



A N A C O S T I A P A R K

Wetlands and Resident Canada Goose

Management Plan/Environmental Impact Statement



**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



October 2014

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

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

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

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.

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 11th Street Bridge and the CSX Railroad Bridge (transferred to the District government in 2008 per the Federal and D.C. Real Property Act of 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

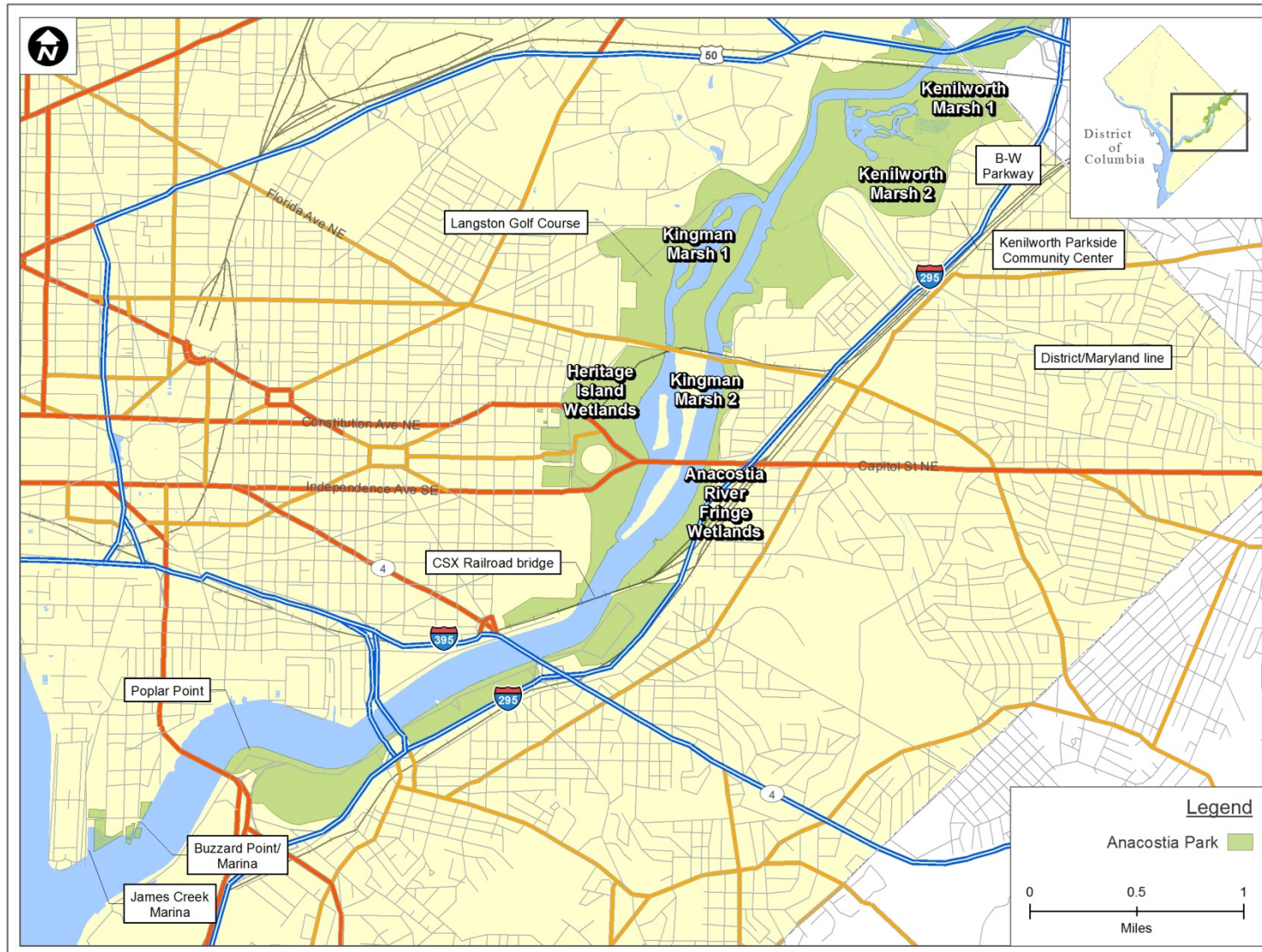


FIGURE 2: ANACOSTIA PARK

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.

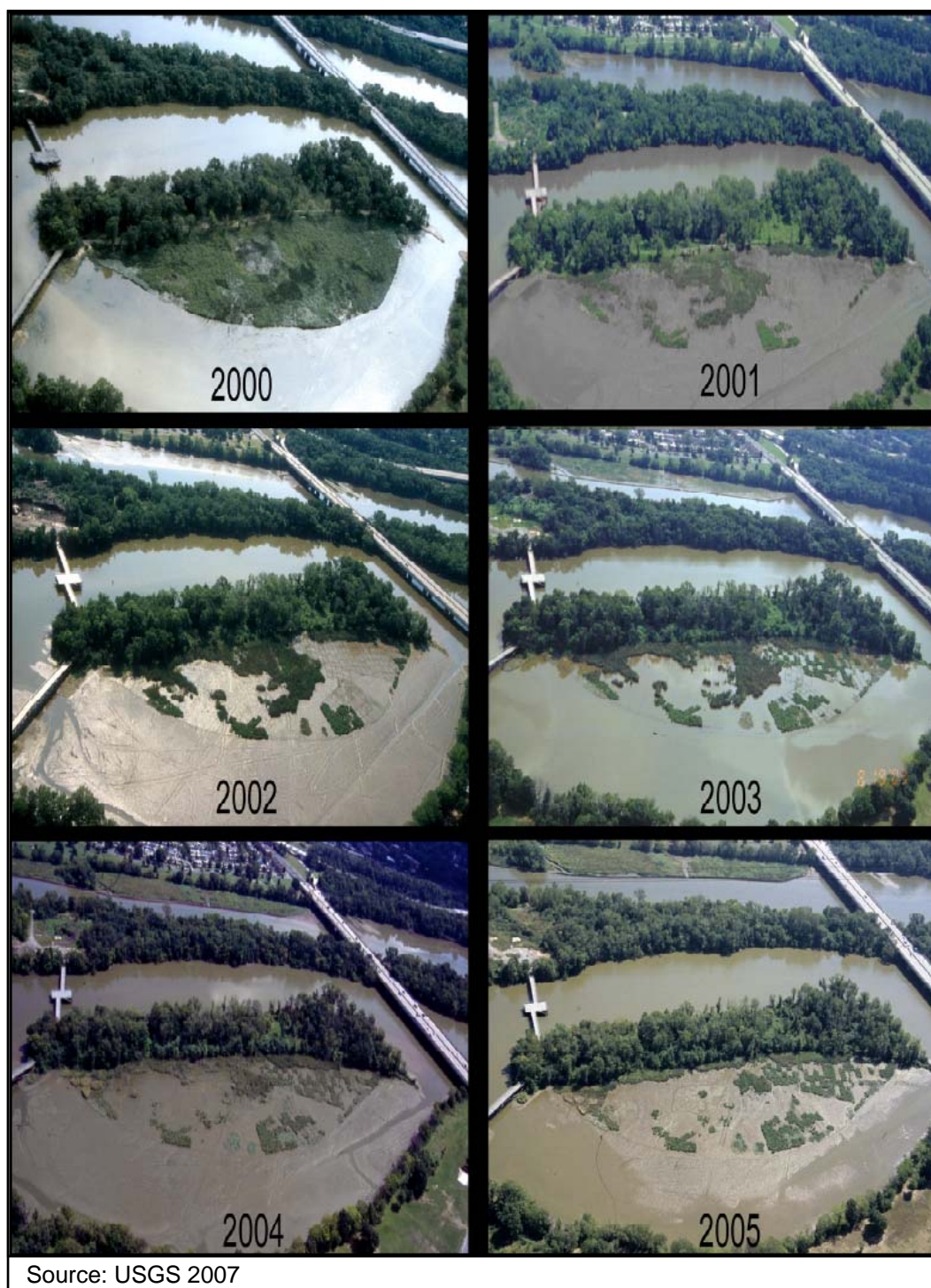


FIGURE 3: LOSS OF WETLAND VEGETATION AT LOWER KINGMAN MARSH FROM 2000 TO 2005

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.

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



Marking Eggs for Oiling

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 GooseChaseTM 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 (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).

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

SUCCESSFUL MANAGEMENT OF RESIDENT CANADA GOOSE POPULATION

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

wetlands. For this plan, a manageable resident Canada goose population is defined as one that allows restored wetlands within the park to function as wetland systems.

During the alternatives development process, a science team was initiated to provide technical information on wetland and resident Canada goose management. The science team was made up of university professors, wildlife biologists, wetland specialists, Canada goose experts, and resource management specialists. The purpose of the science team was to review and provide available research and data pertaining to wetland and 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 ($30.5 \text{ geese/wetland square mile} \times 0.92 \text{ square miles of wetland} = 28 \text{ geese}$) (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 [$397 \text{ turf acres} \times (1 \text{ goose}/15 \text{ acres}) = 26 \text{ geese}$]. 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 goose 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 (MWCOC 2007). Sediment particles serve as binding sites for a broad range of urban pollutants and toxicants. These pollutants include petroleum hydrocarbons, trace metals such as lead, mercury, cadmium, copper and zinc, polychlorinated biphenyls (PCBs), pesticides, herbicides, nutrients, and bacteria. Sediment contaminant levels in the Anacostia River are high enough in organic pollutants such as PCBs, chlordane and 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 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).

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.

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 activities, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbance conditions.” And “Where appropriate and practicable, the NPS will not simply protect, but will seek to enhance natural wetland values by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions.”

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

OTHER LEGISLATION, COMPLIANCE, AND POLICY

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

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

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

Migratory Bird Treaty of 1918—The *Migratory Bird Treaty Act of 1918* implements various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the activities prohibited, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention...for the protection of migratory birds...or any part, nest, or egg of any such bird (16 USC 703).

Canada geese are federally protected by the *Migratory Bird Treaty Act* (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the Act, promulgated in Title 50 CFR parts 13 and 21, and issued by the USFWS. As promulgated in 1999, subpart C of part 21, Specific Permit Provisions, section 21.26 is the Special Canada Goose Permit, issued only to State wildlife agencies, authorizing certain resident Canada goose management and control activities. Section 21.27 pertains to special-purpose permits, which allow for the taking of migratory birds with compelling justification. In subpart D of part 21, section 21.41 pertains to

general depredation permits and section 21.42 authorizes the Director of the USFWS to issue depredation orders to permit the killing of migratory game birds. The USFWS adopted special federal regulations (called “depredation orders” and “control orders”) in 2006 authorizing take of Canada geese without a federal permit in certain situations and is described in detail in Title 50, CFR, Part 21, Subpart D (50 CFR 21D: Control of Depredating Birds).

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

OTHER RELATED DOCUMENTS AND POLICIES

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

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

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.

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

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	<ul style="list-style-type: none">No current actions	<ul style="list-style-type: none">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 marshCreate tidal guts*Address upland runoffInvestigate possible impact of extreme water level changeConsider altering water elevations*Inform DC Harbormaster of importance of enforcing no wake zones	<ul style="list-style-type: none">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 marshAddress upland runoffLimited investigation of possible impact of extreme water level changeInform DC Harbormaster of importance of enforcing no wake zones	<ul style="list-style-type: none">Remove or modify structures that result in erosion and clogging of marshAddress upland runoff	<ul style="list-style-type: none">Same as alternative B
Vegetation	<ul style="list-style-type: none">Continue current management of invasive speciesRemove sheet piling along Anacostia River Fringe Wetlands*	<ul style="list-style-type: none">Manage invasive speciesMechanical seedbank regeneration*High density planting effort with persistent, native species with high root mats and variable heightRemove sheet piling along Anacostia River Fringe Wetlands*	<ul style="list-style-type: none">Same as alternative B except a low density planting effort with persistent native species	<ul style="list-style-type: none">Minor level of invasive species managementPassive seedbank regenerationRemove sheet piling along Anacostia River Fringe Wetlands*	<ul style="list-style-type: none">Same as alternative B
Wetland Restoration	<ul style="list-style-type: none">No new restoration efforts	<ul style="list-style-type: none">Consider daylighting*Stream/stormwater outfall energy dissipation modifications*Consider seawall breaks*	<ul style="list-style-type: none">Least invasive stream/stormwater outfall energy dissipation modifications	<ul style="list-style-type: none">Same as alternative A (none)	<ul style="list-style-type: none">Same as alternative B
Cultural/Education	<ul style="list-style-type: none">Continue some education through park programsMaintain existing trails at the park	<ul style="list-style-type: none">Increased education and interpretationConstruct new boardwalks and trails*	<ul style="list-style-type: none">Increased education and interpretation	<ul style="list-style-type: none">Same as alternative A	<ul style="list-style-type: none">Same as alternative B
Park Operations and Management	<ul style="list-style-type: none">Continue limited trash removal	<ul style="list-style-type: none">Trash managementReduce impervious areas*New rain garden areas*	<ul style="list-style-type: none">Same as alternative B	<ul style="list-style-type: none">New rain garden areas*	<ul style="list-style-type: none">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	<ul style="list-style-type: none"> No lethal control 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> No lethal control Population monitoring for the life of the plan
Habitat Modification	<ul style="list-style-type: none"> Continue to maintain current goose exclusion fencing 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Same as alternative B except no increasing width of existing vegetated buffers
Scare and Harassment	<ul style="list-style-type: none"> No scare and harassment techniques are currently used 	<ul style="list-style-type: none"> Intensive scare/harassment program (visual deterrents + dogs at four locations) 	<ul style="list-style-type: none"> Less intensive scare/ harassment program with minimized rotation (visual deterrents + dogs at two locations and less often than alternative B) 	<ul style="list-style-type: none"> No scare/harassment program 	<ul style="list-style-type: none"> Same as alternative B
Reproductive Control	<ul style="list-style-type: none"> Continue yearly egg oiling program 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Increase egg oiling program after initial reduction Apply goose hatch materials annually 	<ul style="list-style-type: none"> Continue current egg oiling program 	<ul style="list-style-type: none"> Same as alternative B
Cultural/Education	<ul style="list-style-type: none"> Continue park ranger education when possible 	<ul style="list-style-type: none"> Install no feeding signage Park to enforce wildlife CFR Park prepare and distribute brochure on resident Canada goose management 	<ul style="list-style-type: none"> Same as alternative B 	<ul style="list-style-type: none"> Same as alternative B 	<ul style="list-style-type: none"> 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

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

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.

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:

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

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—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.

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.



Photo showing goose exclusion fencing.

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.”

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.

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



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

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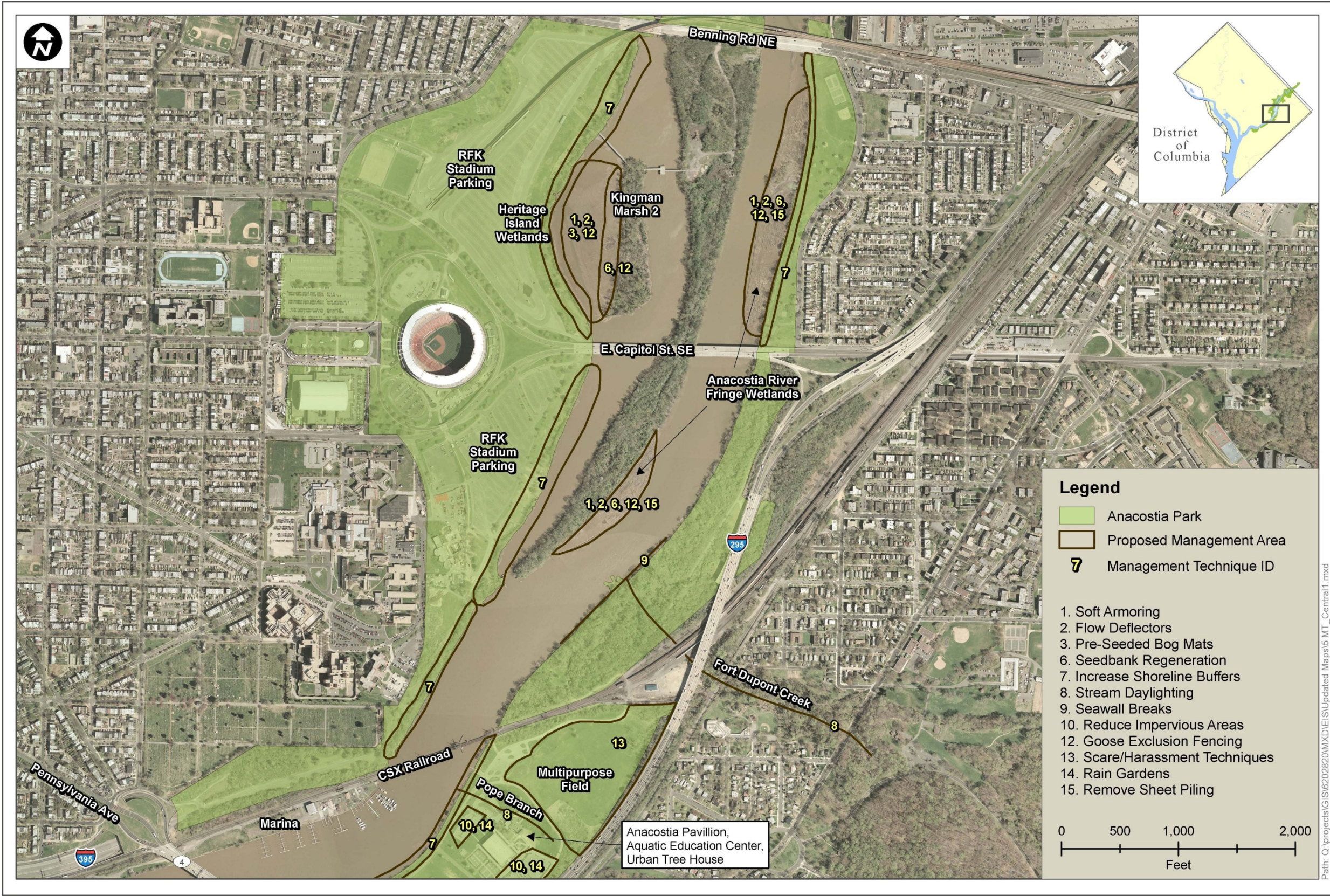


FIGURE 6: ALTERNATIVE B - LOCATIONS OF WETLAND AND RESIDENT CANADA GOOSE MANAGEMENT TECHNIQUES, CENTRAL AREA

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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.