequately articulate park goals.
The DEIS notes that the park has yet to settle on its management goals through approval of a General Management Plan (GMP) (DEIS: 8-9). This is not an appropriate point of departure for any management program, much less one that calls for killing hundreds of wild, native animals. The vagueness inherent in statements such as "The park staff believes that park wetlands are integral to the functioning of all wetlands within the watershed." (DEIS: 17) and "For this plan, a manageable resident Canada goose population is defined as one that allows restored wetlands within the park to function as wetlands systems."(DEIS: 17) further dilute the credibility NPS must establish to justify any management program.

The "Desired Conditions" articulated by NPS (DEIS: 17) are an apparent place holder for fully articulated management goals and objectives. They are not well explained or defended with respect to other objectives statements scattered throughout the document. The desired conditions further do not relate well to the six articulated priority watershed goals. Nor are they explained well with respect to their standing as NPS policy formulations that would endow authority to manage either wetlands or geese. The Final EIS must explain how, in the absence of an approved GMP, the "Desired Conditions" can assume the power of a mandate to manage Canada geese, especially to manage resident but not migratory geese.

The DEIS fails to discuss fully what is meant by "resident" geese and "invasive" species.
The NPS has a strict protective mandate for native species of wildlife and does not intervene in their management except and where those species have, largely under anthropogenic influences, become so numerous that their control can be justified. Not only do the conditions articulated in the DEIS fail to warrant the killing proposed, but the argument(s) concerning the status of "resident" geese are not sufficient.

NPS describes migratory geese by commenting "Migratory geese are a natural part of the ecosystem, which play an important role in the system." (DEIS: 17). It then describes "resident" geese as a "nuisance" species (DEIS: 20) and by saying "Resident geese stay within Anacostia Park and the surrounding area year round, which ultimately disrupts the natural ecosystem." (DEIS: 17). NPS relegates the major description and discussion of "resident" geese to the section on "Invasive Wildlife Species" (pgs. 157ff) and makes further references to "resident" geese as an "invasive" species in a way that either demonstrates poor understanding of what "resident" and "invasive" mean (e.g., discussion on page 161) or suggest that NPS is simply accepting the perspectives of management agencies with wholly different charters and missions.

The definition that the DEIS gives ("Invasive species can include both plant and animal species that are not native to the area and are likely to threaten the native biodiversity of the habitat." (DEIS:157)) is fraught with questionable meaning and potentially opens the door to reclassifying any species of wild animal that might have made a range adjustment following European settlement. For example, mockingbirds (Mimus polyglottos) have significantly expanded their wintering range northward within the last fifty years (e.g., Stiles 1982). Are they "native" to the new areas they occupy or not? If NPS is going to define "resident" geese as a nonnative species then it should be ready to follow a similar practice with respect to many other bird and mammal species that have benefited from human development of landscapes and settlements that encourage range expansions.

NPS must be very careful in the argument it is attempting to make here, which is essentially that "resident" Canada geese lack the "value" of native (i.e., migratory) geese and are a "nuisance" (DEIS: 20) species. That argument may be made (however weakly) by those responsible for managing geese as a consumptive resource, but it should not be applied to species that are engaging in adaptive behavior. Beyond this, NPS must demonstrate how artificially engineered and planted wetlands can be identified as "native biodiversity" when "resident" geese cannot.

The Final EIS must explain in terms relevant to the NPS mission (as articulated in its Organic Act) how Canada geese can be treated as an "invasive" species. It must provide evidence that a service-wide standard can be applied with respect to other species of native wildlife throughout the parks as regards their classification and status. The perspective applied to "resident" geese in this DEIS is consistent with classifications that flow from agencies who manage these birds for consumptive purposes and do not go to the point, or heart, of NPS positions or policies governing native species.

The DEIS fails to follow IPM policies and practices
The DEIS fails to establish a plan for managing conflicts with Canada geese that follows NPS IPM policies. In employing an IPM approach it would be incumbent on NPS to determine management objectives, then set action thresholds, monitor, and choose action based on selection of least- to most-invasive approaches in order (McShea & DiSalvo 2001). It is consistent with an IPM approach as well that actions be coordinated and integrated in regional approaches, something we have attempted to emphasize in both initial scoping (Brasted to Hazlewood, 8/9/07) and alternatives drafting (Brasted to Syphax, 10/3/08) comments we have submitted. Further, the DEIS' preferred alternative calls for the lethal control of a vertebrate species, raising additional concerns and setting a high bar for how management is planned and implemented. The Final EIS must, therefore, meet the IPM conditions included in the NPS' own 11-step procedure (DiSalvo 2009) as well in the stepwise approach codified in contemporary vertebrate pest management (see summary in Hadidian 2010).

The DEIS does not examine nonlethal management options sufficiently and demonstrates a general lack of understanding concerning how conflicts with Canada geese can be addressed and resolved that is disconcerting. This is especially at issue given the apparent restriction of most, or all, concerns for goose herbivory to the Kingman Marsh site-activities that are likely tied directly to the concentration of geese at the adjacent golf course (Paul et al. 2004). The attraction of geese to sites such as golf courses is well known and the presence of both resident and migratory Canada geese can be successfully addressed with nonlethal means (e.g., Woodruff & Green 1995). Yet, the DEIS (pg. 167) mentions that course managers had only once tried to use a trained dog to deter geese from the site. The Final EIS must present a plan that follows an IPM approach consistent with NPS policies and that demonstrates a systematically integrated series of actions that proceed from least- to most-invasive for the species being managed.

Lack of good science and incomplete consideration of available information
The DEIS relies on information contained in reports, technical brochures, and unpublished materials (and even omits from the bibliography authorities cited in text, such as Bates 2010a) that suggest it was prepared with only casual scholarship. It misses or ignores important factors relating to both the biology and ecology of Canada geese as well as effective nuisance abatement strategies that call to question whether the understanding of goose biology or ecology is sufficient to have planned for management at all. We can only conclude that it was not.

The DEIS (pg. 245) claims that resident geese stay within a 5 to 10 miles radius during non-breeding and 0.25 to 0.50 mile radius during the breeding season, citing itself (NPS 2010a) again with a source that does not appear in the bibliography. No mention is made of the phenomenon of molt migration, despite literature demonstrating that significant proportions of "resident" goose populations will undertake migratory movements when their nests fail (Luukkonen et al. 2008, Dieter & Anderson 2009). In our many years of direct experience with Canada goose programs we have found that egg and nest destruction, combined with harassment such as by trained dogs (Castelli & Sleggs 2000), can be highly successful in eliminating Canada goose problems when timed and applied correctly.

Beyond the previously mentioned study of goose herbivory on wild rice (Haramis & Kearns 2007), the DEIS contains only one mention of a peer review article on goose herbivory (Conover 1991; cited in the DEIS as Conover 1999), where numerous others (e.g., Bushbaum et al. 1987, Buchsbaum & Valiela

1987) would have been within range of even a modest literature review. The same holds for nuisance abatement strategies (e.g., Aguliera et al. 1999, Conover 1985, 1992, Fairaizl 1992, Heinrich & Craven 1990, Whitford 2002, 2008). They simply are not reviewed or analyzed sufficiently and the literature covered is almost wholly from secondary rather than primary sources, with little useful information incorporated into the development of alternatives.

The DEIS makes claims concerning health and safety that are incomplete and could be misleading
The claims made in the DEIS that geese will affect the water quality of the Anacostia River (e.g., "The water quality of the Anacostia River is being affected by the resident Canada geese due to herbivory on wetland plants and as a result of fecal droppings." DEIS: 128 and "The water quality of the Anacostia River is being affected by the resident Canada geese due to fecal droppings…" DEIS: 202) are not substantiated. These statements set up inappropriately negative imagery concerning geese and their impacts that is not mitigated by NPS also saying that impacts from goose feces are almost certainly negligible. If an impact is negligible, then why is it mentioned at all?

The fact is that (at a minimum, by estimates in the DEIS) hundreds of millions of gallons [our emphasis] of combined human sewage and runoff affect the Potomac and Anacostia rivers 75 times a year (on average). It does no honor to NPS' credibility that statements about goose feces and the pathogens that might or might be harbored in their droppings are being made in this document. No credible sourcing is mentioned. With respect to the laundry list of pathogens enumerated, it is not mentioned that they are seldom, if ever, all found in the same population of geese (cf. Bedard, & Gauthier 1986, Converse et al. 2001). NPS also argues that resident geese "may threaten" (DEIS: 235) other wildlife, especially waterfowl through influenza A viruses and avian tuberculosis, but presents nothing by way of evidence that such events have ever happened, much less happened on the Anacostia River. Finally, NPS brings the question of aircraft safety obliquely into the discussion (DEIS 27-28) before suggesting that it is probably not an issue along the Anacostia River at all. The Final EIS must establish exactly what the public health and safety, as well as wildlife health, risks are including how they are measured, estimated, evaluated, and determined. Documentation of the presence and/or potential for risk must be presented rather than vague and oblique comments about how various risks might present themselves.

The DEIS fails to adequately address issues of scale and land use
NPS notes (DEIS: 214) that originally the area of concern along the Anacostia River was flanked by 2500 acres of tidal marsh, of which less than 100 are involved in the current restoration effort at four locations (DEIS: 8). Thus approximately 4% of the original system is being retained, in parcels that range in relative sizes from 0.02% to 1.6% of what formerly existed within this system. The Final EIS must address how such fragmentary remnants of the original tidal marsh can function as it argues wetlands in the Anacostia will, especially to "…improve water quality in the Anacostia River…"(DEIS: 8). It must also demonstrate that restored fragments of this order can sustainably withstand any of the potentially compromising environmental events (e.g., floods, sewage discharge, pollution from runoff, herbivory by geese or other animals, etc.) that can be expected to occur into the future.

As we noted in our comments of August 9, 2007, on the scope of the analysis, land use is both a potentially effected element of the environment and a significant contributor to the issues this Plan/EIS seeks to address. The Plan/EIS Alternatives must include consideration of land use because these uses play a significant role in attracting resident geese to the area around the artificial wetlands. This is particularly true at the Kingman Island site; right next to a golf course and other open grassy public areas. The Park's goal of creating artificial wetlands, admirable as it is, is in serious conflict with the Park's goal of providing the specific recreation opportunities that constitute a magnet for Canada geese. It may simply not be realistic to expect any management concept to work in such an environment without a significant and coordinated effort that occurred across different land management units.

The Final EIS should explicitly include steps to examine land use and consider changes to current and planned land use that could achieve the objectives of the DEIS. Both Council on Environmental Quality (CEQ) regulations (§1502.14(c)) and judicial review have long made it clear that the entire range of reasonable alternative ways to substantially achieve the stated project objectives, including actions the responsible agency itself cannot implement alone as well as action it may not prefer, must be analyzed

The DEIS does not adequately address the human environment. Humaneness not considered.
One of the objectives of the NEPA process is to address concerns emanating from the values and beliefs people hold concerning the environment, and to take into account how the public at large regards proposed federal actions. The DEIS addresses what it calls the "visitor experience" or "natural recreation experience" in several places, but largely in a way that dismisses any notion that individuals or groups will experience any sense of loss if geese are killed. The controversies surrounding lethal control of resident geese are well known and have been addressed (e.g., Loker et al. 1999, Swift 2000) in ways that should have made it clear to the preparers of this DEIS that a close look at the issue of valuation of geese was mandatory. The FEIS must fully account for the human dimension in managing conflicts with geese, addressing this issue far more substantively than has been done.

The methodologies NPS proposes for lethal removal of geese must also be critically examined and their humaneness evaluated. Where geese are frequently referred to as a nuisance (e.g. DEIS: 62) virtually no mention, and clearly no analysis, is made concerning the value they may have for individuals or groups. The Final EIS must address these factors and it must describe in far greater detail the extent to which geese will suffer during the process of removal and killing and the humaneness of the killing methods. The issue of potential human exposure (e.g. Amundson 1988) to environmental hazards should geese by processed for food must also be addressed in the Final EIS.

Economic projections need to be better explained
The lethal control of geese is cost-estimated for only one year under all alternatives presented, creating a potentially misleading impression that expenses will not be great. The Final EIS should explain and defend why one-year estimators are used here but not for other actions.

Specific Comments
NPS is still under the impression that it is necessary to obtain Federal permits for nest destruction and removal (DEIS: 106) something which is not the case any longer, and which we attempted to bring to your attention in previous comments. You should be aware that effective in September 2006 the federal US Fish and Wildlife Service removed the permit requirement for resident Canada goose nest and egg treatment. The NPS must merely register locations where it will treat nests and/or eggs online at the Service's website.

Summary
NPS does not have a credible or defensible case for the lethal control of Canada geese in Anacostia Parks and should choose Alternative D as its preferred alternative. We have great respect and pride as Americans in NPS and its mission which, put in the vernacular, is to protect and preserve our nation's natural resources. You should not be in the business of killing wild animals except under the most compelling, justifiable, and urgent need. Nothing of the sort is identified here. The Humane Society of the United States. American Society for the Prevention of Cruelty to Animals, and City Wildlife would be delighted, and offers here, to explore the nonlethal options further with you and to commit time and resources from our organization to a trial program to fully test the efficacy of resolving conflicts with geese in a holistic, integrated, and environmentally responsible manner.

Sincerely,

Maggie Brasted
Director, Urban Wildlife Research and Education
The Humane Society of the United States
2100 L St. NW
Washington, DC 20037
301/548-7753
mbrasted@humanesociety.org
humanesociety.org

Nancy V. Perry
Senior Vice President
Government Relations
The American Society for the Prevention of Cruelty to Animals
(202)595-4120
nancyp@aspca.org
aspca.org

Anne Lewis
President
City Wildlife, Inc.
P.O. Box 40456
Washington, DC 20016
anne.lewis@citywildlife.org
citywildlife.org

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Correspondence (6)

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Author Information

Keep Private:	No
Name:	David Culp
Organization:	
Organization Type:	I - Unaffiliated Individual
Address:	121 12th St., SE, Apt. 403 Washington, DC 20003 USA
E-mail:	davidculp@yahoo.com

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent: 09/26/2011	**Date Received:** 09/26/2011 7:08 PM
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Web Form
Notes:	

Correspondence Text

David Culp
121 12th Street, S.E., Apt. 403
Washington, D.C. 20003

September 26, 2011

Alex Romero, Superintendent
National Capital Parks-East
1900 Anacostia Drive, S.E.
Washington, D.C. 20020

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

Dear Mr. Romero:

I am commenting on the Draft Anacostia Park Wetland and Resident Canada Goose Management Plan and Environmental Impact Statement (plan/EIS).

I live on Capitol Hill and regularly hike in the National Park Service (NPS) parks in the District of Columbia on the weekends. I am a member of Audubon Naturalist Society; Maryland Native Plant Society, Washington, D.C. Chapter; National Audubon Society, District of Columbia Chapter; and Sierra Club, Washington, D.C. Chapter. I am a lobbyist on Capitol Hill for the Friends Committee on National Legislation (Quakers), working on defense and foreign policy issues. However, these comments are my own views.

In general, I support Alternative B-Very High Level of Wetland and Goose Management. I believe the overpopulation of resident Canada geese in Anacostia Park causes extensive damage to the wetlands in the park.

Wetlands

1. An analysis of previous wetland restoration efforts in the park should be included in the final plan/EIS. NPS and other government agencies have spent a great deal of time, effort and money on wetland projects along the Anacostia River. A number of studies have been done of those projects. An analytical synthesis of those results would aid future efforts.

2. The wetlands at the Poplar Point Site should be included in the plan/EIS. The first sentence of the document states, "The purpose of this plan is to guide and direct the actions of the National Park Service (NPS) in the management of wetlands … at Anacostia Park." (p. i) Clearly, the Poplar Point wetlands are within the park, but they have been omitted from the plan/EIS.

NPS has stated that "NPS acknowledges that community involvement activities relating to the development of the Poplar Point Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) are on-going. CERCLA and the NCP also require community relations activities to be conducted. NPS and the District will use their best efforts to coordinate the community relations activities for the RI/FS, EIS and other Site processes." (NPS and District of Columbia, Poplar Point Settlement Agreement, September 19, 2008, Appendix B, p. 7, available at http://www.nps.gov/nace/parkmgmt/upload/2008-Administrative-Order-on-Consent.pdf)

NPS appears to have stopped work on its earlier Poplar Point EIS. No notices or documents have been added to the NPS's "Planning, Environment and Public Comment" website (http://parkplanning.nps.gov/projectHome.cfm?projectID=22344) for that EIS for the last three years. This wetland/geese plan/EIS states that "The NPS and the District Government have partnered to initiate the [Poplar Point] EIS, which is currently in the planning stages; an EIS is proposed for release to the public in winter 2009/2010." (p. 189) However, no such EIS on Poplar Point has ever been released.

3. The Barney Circle wetland projects should be re-examined. Barney Circle was a proposed highway project to be built where Pennsylvania Avenue, S.E. crosses the Anacostia. New wetland projects were planned, but never implemented, for environmental remediation. Those project plans may have useful ideas for this plan/EIS.

4. The RFK Memorial Stadium parking lots should be modified to reduce runoff into the Anacostia. Those parking lots are the largest impervious surfaces within the park, yet there are few measures discussed to control their runoff.

Geese

1. The plan/EIS should include an analysis of where the resident geese congregate within the park and the factors that makes those habitats attractive to geese. NPS has records of the location of goose nests (p. 45). That data along with the goose count data in the tables on pp. 162-163 should be analyzed to identify where the geese are. Those habitants should be evaluated to identify the key factors that make them desirable to geese. Wildlife biologists have extensively studied the habitat factors that affect resident geese populations. A summary of that literature should be a part of the management plan. More discussion of habitant modification at goose congregation sites within the park should be in the plan.

2. The goal for the goose population should be based on more than one data point. Greg Kearns of the Jug Bay Regional Park is the source for your density goal. I have heard Greg speak on goose management and have met him several other times. I am sure he is a good wildlife biologist and that Jug Bay is a similar habitat to the park. However, a multimillion plan needs to be built on more than one data point.

3. Shooting geese in the District of Columbia is not a reasonable option. In fact, it is a really bad idea. Guns are a controversial subject in Washington. The park is in the middle of a major urban area. This is not rural Maryland, like Jug Bay. Shooting geese within the District threatens to jeopardize your whole plan by public controversy.

4. Visual deterrents such as Mylar tape, flags, balloons and dogs are mentioned as control measures (p. 65). What would be the impact on other wildlife, such as ospreys and bald eagles?

5. The section about the jet crash in the Hudson River in 2009 should be omitted. The Smithsonian Institution determined that crash was caused by migratory Canada geese (http://smithsonianscience.org/2009/07/scientists-determine-geese-involved-in-hudson-river-plane-crash-were-migratory/). The plan/EIS acknowledges that fact (p. 28), but has a long discussion of the crash and geese, which appears designed to scare people. Do resident geese in the park really fly at 2,900 feet? This section should be removed

General

1. The cost of $16.3 million for Alternative B is unrealistic, given the tough budget climate for federal agencies for the next few years. NPS is likely to have flat budgets, as least in real terms, for the next five years. The plan/EIS should set clear budget priorities within Alternative B.

2. The plan/EIS would be greatly improved if it had more analysis and less repetitive verbiage.

3. The plan/EIS needs to be better proofread. As an example, the tables are not consecutively numbered and don't match the "List of Tables" on p. ix.

4. The public participation plan needs to be better planned. Only three people attended the public meeting on the draft plan/EIS on September 7.

Thank you for your consideration.

Sincerely,

/David Culp/

David Culp

Correspondence (10)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	No
Name:	Jennifer Mattioli
Organization:	
Organization Type:	I - Unaffiliated Individual
Address:	1375 Massachusetts Avenue SE Washinton, DC 20003 USA
E-mail:	Freedlcrft@aol.com

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent:	**Date Received:** 09/27/2011
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** E-mail
Notes:	

Correspondence Text

Dear Superintendent Alex Romero, Please reconsidering using lethal methods to control the Canadian Geese populations along the wetlands of our Anacostia River. As a local resident of Southeast, Washington DC, I enjoy the presence of ALL area wildlife, and consider the geese to be a symbol of just how far the river's recovery has come from years past. Surely then, the park service must recognize that the killing of mass numbers of these beautiful creatures is not only inhumane, but moreover a poorly contrived method for the management of aperhaps out of balance ecological system. As a citizen of this area, I would strongly urge the park service to consider more humane, and more ecologically sound options for population control and/or to make the areas a bit less appealing to a nesting goose. Thank you in advance for your consideration. Sincerely, Jennifer Turner Mattioli 1375 Massachusetts Ave, SE Washington, DC 20003 freedlcrft@aol.com

Correspondence (11)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	No
Name:	Steve McKinley-Ward
Organization:	
Organization Type:	I - Unaffiliated Individual
Address:	N/A N/A, UN N/A USA
E-mail:	

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent:	**Date Received:** 10/21/2011
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Transcript
Notes:	

Correspondence Text

I'm Steve McKinley-Ward. I live in Mt. Ranier, Maryland. A former worker at the Anacostia Watershed Society for most of the last decade and was active in the mud of the Anacostia River doing what we could, as a citizen group, trying to help the wetlands be a success.

And I am gratified to learn just in recent weeks with the issuing of this plan/ EIS that the preferred alternative is taking pretty aggressive measures to try to curb the population of Canada geese. I think that's right on target.

That's what my former organization and I really believed needed to happen. I'm glad to see Park Service is heading in that direction. And I have submitted already some written comments through the website and I'll drop the same thing off here tonight. These sheets right here.

I got a couple of kind of small comments and suggestions. The one thing that I'd like to raise here that might be something out of left field, but let me just read it and see if I can have enough time to read this to you.

Finally, a word about global warming and likely rising tides on the Anacostia. Oceans rising will have an effect on our tidal river. Long time Patuxent River Naturalist Greg Kearns believes the tide in Prince George's County is rising at the rate of 1/8th of an inch per year. If that is true, it makes sense to assume that the Anacostia should be rising at about the same rate and will rise about two inches during the 15-year life of this plan.

Since tidal elevations matter and matter in terms of inches for how wetland plans are successful or not, long-term planning for this scenario would seem to me to be prudent. I may have missed it, but I didn't see this addressed in the plan.

I think I'm going to broach. This is more on the lines of a little -- I'll just say it because it's something I believe.

Finally, a word of encouragement for all of us who -- all of us to get more involved in slowing our use of fossil fuels to mitigate the worst outcomes of the, you guessed it, climate change.

One specific step we can take this -- all this to encourage President Obama to live up to his campaign promises for turning to renewable energy and to rebuff, on the other hand, the momentum for building the Keystone XL pipeline from the North Alberta Tar Sands 1700 miles south to the Texas refineries. He will be able to decide the fate of this pipeline himself without Congress.

Dr. James Hanson, noted NASA climate scientist, said this this summer. "Phase out of the emissions from coal is itself an enormous challenge. However, if the Tar Sands are thrown into the mix, it is essentially game over for a stable climate."

This is something that I don't think many of us are aware of. This pipeline being built from Northern Alberta down to Texas.

So, three additional measures for the long-term success of the Anacostia wetlands would be: Number 1, ride your bike as much as you can; number 2, use clothes pins instead of the dryer and number 3, activism, demand the change we were promised by President Obama.

Thank you and I look forward to the rest of the process.

Correspondence (12)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	No
Name:	Jorge Bogantes
Organization:	Anacostia Watershed Society Official Rep.
Organization Type:	P - Conservation/Preservation
Address:	N/A N/A, UN N/A USA
E-mail:	

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent:	**Date Received:** 10/21/2011
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Transcript
Notes:	

Correspondence Text

Hello. My name is Jorge Bogantes. I'm from the Anacostia Watershed Society. I am the Staff Conservation Biologist.

The Anacostia Watershed Society supports Alternative B and again, like to see -- we're glad to see that that's the NPS's choice.

We've been working on the wetlands for nine years. Steve was a big part of it and we really want to see the big wetlands recovered. We want to see more area of wetlands. We want to see, you know, a healthier wetland ecosystem with a nice diversity of plant species which provides a lot of ecosystem services that this river really needs.

This is still an impaired river. So, we need those wetlands to do their, you know, job and I think this Alternative B is headed in the right direction.

Only one concern that we have is the cost. How, you know, the National Park Service is going to, you know, get this money? This $60 million. Right. Fifteen years.

And the other one is how -- I know that this is only for the Park, but it would be nice if this effort is integrated more regionally with other jurisdictions. Because, you know, we're going to be getting geese from, you know, north, south, east and west. Well, mostly north and south.

So, yes, that's pretty much it.

Correspondence (13)

Enter More | Edit | Print | Back To List

Author Information

Keep Private:	No
Name:	David Culp
Organization:	
Organization Type:	I - Unaffiliated Individual
Address:	N/A N/A, UN N/A USA
E-mail:	

Correspondence Information

Status: Reviewed	**Park Correspondence Log:**
Date Sent:	**Date Received:** 10/21/2011
Number of Signatures: 1	**Form Letter:** No
Contains Request(s): No	**Type:** Transcript
Notes:	

Correspondence Text

I'm sorry to upset the apple cart. My name is David Culp C-U-L-P. We're here in Washington, D.C. and I was hoping we were going to have a more informal session where we could ask questions.

So, I'm still going to ask my questions and hopefully, somebody will take some notes and may or may not ever get any answers.

So, here's my comments and I'm going to write up some more formal ones and get them in there by the deadline.

One, I do support in general Alternative B. I do think the geese are a big problem. But, I've got some problems with what you've come up with and I will go through that.

I'm sort of just going through in the order of the plan. I would like you guys to dig up the old remediation project from the Barney Circle Freeway. There were a bunch of plans that involved -- for additional wetlands in connection with the Barney Circle Project. I have no idea if those are good plans or bad plans, but there was a lot of money spent on developing wetland plans and so, I think you ought to at least take a look at whether some of those can be pulled up and used.

Second, and this is a major point for me, I think that shooting the geese is just not a viable option in the District of Columbia. Guns period are a very controversial issue and I think you're going to just torpedo this whole plan by shooting ducks or the geese and yes, it works over at Patuxent, but it's a completely different kind of atmosphere.

A big concern that I've got is you used Greg Kearns' data, but that's the only data that you used and yes, I know him and I think he's a good wildlife biologist, but you've constructed this whole plan off of one data point in terms of how many geese were -- how many geese is for the park and you've extrapolated that all just from him and maybe that's the right number. Maybe it's too high. Maybe it's too low. But, you have to have some more data points than just one data point.

I kept looking in the plan and maybe it's in there, but I could not find it.Really -- some real analysis as to where the geese are in the Anacostia Park. I mean a couple of places. One back towards the end you say that they're hanging around the golf course, but it seems to me if we got to come up with a management plan, you need to do a little more work as to where the geese are.

You've got a big park and why are the geese there? Is it food? Is it the water? Is it the habitat? If you're trying to -- what is it you need to change or you can change to reduce the numbers and so, highly committed to a little more sophisticated analysis as to where the geese are in this very large park and why are they there.

This is pretty minor, but you had talked once about the airplane crash in New York City. Well, I spent about two minutes on Google and it turns out the Smithsonian found out that those were not resident geese. Those were migratory geese. So, all this concern about airplane crashes I think is not relevant.

You talk about at several different points in the plan impervious surfaces and yes, those are important, but the biggest impervious surface you can talk about or you're not addressing and that's the parking lots around the stadium and if you're going to come up -- these little rain gardens are nice and you ought to be doing them, but, I mean you've got huge imperious surfaces and you don't address that at all.

I'm not a wildlife biologist, but it just seems to me that there ought to be a lot more discussion about modifying -- okay, modifying the golf course landscape somehow. I mean that seems to be where the geese summer.

As was mentioned earlier, when I looked at the cost estimate for Alternative B, I just shook my head. I mean basically the Park Service has got a flat budget for the next couple of years and I think you need to prioritize exactly what you'd be doing in Alternative B. Because I don't believe you're ever going to get all that money.

Okay. So, this is a major point of mine. In the alternative, you don't mention restoration and opening up of the wetlands at Poplar Point. So, this is an EIS, the wetlands in the Anacostia Park, but there's really no discussion of the wetlands at Poplar Point and you're going to tell me well, something else is going on about that. Something else has been going on for 20 years. I've been following this for a very long time and so, I would like to see the wetlands at Poplar Point restoration and opening them to the public as an alternative. It fits in the goals of this EIS and why you're leaving it out is a mystery to me.

But, in general, this session, frankly, would have been a lot more productive if you'd opened it up to discussion.

So, that's my two cents.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

(2014)

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