



## Chapter 4: Environmental Consequences



## **CHAPTER 4: ENVIRONMENTAL CONSEQUENCES**

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

### **SUMMARY OF LAWS AND POLICIES**

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

### **GENERAL METHODOLOGY FOR ESTABLISHING IMPACT THRESHOLDS AND MEASURING IMPACTS BY RESOURCE**

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

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

These elements are described in the following sections.

### **GENERAL ANALYSIS METHODS**

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

## ASSUMPTIONS

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

### Analysis Period

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

### Commitment of Techniques

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

### Geographic Area Evaluated for Impacts

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

### Duration and Type of Impacts

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

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

## Future Trends

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

## Impact Thresholds

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

## CUMULATIVE IMPACT ANALYSIS METHOD

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

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

## Past Actions within and around Anacostia Park

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

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

**Kingman Lake**—Kingman Lake is a site of 2 recent large-scale restoration efforts, completed in 2000. This project was support by USEPA, USACE, NPS, and the District and Prince George's County

governments. The site restored totaled 40 acres. In 2005, the Heritage Island Ecosystem Restoration added an additional 6 acres of restored emergent wetland to the site.

**Anacostia Riverwalk Trail**—A priority of the recreation and transportation agenda of the AWI was the establishment of a continuous Anacostia Riverwalk and Trail along the east and west banks of the Anacostia River. The Anacostia Riverwalk is a planned 16-mile multi-use trail along the east and west banks of the Anacostia River in the Washington, DC. The vision for this continuous Riverwalk is a key component of the AWI Framework Plan. It realizes several AWI goals such as enhancing parkland, improving water quality, and increasing access to waterfront destinations. The District Department of Transportation (DOT) has taken the lead in planning and constructing the Riverwalk as a recreational amenity and transportation alternative for Washington residents. When completed, it will connect sixteen waterfront neighborhoods to the Anacostia National Park and the Anacostia River. Washington residents and visitors will be able to walk and bike on the Riverwalk to several popular destinations, including the Fish Wharf, the new baseball stadium, Poplar Point, the Navy Yard, historic Anacostia, RFK stadium, Kingman Marsh, and National Arboretum. The trail connects the National Mall at the Tidal Basin to the Bladensburg Marina Park in Prince George's County, MD (DCDOT 2006a). The East Bank Trail incorporated a 2-mile section of trail that realigns and rebuilds Anacostia Drive, which was completed in 2005. The West Bank Trail incorporated a 2.5-mile trail that connects the Benning Road Bridge in the north to the Navy Yard promenade in the south which was completed in 2007 (DCDOT 2006b). The Riverwalk and its loops provide interconnected greenway trails, pedestrian-friendly river crossings, and cycling lanes on streets connecting waterfront recreational areas with neighborhoods and cultural sites along the Anacostia River (DCOP 2009). Other phases are scheduled for completion by 2012 (DCDOT 2006a).

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

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

### **Current Actions within and adjacent to Anacostia Park**

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

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

**Riverfront on the Anacostia**—The District Zoning Commission gave preliminary approval on March 20, 2008 to design a 1.1 million-square-foot, four building, mixed-use project on the site between Nationals Park, the Anacostia River, the Frederick Douglass Memorial Bridge, and the proposed Diamond Teague Park. The developers need to submit more detailed drawings of the plans for the South

Capitol Street facades. Zoning approvals were received in 2008 and construction is proposed to begin in 2010 (Dupree 2008).

**Anacostia Waterfront Initiative (AWI)** - Includes approximately 900 acres of land characterized as susceptible to change for redevelopment along the 8-mile long Anacostia waterfront and Washington Channel, including the Southwest, the Southeast, Poplar Point, Hill East Waterfront, RFK Stadium Area, South Capitol Street Corridor, and Anacostia Park/Arboretum Area. Portions of the project have been completed, other phases are underway, and additional phases are proposed for the future. The AWI is a partnership between the federal and District governments to revitalize the Anacostia River waterfront. The District Office of Planning produced the Framework Plan in collaboration with a steering committee of federal and District agencies and an advisory group of community leaders. The targeted land is 90 percent publicly owned and will offer increased public access to the waterfront, will build new parks, and will create mixed-use and mixed-income waterfront neighborhoods.

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

### **Foreseeable Future Actions in and adjacent to Anacostia Park**

**11th Street Bridge Replacement Project**—A major project is currently under study to rebuild the interchange between I-295, DC 295 and the 11th Street Bridges. Due to the cancellation of both the remainder of the Southeast Freeway and the newer Barney Circle Freeway, there are no through connections between the 11th Street Bridges and DC 295, leading to severe congestion and major traffic routing problems. A proposed project would construct the missing movements at this interchange, allowing direct freeway-grade access to and from DC 295 at the 11th Street Bridges, as well as provide a through grade-separated north-south route within DC. The project is scheduled to begin construction in 2011 (DCDOT 2006b).

**Poplar Point**—The District Government, NPS, NOAA, and the AWI began a partnership in 2001 to assess and develop clean-up and habitat restoration plans at Poplar Point. The District Lands Act calls for the redevelopment of Poplar Point by the District Government. The NPS and U.S. Park Police, which is part of the NPS, presently operate in facilities at the Poplar Point site. These facilities are proposed for relocation. The Poplar Point site is approximately 130 acres (mostly under NPS jurisdiction) and 60 acres of managed meadows. It is proposed that the site will increase to approximately 150 acres, but that only 70 acres will be maintained for park purposes. The NPS and the District Government have partnered to initiate the EIS, which is currently in the planning stages; an EIS is proposed for release to the public in winter 2009/2010. The EIS essentially includes transforming the site into an interconnected park system by developing a community that connects existing neighborhoods, establishes ecological functions, and redevelops the waterfront, including maintaining 70 acres for NPS purposes. The plan for the Anacostia Park portion of the project includes creating meadows, preserving wetlands and creating new wetlands, planting additional forest buffers, and providing increased recreational and educational opportunities (NPS 2008e).

**Southeast Federal Center**—This project includes a 5.5 million square foot, 44-acre site development, which will include 2,800 housing units, 1.8 million square feet of office space, 200,000—400,000 square

feet of retail/cultural, new parks and a marina. This project is to be completed along the waterfront of the Anacostia River (Poplar Point 2007).

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

## **PHYSICAL RESOURCES**

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

### **SOILS**

#### **NPS Management Policies 2006**

NPS *Management Policies 2006* require the NPS “to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil or its contamination of other resources.” “Management action will be taken by superintendents to prevent or at least minimize adverse, potentially irreversible impacts on soil” (NPS 2006a, 56). Therefore, NPS is required to protect geologic features from the unacceptable impacts of human activity while allowing natural processes to continue (NPS 2006a).

#### **Assumptions and Methodologies**

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

Primary steps for assessing impacts to soils include identifying:

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

#### **Impact Threshold Definitions**

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

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



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

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

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

## Soils Alternatives Evaluation

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

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

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

reducing erosion, and intercepting runoff of urban contaminants, thus preventing the reintroduction of contaminants. Other projects that include wetland restoration and streambank stabilization projects in the vicinity of the project area could reduce erosion in the Anacostia River Watershed. Overall, the projects and actions in and near Anacostia Park that were considered for the cumulative impacts analysis provide beneficial impacts to soils.

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

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

### **Soil Impacts Common to All Action (Management) Alternatives**

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

**Alternative B –High Wetland, High Goose Management**—Alternative B combines the most aggressive wetlands management techniques with intensive goose management techniques (lethal control combined with other techniques). Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River, which would increase wetland vegetation and rootmass, thus stabilizing soils adjacent to the river. Stabilization would benefit soils through reducing

actual soil loss during rain events. Vegetation techniques proposed, such as mechanical seedbank regeneration and high density planting efforts would increase the width of the existing vegetative buffer along the Anacostia River and reduce bare areas where soil erosion currently occurs which would also reduce soil loss during rain events. Improvements to soils would result from increased plantings. These techniques would have a beneficial impact on soils.

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

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

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

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

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

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

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

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

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

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

**Conclusion**—Alternative D would result in overall long-term minor adverse impacts on soils, erosion, and the ability of soils to support native vegetation because the effects would be detectable, but would be

small and localized. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

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

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

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

## WATER RESOURCES

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

### HYDROLOGY

#### Guiding Regulations and Policies

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

#### Assumptions and Methodologies

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

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

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

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

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

### **Impact Threshold Definitions**

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

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

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

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

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

### **Hydrology Alternatives Evaluation**

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

because changes in hydrologic conditions would be detectable but would not be large enough to cause substantial local changes.

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

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

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

### **Hydrology Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. Considering new rain gardens and the removal of sheet piling along Fringe wetlands (which would both require additional NEPA compliance) would result in beneficial impacts to hydrology. Removing the sheet piling would result in hydrologic communication between the Fringe Wetland and the mainstem of the river (NPS 2008b); therefore, causing a beneficial impact to hydrology through reconnection of the river with the wetland in this immediate and local area. Installing new rain gardens would benefit hydrology since infiltrating stormwater into soils mimics natural drainage processes and reduces the volume of stormwater runoff that enters the Anacostia River during rain events; however, these areas may be too small and localized in nature to create a detectable impact on hydrologic conditions. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this technique (see table 1 in chapter 2). Overall, the techniques common to all action alternatives would result in negligible impacts to hydrology because the impacts would be at the lower levels of detection and because of the limited and localized nature of the proposed techniques.

**Alternative B – High Wetland, High Goose Management**—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland

vegetation in the watershed. This alternative includes a suite of potential techniques to improve the hydrology of the watershed, including erosion control techniques, removing/modifying structures that negatively affect the marsh, creating tidal guts, potential enforcement of no wake zones along the River, investigating the effects of extreme water level change, and considering altering water elevations. Revegetating and stabilizing areas along the river and proposed wetland restoration techniques would also benefit hydrology in the watershed. Hydrology would benefit as a result of alternative B because the riverine wetland acreage within the Anacostia River in Anacostia Park would not continue to erode and wetlands and aquatic habitat within the Anacostia River would be preserved. This vegetation effectively protects wetland soils from eroding thus preventing further degradation of the wetlands in the river particularly during storm events (Curtis 2010). Additional wetland management techniques such as reducing impervious areas would also benefit hydrology. The combination of techniques described above would benefit hydrology since infiltrating stormwater into soils mimics natural drainage processes and reduces the volume of stormwater runoff that enters the Anacostia River during rain events; stream and channel flow would also be improved by removing and/or modifying structures that impede flow, thus benefiting hydrology as well. Therefore, alternative B would result in beneficial impacts to hydrology that would be detectable but localized in the watershed as a result of improved wetlands along the Anacostia River through wetland management and goose management techniques.

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

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

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C includes many of the same wetland management and goose management techniques proposed as alternative B, although in general this alternative uses less intensive techniques. Compared to alternative B, alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and options for removal of structures that result in erosion and clogging the marsh would be more limited than alternative B. Overall, impacts to hydrology for alternative C would be the same as alternative B: beneficial because the wetland management and goose management techniques would locally improve hydrology through stormwater infiltration that will reduce the volume of runoff that enters the Anacostia River during rain events and improved stream and channel flow. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to the hydrology at the park. An overall, beneficial impact for alternative C is appropriate because improvements to hydrology would be detectable, but these beneficial impacts would be small and localized.

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



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

**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques proposed and no initial lethal reduction activities. The one-time population reduction would not have a short-term or long-term effect on hydrology and goose herbivory of vegetation would continue. Additionally, alternative D does not include wetland management techniques such as reduction in impervious surface, or addressing upland runoff. No erosion control techniques are proposed to improve hydrology and no new wetland restoration techniques are included as part of alternative D. Therefore, alternative D results in negligible impacts to hydrology because no changes to hydrologic conditions are expected.

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

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

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—Alternative E has the same wetland management techniques proposed as alternative B but the goose management techniques proposed do not include lethal population reduction activities. New wetland restoration techniques are proposed, which would trap pollutants such as sediment through plantings and increased vegetative cover. However, no lethal control for resident Canada geese is proposed, and therefore goose herbivory of vegetation would continue. Alternative E would result in negligible impacts to hydrology because no changes to hydrologic conditions are expected.

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

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

## WATER QUALITY

### Guiding Regulations and Policies

NPS *Management Policies* 2006 state that the NPS would “take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations” (NPS 2006a). The NPS has also established general goals for water quality, and in accordance with these goals, the NPS works

cooperatively with the state to protect and enhance the quality of water in national park units. The Clean Water Act (33 USC 1251 et seq.) protects and restores the quality of natural waters through the establishment of nationally recommended water quality standards. Under the oversight of the USEPA, states administer provisions of the Clean Water Act by establishing water quality standards and managing water quality. According to USEPA regulations, water quality standards must:

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

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

### **Assumptions and Methodologies**

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

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

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

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

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

### **Impact Threshold Definitions**

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

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

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

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

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

## Water Quality Alternatives Evaluation

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

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

Overall, continued long-term minor adverse impacts to water quality are anticipated as a result of the no action alternative. These adverse impacts to water quality would occur during storm events due to exposed and eroding banks where vegetation does not currently exist along the Anacostia River, erosion

of soil into waterways that can cause an increase in turbidity, a decrease in water clarity, and reduced water quality.

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

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

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

area projects may also provide opportunities for separation of some stormwater from the combined sewer, which would translate to a proportionately lower volume of discharge from CSOs to the river.

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

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

### **Water Quality Impacts Common to All Action (Management) Alternatives**

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

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

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

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

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

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

As a result of alternative B, improvements to water quality would be detectable, but these beneficial impacts would be small and localized. Alternative B would also have a short-term adverse impact on water quality and would range from negligible to minor, depending on the area disturbed due to land disturbance activities and during storm events while the newly planted vegetation is being established.

Overall, alternative B would result in beneficial impacts to water quality as a result of improved wetlands along the Anacostia River through very high wetland management and high goose management because improvements would be detectable but would not cause substantial local changes.

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

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

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

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

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

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

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

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

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

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

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

## FLOODPLAINS

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

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

Executive Order 11988, “Floodplain Management” directs all federal agencies to avoid both long- and short-term adverse effects associated with occupancy, modification, and development within the 100-year



floodplain, when possible. All federal agencies are required to avoid building in a 100-year floodplain unless no other practicable alternative exists.

### Assumptions and Methodologies

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

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

The geographic study area for the 100-year floodplain includes areas within the park that could be impacted by wetland and resident Canada goose management activities.

### Impact Threshold Definitions

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

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

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

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

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

### Floodplains Alternatives Evaluation

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

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

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

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

### **Floodplain Impacts Common to All Action (Management) Alternatives**

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

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

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

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

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

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

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

to floodplains, there would negligible cumulative impacts on floodplains when added to the negligible impacts from alternative C.

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

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

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

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

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

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

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

## WETLANDS

This topic includes tidal and non-tidal wetland resources.

### Guiding Regulations and Policies

The NPS 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*.

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

Section 4.4.4 of the NPS *Management Policies 2006* (Management of Exotic Species) states that exotic species 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. This section is applicable to this plan/EIS due to the presence of exotic plant species, including wetland plant species at the park.

Specifically, Section 4.4.4.2 of the NPS *Management Policies 2006* (Removal of Exotic Species Already Present) states that all exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species:

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

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

Section 404 of the Clean Water Act established a program to regulate the discharge of dredged or fill material into water of the United States. The Rivers and Harbors Act of 1899 defined navigable waters of the United States as “those waters that are subject to the ebb and flow of the tides.” The Clean Water Act

built on this definition and defined the waters of the United States to include tributaries to navigable waters and wetlands adjacent to other water of the United States. The Clean Water Act does not allow for the filling of wetlands if there is another practicable alternative that would be less damaging to aquatic resources or if significant degradation would occur. Permits for work within wetlands are issued by the USACE and state agencies. The USACE encourages agencies to avoid and/or minimize impacts to wetlands, and requires mitigation if unavoidable impacts to wetlands occur.

A SOF describing wetlands and impacts according to the NPS definition is normally required for impacts to wetlands as a result of a proposed project. However, as described in Section 4.2 of Director's Order #77-1, some NPS requirements (SOF and wetland compensation) may be waived for certain excepted actions (NPS 2008d). Some of the techniques in this plan/EIS may be considered an excepted action if wetland impacts stay under certain acreage as described in Section 4.2.1h (actions designed for the purpose of restoring degraded aquatic habitats or ecological processes) because the purpose of the project is to restore wetlands along the Anacostia River. Under this excepted action, up to 0.25 acres of new long-term adverse impacts on wetlands are allowed if directly associated with and necessary for the restoration (NPS 2008d). However, the techniques included in this plan/EIS that would require additional NEPA compliance may also require a SOF for activities proposed in wetlands.

### **Assumptions and Methodologies**

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

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

### **Impact Threshold Definitions**

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

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

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

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

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

## Wetland Impacts Alternatives Evaluation

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

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

The USGS Patuxent Wildlife Research Center has participated in a five-year monitoring project that measured the progress of a reconstructed marsh (Kingman Marsh) towards becoming a functioning, viable freshwater tidal wetland (USGS 2006b). Results derived over the course of the study substantiated major losses of wetland vegetative cover, species richness, and diversity at Kingman Marsh (USGS 2006b). It has been estimated that resident Canada goose damage results through their herbivory has led to Kingman Marsh being reduced to less than one third its original wetland cover along with severe reduction in palatable plant species (USGS 2007). The wetland vegetation impacts at Kingman Marsh could therefore be attributed to herbivory by resident Canada geese (Hammerschlag et al. 2001) coupled with effectively lowered sediment elevations following reconstruction (USGS 2006b). A goose exclusion

study by Haramis and Kearns at the nearby Patuxent River in Maryland (2006) showed that fenced areas of marshland were able to support a lush, healthy population of wild rice (wetland vegetation), whereas in unfenced areas survival of wetland vegetation was extremely low due to grazing by resident Canada geese (Haramis and Kearns 2006). Although current goose exclusion fencing would be maintained, no new fencing is proposed.

Overall, alternative A would have a long-term moderate adverse impact on wetland vegetation because the resident Canada goose population would continue herbivory of wetland vegetation that is not fenced and no measures other than egg oiling would be taken to limit or control the resident Canada goose population under this alternative. A reduction in the abundance and diversity of wetland vegetation has already occurred at Anacostia Park, which further supports a conclusion of long-term moderate adverse impact.

**Cumulative Impacts**—The Anacostia River was historically flanked with nearly 2,500 acres of tidal marsh. However, in the early 20th century the USACE was charged with a major “reclamation” effort designed to improve navigation by channeling and containing the river within a stone seawall. The Anacostia River was engineered into a channeled city river from a meandering river with extensive wetlands. Tidal flats and wetlands were drained and filled to help rid the city of mosquito-borne diseases and stench along the river. Public and government interests in restoring wetlands in the Anacostia River watershed grew in the 1980s when the NPS began working with others to restore nearly 100 acres of wetlands in the park. The restoration of tidal marshes was completed to improve the water quality of the Anacostia River, improve native plant and animal diversity, and provide a more natural recreation experience for park visitors along the river, as well as meet the Department of the Interior’s agreement to the Chesapeake Bay Recovery Program. The restoration, creation, and enhancement of wetlands in the Anacostia Watershed as well as within the park, have had a cumulative beneficial impact on wetlands. Many of these projects have already been completed, some are currently underway, and numerous others are scheduled for the future. These projects have been and continue to be undertaken by a diversity of government programs, agencies, groups, and community organizations.

One of the six restoration goals of the Anacostia Watershed is to increase wetland acreage, and many wetland restoration projects have already been completed or are scheduled for completion (MWCOG 2007). Past wetland restoration projects that have already been completed include the Anacostia Wetland Mitigation Project (ANA-11 created 54 acres of wetlands), Kenilworth Marsh (restored 77 acres of wetlands), Kingman Lake (restored a total of 46 acres of wetlands), Kingman Marsh (restored 40 acres of wetlands), River Fringe Wetlands (restored 16 acres of wetlands), and Heritage Island Wetlands (restored 6 acres of wetlands). Other wetland restoration projects completed include the lower Anacostia Park Enhancements-Pope Branch Restoration, Hickey Run Restoration, and the Watts Branch Restoration. In addition to wetland efforts being initiated by the NPS, the District DOH, EHA is the lead agency implementing many wetland and watershed restoration projects throughout the Anacostia watershed. Key partners for these restoration projects include the USACE-Baltimore District, NPS, USDA-NRCS, USEPA, the USGS Patuxent Wildlife Research Center, District DOE, and USFWS. The wetland restoration projects mentioned above have beneficial impacts to wetlands in and near Anacostia Park.

Numerous other efforts by various federal, local, and community organizations have been completed and are either currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. Environmental programs associated with the Woodrow Wilson Project have included tidal wetland creation comprised of multiple native species (ANA-11 as mentioned above), restoration of tidal wetlands upon removal of landfill material, and wetland creation and enhancement of non-tidal wetlands dominated by phragmites. Wetland Mitigation/Enhancement projects completed by SHA within the Anacostia River Watershed include Tuxedo Road (1.70 acres), Bladensburg Waterfront Park (1.30 acres), Anacostia East (23 acres), and many other small projects totaling over 30 acres (SHA 2006). Future SHA



projects scheduled as a result of Intercounty Connector (ICC) Environmental Stewardship or ICC mitigation include over 20 acres of wetland mitigation/enhancement in the Anacostia River Watershed (SHA 2006). Other future wetland restoration or creation projects are proposed as a result of projects associated with the AWI. AWI projects that incorporate wetland restoration components include Poplar Point. The wetland restoration projects mentioned above have beneficial impacts to wetlands in and near Anacostia Park.

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

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

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

### **Wetland Impacts Common to All Action (Management) Alternatives**

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

Removing sheet piling along the Fringe wetlands would have a short-term, minor adverse effect on wetlands due to erosion that would occur and water quality impacts that would follow this process but a beneficial impact would occur because wetlands would be improved by removing structures in the wetlands. Vegetation surveys over the last five years by the USGS indicate that the wetland vegetation is well established in the Fringe Wetland with over 95 percent cover (Krafft et al. 2008). Reconnection of the floodplain with the Anacostia River would restore the functionality of the floodplain, restore hydrology, and benefit wetlands as well. Additionally, any adverse impacts to wetlands would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

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

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

The primary impact to wetland vegetation within the park would be the result of immediate lethal actions taken to control the resident Canada goose population. It is expected that with rapidly reduced goose browsing pressure, the herbivory previously observed in wetland vegetation would start to reverse, as was found in enclosure studies conducted in the nearby Patuxent River (Haramis and Kearns 2006). Immediately reducing and controlling the growth of the resident Canada goose population would result in beneficial impacts to wetland vegetation, which could recover from current herbivory through decreased goose browsing. Decreased browsing may not only increase the areal coverage of the wetland areas but could also increase diversity through natural recruitment, if supported by current hydrology. The closer

the goose density would get to the initial goal of 54 geese within the park, the higher the chance of achieving successful wetland restoration (NPS 2009b). This conclusion is supported by previous studies documenting goose herbivory of wetland areas within the park and comparison of open plot data with enclosure data for wetland vegetation. Observations drawn from enclosure experiments, as well as enclosed, fenced plantings at Kingman Marsh, clearly demonstrated the ability of marsh vegetation to grow at suitable sediment elevations when protected from herbivory (USGS 2006b). Similarly, a goose exclusion study by Haramis and Kearns at the nearby Patuxent River in Maryland (2006) showed that fenced areas of marshland were able to support a lush, healthy population of wild rice, whereas in unfenced areas grass survival was extremely low due to grazing by resident Canada geese (Haramis and Kearns 2006). In addition to lethal means of reducing the resident Canada goose population, alternative B also includes an intensive scare/harassment program as well as the following reproductive control techniques: increased egg oiling, egg addling, egg replacement if population increases after initial reduction, and application of goose hatch material if population increases greater than 20 percent in one year. It is assumed that these techniques would also reduce the resident Canada goose population and would improve existing and proposed wetlands within Anacostia Park.

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

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

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

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

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

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

Overall, alternative B would have a beneficial impact on wetlands at the park because abundance, diversity, and functionality of wetlands would improve and would be measurable. It is expected that the high wetland management techniques in combination with the high goose management techniques would

protect and slow the current erosion rate of the riverine wetlands in Anacostia Park, resulting in less wetland loss and erosion during rain events. Additionally, negligible impacts to the wetlands would result from elements of alternative B that propose soil disturbance and/or construction for some wetland management techniques. However, these impacts would only occur during active construction of wetland restoration projects and the beneficial impact on wetlands would far outweigh the negligible impacts. Additionally, these impacts would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

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

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

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

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

As part of alternative C, immediately reducing and controlling the growth of the resident Canada goose population would result in beneficial impacts to wetland vegetation, which could recover from current herbivory through decreased goose browsing. Decreased browsing may not only increase the aerial coverage of the wetland areas but could also increase diversity through natural recruitment, if supported by current hydrology. The closer the goose density would get to the initial goal of 54 geese within the park, the higher the chance of achieving successful wetland restoration (NPS 2009b). Although alternative C only allows for the lethal reduction of the resident Canada goose population one time in the first year of the plan/EIS and a maximum of five total times throughout the plan to meet the initial population goal, a reduction of geese in the park should still provide a beneficial impact to wetland vegetation, similar to described above for alternative B, but to a lesser scale. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in

the intensity of the impact (beneficial) to wetlands at the park. That said, it has been demonstrated that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other goose management techniques proposed as part of alternative C such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) would work in combination with the population reduction techniques.

Even though alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B, the remaining wetland management techniques proposed as part of alternative C are the same as those included in alternative B. Some techniques included in alternative C would require additional NEPA analysis because site-specific designs would be necessary to make these improvements. For projects that will require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the wetland and not affecting the wetland, NPS will prepare and approve a SOF for activities in a wetland. The high wetland management techniques proposed as part of this alternative in combination with moderate goose management should provide an overall beneficial impact to wetland vegetation, similar to described above for alternative B and these techniques would protect and slow the current erosion rate of the riverine wetlands in Anacostia Park, resulting in less wetland loss and erosion during rain events. Additionally, negligible impacts to the wetlands would result from elements of alternative C that propose soil disturbance and/or construction for some wetland management techniques. However, these impacts would only occur during active construction of wetland restoration projects and the beneficial impact on wetlands would far outweigh the negligible impacts. Additionally, these impacts would be minimized and/or mitigated by appropriate BMPs and may include an E&S plan, or other required documents in the District.

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

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

**Alternative D – Low Wetland, Low Goose Management**—Alternative D combines less aggressive wetlands management options with primarily non-lethal goose management options. This alternative offers the lowest management effort for both wetlands and resident geese. Under wetland management techniques for alternative D, there are no erosion control techniques proposed, no planting efforts proposed, and no new wetland restoration efforts proposed. Under alternative D, there would be no initial lethal resident Canada goose population reduction activities, but the resident goose population would be monitored annually. Other goose management techniques are proposed (including planting buffers, applying goose repellents, a less intensive scare/harassment program, and egg oiling) as part of alternative D as discussed in chapter 2. If the other goose management techniques discussed do not keep the goose population at the goose population goal, a onetime population reduction using lethal controls of 40 to 60 percent of the resident goose population would be performed during the life of the management plan but only if needed. The lethal control technique during the one-time population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. However, in time, it is likely that, due to the nature of urban-dwelling geese, other geese

would capitalize on the newly void habitat. Relocating or removing resident Canada geese has been described by Gosser et al. (1997) as a stop-gap effort because the site must be modified to make it less attractive to resident Canada geese, or the removed geese would be replaced with new ones. Additionally, Dr. Allan (1999) states that a cull (gathering and removing) of breeding resident Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). Future population reduction strategies beyond the one-time reduction are not proposed as part of alternative D.

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

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

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

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—This alternative combines aggressive wetland management techniques with intensive goose management activities; however, there is no lethal control for resident Canada geese. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose population reduction may be either completely offset or take longer to realize. Under this alternative, no resident Canada geese would be removed, but the population would be monitored during the life of the plan/EIS. Although an initial goal of 54 resident Canada geese within the park was determined by a scientific team, this goal would

likely not be met since a population reduction would not occur as part of alternative E. Some of the techniques included as part of alternative E would require additional NEPA analysis because site-specific designs would be necessary to make these improvements. For projects that will require additional NEPA compliance, when it is not practicable to locate or relocate projects outside of the wetland and not affecting the wetland, NPS will prepare and approve a SOF for activities in a wetland.

However, the full suite of wetland management techniques as proposed in alternative E would provide an improvement to wetland vegetation, even though these benefits would most likely be offset by the size of the resident Canada goose population. At a minimum, the resident Canada goose population would remain similar to existing conditions, but could possibly increase in size with time. It has been demonstrated that a combination of techniques are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other goose management techniques proposed as part of alternative E such as habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material) would work in combination with the other techniques. The high wetland management and moderate goose management techniques proposed as part of this alternative would protect and reduce the erosion of the riverine wetlands in Anacostia Park, but some loss of wetland vegetation and erosion during rain events would still occur as a result of alternative E, although the loss would not be as pronounced as either alternatives A or D. Therefore, the high wetland management techniques proposed as part of this alternative in combination with moderate goose management (but a lack of lethal control) would provide an overall long-term minor adverse impact to wetland vegetation.

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

**Conclusion**—Alternative E would result in overall long-term minor adverse impacts on wetlands because impacts to wetlands and wetland vegetation and wildlife would be detectable, but the overall functionality of the wetland would not be affected. A reduction in the abundance and diversity of wetland vegetation would be measurable, but would be limited and would not have much consequence on the native plant community and its functionality. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

## NATURAL RESOURCES

This section discusses the plan impacts to the natural resources in the study area, including aquatic and terrestrial resources.

### AQUATIC RESOURCES

This topic includes benthic invertebrates, finfish, and shellfish.

### Guiding Regulations and Policies

NPS regulations and policies, including the *Organic Act of 1916*, *Management Policies 2006*, and *Reference Manual 77*: Natural Resource Management directs the park to manage and preserve physical



and biological processes, as well as individual species, features, and plant and animal communities. The NPS would ensure that the environmental costs and benefits of proposed operations, development, and resource management are fully and openly evaluated before taking actions that may impact the natural resources of the park (NPS 2006a). These policies require the NPS to manage natural resources to maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic systems. The NPS seeks to:

- eliminate human-induced impacts on aquatic habitats,
- limit effects and mitigate damage if impacts are unavoidable,
- maintain and restore aquatic habitats to protect their ecological and aesthetic character and dependent plant and animal communities.

### **Assumptions and Methodologies**

The evaluation of aquatic species was based on a qualitative assessment of how management activities would impact aquatic species and their habitat. Potential impacts to aquatic resources were assessed based on the extent of disturbance to the aquatic resource habitats and the individual species.

The geographic study area for aquatic resources includes all waterbodies at Anacostia Park.

### **Impact Threshold Definitions**

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

*Negligible:* There would be no observable or measureable impacts on aquatic species, their habitats, or the natural processes sustaining them at the park. Impacts would be similar to natural fluctuations.

*Adverse: Minor:* Impacts to aquatic species, their habitats, or the natural processes sustaining them would be detectable at the park. Occasional responses to disturbance from management practices could be expected, but would not interfere with foraging or reproduction. Harassment, injury, or mortality of aquatic species is not expected. The overall viability of the species would not be affected.

*Moderate:* Impacts to aquatic species, their habitats, or the natural processes sustaining them would be detectable at the park. Frequent responses to disturbance from some individuals could be expected and may interfere with foraging or reproduction. Some impacts may occur during critical periods of reproduction or in key habitats and may result in harassment, injury, or mortality to one or more individuals. Detectable changes to the availability of functional habitat or key components of habitat would occur, however the viability of the species would not be affected.

*Major:* Impacts to aquatic species, their habitats, or the natural processes sustaining them would be obvious at the park. Frequent responses to disturbance by several or most individuals would be expected with impacts on foraging or reproduction. Impacts would occur during critical periods of reproduction or in key habitats and would result in direct mortality or loss of habitat that may affect the viability of the species.

## **Aquatic Resources Alternatives Evaluation**

**Alternative A – No Action Alternative**—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland vegetation in the watershed and creating open areas in the marsh, susceptible to sediment scouring and no wetland restoration techniques are proposed as part of the no action alternative. In addition, it is expected that the riverine wetlands along the Anacostia River in the park will continue to erode during the life of this plan/EIS based upon park observations and personal communications, resulting in a further loss of wetlands and an already limited aquatic habitat within the Anacostia River (NPS 2010a). As a result of herbivory and wetland loss, the open, bare areas of the marsh have less potential to support benthic macroinvertebrates and therefore, would support fewer finfish species dependent upon this food source. These open, bare areas of the marsh are susceptible to sediment scouring which causes turbidity and can degrade water quality; water quality influences the presence of shellfish such as mussels. Recent surveys in the Anacostia River have indicated the presence of pollution-tolerant benthic macroinvertebrates and finfish species, indicating environmental stressors such as the lack of cover in unvegetated areas, disturbance, and likely polluted sediments (USGS 2006a). The abundance and diversity of finfish species in the river remains below its potential due to poor water quality (excess sediment and bacteria and low DO). It has been concluded that the loss of vegetation and the subsequent erosional substrate at wetlands in Anacostia Park are due to wildlife grazing (primarily resident Canada geese) which has affected the macroinvertebrate community development (USGS 2006a). Removing sheet piling along the Fringe Wetlands would result in a short-term minor adverse impact on benthic macroinvertebrates and on finfish during construction due to erosion that would occur and water quality impacts that would follow this process. However, a beneficial impact to benthic macroinvertebrates and finfish would occur following removal of the sheet piling because a physical barrier between the bottom of the Anacostia River and the wetlands would be removed and the historic reconnection would occur. However, the resident Canada goose population would not be intensively reduced as part of the No Action Alternative. Additionally, wetland restoration techniques and improvements to water quality as a result of the no action alternative would not indirectly benefit benthic macroinvertebrates, finfish species, or shellfish. It is estimated that over the life of this plan/EIS, the riverine wetlands will continue to erode (NPS 2010b, Curtis 2010), resulting in a further loss of wetlands and aquatic habitat within the Anacostia River (Curtis 2010). Therefore, overall and continued, long-term moderate adverse impacts to aquatic resources in the park are anticipated as a result of the no action alternative. Because a loss of habitat and changes to the natural processes sustaining them would be detectable at the park such as the availability of functional habitats or key components of supporting habitat.

**Cumulative Impacts**—The benthic community in the Anacostia River is characterized by low diversity, low abundance, and dominance by pollution-tolerant worms, as described in the “Benthic Invertebrates” section of chapter 3. These conditions were likely caused by a combination of chronic exposure to pollutants and low dissolved oxygen levels. The Anacostia River substrate is dominated by mud and the area generally has a degraded benthic community as well as few instream structures for fish habitat. Proposed projects such as the 11<sup>th</sup> Street Bridge Replacement Project would not cumulatively affect finfish; the replacement structures would cause no greater blockages to passage of migratory fish to upper watershed spawning sites than the existing bridges. Some fish kills were reported as a result of the Woodrow Wilson Bridge project, particularly related to the explosives demolition of the earlier bridge; explosives will not be used to demolish the 11<sup>th</sup> Street Bridge (DCDOT and FHWA 2007). As mitigation, the Woodrow Wilson Project environmental programs includes the following which may benefit fish species: Removal of fish blockages to open historical anadromous fish habitat, five years of fish hatchery restocking in tributary streams where fish passage restorations are implemented, riffle grade controls, and construction of a rock chute. Barriers to fish movement throughout the Anacostia watershed are a problem for both migratory and resident fish. Unimpeded fish passage is especially important for anadromous fish, which live much of their lives in tidal waters, but must move into non-tidal rivers and streams to spawn.

Within the Anacostia Watershed, the Woodrow Wilson Mitigation Project removed or modified a total of 14 fish barriers (NOAA 2007b). Tidal freshwater wetland restoration in Kenilworth Marsh and Kingman Marsh have already added critical rearing habitat for juvenile anadromous fish species (NOAA 2007b). Restored emergent tidal wetlands and off-channel habitat can provide similar habitat to natural wetlands and can increase food availability and shelter over degraded sites (NOAA 2007b). Surveys in the Anacostia River have indicated the presence of two shellfish species, the Eastern floater mussel (appendix E) and the tidewater mucket mussel. It is unlikely that any of the techniques described above for all action alternatives would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park. Given the normal turbidity of the river, any temporary adverse impacts as a result of proposed projects such as the 11<sup>th</sup> Street Bridge Replacement Project would not cumulatively affect aquatic resources.

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

**Conclusion**—Alternative A would result in long-term moderate adverse impacts on aquatic species and their habitat. Impacts would be detectable in the park, and may occur in key reproduction periods and habitats resulting in harassment, injury, or mortality to individuals. Some individuals may frequently be disturbed, which could interfere with foraging and reproduction. Detectable changes to the availability of functional habitat and habitat components would occur, but would not impact species viability. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

### **Impacts to Aquatic Resources Common to All Action Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. Removing sheet piling along the Fringe wetlands would result in a short-term, minor adverse impact on benthic macroinvertebrates and on finfish during construction due to erosion and water quality impacts that would follow this process. However, a beneficial impact to benthic macroinvertebrates and finfish would occur following removal of the sheet piling because a physical barrier between the bottom of the Anacostia River and the wetlands would be removed and the historic reconnection would occur. Surveys in the Anacostia River have indicated the presence of two shellfish species, the Eastern floater mussel (appendix E) and the tidewater mucket mussel. It is unlikely that any of the techniques described above for all action alternatives would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

Because wetlands provide both aquatic diversity and habitat for benthic macroinvertebrates and finfish in the Anacostia River, and wetland plants serve as a food source (detritus) both directly and indirectly, improvements to wetlands would have an overall beneficial impact on aquatic resources: A result of the management techniques detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. Beneficial impacts would occur because wetlands (and therefore the benthic and finfish community) would be improved in a limited and localized area by removing structures in the wetlands.

**Alternative B – High Wetland, High Goose Management**—The resident Canada goose population would be intensively reduced as part of this alternative, which would result in improvements to wetland vegetation. This alternative also includes a suite of potential techniques to improve wetlands in the park, including erosion control techniques to improve wetlands and creating tidal guts.

Revegetating and stabilizing areas along the river and wetland restoration techniques would improve the benthic macroinvertebrate population as well as the finfish within the park. Because wetlands provide both aquatic diversity and habitat for benthic macroinvertebrates and finfish in the Anacostia River, and wetland plants serve as a food source (detritus) both directly and indirectly, improvements to wetlands would have a beneficial impact on aquatic resources because detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. Beneficial impacts would occur because wetlands (and therefore the benthic and finfish community) would be improved in a limited and localized area by removing structures in the wetlands. Wetland vegetation improvements and creating tidal guts vegetated with wetland plants would provide additional detritus and create a more complex habitat to support benthic macroinvertebrates and finfish species. Additionally, because water quality influences the presence of mussels, improvements to wetlands and water quality as a result of the management alternatives would indirectly benefit shellfish in the Anacostia River, although this change would not necessarily be perceptible or measurable. Namely, hydrology techniques that include removing or modifying structures that result in erosion and clogging of marsh and creation of tidal guts would have a similar overall beneficial impact on water quality and thus fisheries. Additionally, habitat modification as part of goose management includes planting 25- to 50-foot buffers along the shorelines of the river throughout the park and increasing the width of existing vegetated buffers. Additional and/or enhancing buffers along the shoreline would benefit finfish species by shading the river and reducing the water temperature in surface waters located immediately adjacent to the buffer zone. The District WAP has identified four fish within Anacostia Park that are considered species of greatest conservation need and include alewife, American eel, American shad, and blueback herring. NPS makes every reasonable effort to conduct its actions consistent with relevant state laws and regulations and these species are given equal consideration for analysis in this plan/EIS compared to federally and state listed species. Impacts to the four finfish species listed by the District WAP and observed at Anacostia Park would also be beneficial because detectable improvements to food sources and habitat quality would occur as part of alternative B.

As part of alternative B, any submerged land disturbance may directly affect and displace benthic macroinvertebrates and indirectly affect finfish during construction activities. These activities would result in a short-term minor adverse impact during construction due to direct disturbance and as a result of erosion and water quality impacts that would follow this process. Although benthic invertebrates have limited mobility, most fish species are mobile and would be able to temporarily avoid submerged areas under construction. Overall impacts to aquatic resources (benthic macroinvertebrates and finfish) as a result of alternative B would be beneficial and would offset the short-term minor adverse impacts because detectable improvements to food sources and habitat quality would occur through improved natural processes sustaining benthic macroinvertebrates and finfish. It is unlikely that any of the techniques described above for alternative B would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

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

**Conclusion**—Alternative B would result in overall beneficial impacts on aquatic resources because revegetation, stabilization, and changes to hydrology would improve habitat and food sources for aquatic species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C includes many of the same wetland management and goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C would include only limited removal of structures, both mechanical and passive seedbank regeneration, and least invasive stream/stormwater outfall modifications. Alternative C would not include creating tidal guts and would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Overall impacts to aquatic resources (benthic macroinvertebrates and finfish) as a result of alternative C would be the same as alternative B: beneficial because detectable improvements to food sources and habitat quality would occur as a result of improvements to wetlands and vegetative buffers along the shoreline. Submerged land disturbance would still occur during construction activities, and would have a short-term minor adverse impact on aquatic resources, but this impact would be offset by the overall beneficial impact of alternative C. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to finfish at the park. An overall, beneficial impact for alternative C is appropriate because impacts to finfish habitat and food sources would be detectable as a result of improvements to wetlands and water quality in the park. It is unlikely that any of the techniques described above for alternative C would have an impact on shellfish species since only limited shellfish currently inhabit substrate within Anacostia Park.

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

**Conclusion**—Alternative C would result in overall beneficial impacts on aquatic resources because wetland improvements would have detectable improvements on food sources and aquatic habitats. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques proposed and no initial lethal reduction activities. No wetland planting efforts or new wetland restoration techniques are proposed to increase wetland vegetative cover. Therefore, food sources and habitat would not be improved or created for aquatic resources. Open, bare areas of the marsh would have less potential to support benthic macroinvertebrates, and therefore, would support fewer finfish species dependent upon this food source. The low wetland management techniques proposed as part of this alternative in combination with low goose management would provide an overall, negligible impact to aquatic resources (benthic macroinvertebrates, finfish, and shellfish) because there would be no measurable change in habitat or natural processes sustaining aquatic resources; impacts would be similar to natural fluctuations.

**Cumulative Impacts**—The negligible impacts on aquatic resources as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be

beneficial to aquatic resources, there would be beneficial cumulative impacts on aquatic resources when added to the negligible impacts from alternative D.

**Conclusion**—Alternative D would result in overall negligible impacts on aquatic resources because there would be no measurable impacts on aquatic species, their habitats, or natural processes within the park that sustain aquatic species. Impacts would be similar to natural fluctuations. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—

Alternative E has the same wetland management techniques proposed as alternative B but the goose management techniques proposed do not include lethal population reduction activities. The benefits from a full suite of wetland management techniques proposed without a resident Canada goose population reduction may be either completely offset or take longer to realize. Therefore, alternative E results in negligible impacts to aquatic resources (benthic macroinvertebrates, finfish, and shellfish) because there would be no detectable or measureable improvements to food sources and habitat quality for aquatic resources.

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

**Conclusion**—Alternative E would result in overall negligible impacts on aquatic resources because there would be no measurable impacts on aquatic species, their habitats, or natural processes within the park that sustain aquatic species. Impacts would be similar to natural fluctuations. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial.

## VEGETATION AND WILDLIFE

This topic includes terrestrial vegetation and wildlife. Since the resident Canada goose is the focus of this plan/EIS, this species is presented in a separate section that follows the wildlife impacts analysis.

### Vegetation

#### Guiding Regulations and Policies

NPS *Management Policies 2006* state that the fundamental purpose of the national park system begins with a mandate to conserve park resources and values and provide for the public enjoyment of the park's resources and values to the extent that the resources will be left unimpaired for future generations. Native vegetation is identified as a park resource (NPS 2006a). NPS *Management Policies 2006* provides general principles for the maintenance of vegetation in the park by:

- Preserving and restoring the natural abundance, diversities, dynamics, distributions, habitats, behaviors of native plant populations and communities and ecosystems in which they occur.
- Restoring native plant populations in parks when they have been extirpated by past human-caused actions.
- Minimizing human impacts on native plants, communities, and ecosystems, and the processes that sustain them.

## Assumptions and Methodologies

The geographic study area for vegetation would include all upland areas throughout Anacostia Park; impacts would be measured qualitatively. It is also important to note that *beneficial* impacts would result if the general coverage of invasive plant species decreases.

## Impact Threshold Definitions

The following thresholds were used to determine impacts to vegetation:

*Negligible:* A reduction in the abundance and diversity of vegetation may occur, but any change would be so small that it would not be measurable. The general coverage of invasive plant species would remain the same.

*Adverse: Minor:* A reduction in the abundance and diversity of vegetation would occur (invasive plant species coverage may increase) and would be measurable but would be limited and of little consequence to the greater functionality of the plant community in Anacostia Park.

*Moderate:* Some reduction in the abundance and diversity of native vegetation would occur (invasive plant species coverage may increase), and it would be measurable but would result in a small-scale consequence to the greater functionality of the plant community in Anacostia Park.

*Major:* A noticeable reduction in the abundance and diversity of native vegetation would occur (invasive plant species coverage may increase). The change would be measurable and of widespread consequence to the viability of the native plant community within Anacostia Park.

## Vegetation Alternatives Evaluation

**Alternative A – No Action Alternative**—As detailed in the previous “Wetlands” section of this chapter, the resident Canada goose population would remain in excess of the recommended initial goal for successful wetland restoration projects and would increase over time, adversely impacting wetland vegetation as well as terrestrial vegetation. No new native plantings would occur and existing buffers would not be enhanced as a result of the no action alternative. Currently, resident Canada goose herbivory is occurring at turf feeding areas; breaks in the vegetative buffers along the shorelines of the Anacostia River are allowing geese to access these areas and other areas that support terrestrial vegetation. The limited, current management of invasive species would be continued with the no action alternative, which would increase the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially reduce native vegetation. Removal of the sheet piling would have a negligible impact on vegetation because the abundance and diversity of terrestrial vegetation is not expected to change. An overall reduction in the abundance and diversity of vegetation would occur (including invasive plant species increase in coverage) under alternative A that would be measurable but would not necessarily affect the overall functionality of the plant community in Anacostia Park. Overall, continued, long-term minor adverse impacts to terrestrial vegetation are anticipated as a result of the no action alternative.

**Cumulative Impacts**—Due to the numerous redevelopment projects proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11<sup>th</sup> Street Bridge

Replacement Project, impacts to terrestrial vegetation are anticipated. Most construction projects excavate soils, which would require existing vegetation to be removed. The greatest potential for impact to terrestrial habitats would come from the redevelopment project at Poplar Point, which is a large tract of natural habitat types within and adjacent to Anacostia Park. Other projects in the area are redevelopments of urbanized areas that contribute little to the naturalized habitat of the area. The Poplar Point project could potentially impact from 30 to 100 acres, but impacted habitat types are unknown at the time. The 11th Street Bridge Replacement Project would directly affect about 8 acres of woodland and scrub habitats. Although AWI projects and the 11<sup>th</sup> Street Bridge Replacement Project would affect terrestrial vegetation, planting vegetation and trees in the area is proposed as mitigation. The District DOT and FHA have committed to providing plantings in select areas of the park where impacts from the 11<sup>th</sup> Street Bridge Replacement Project are anticipated (DCDOT and FHWA 2007) and a goal of the AWI is to restore riparian function in the watershed in both urban and natural environments (DCOP 2009). As a result of the many redevelopment projects described above, a long-term minor adverse impact to terrestrial vegetation would occur.

In addition to this plan/EIS, which would manage invasive species, other projects are also reducing areal coverage of invasive plant species along the Anacostia River. The Woodrow Wilson Project's environmental programs have included wetland restoration in areas dominated by common reed grass, a top ten NCR-EPMT target species. Also, the Anacostia Wetland Mitigation Project (ANA-11) eliminated invasive non-native species. Therefore, beneficial effects are expected through reduced areal coverage of invasive species. However, these beneficial impacts would most likely be cancelled out by the long-term minor adverse impacts to terrestrial vegetation as described above, resulting in negligible impacts.

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

**Conclusion**—Alternative A would result in overall long-term minor adverse impacts on vegetation because there would be a measurable minor but limited reduction in vegetation diversity and abundance, which would be of little consequence to the functionality of the plant community in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

### **Vegetation Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. With the exception of installing new rain gardens (which would require additional NEPA compliance), the techniques described above for all action alternatives would have a negligible impact on vegetation because the abundance and diversity of terrestrial vegetation is not expected to change. Installing new rain gardens may disturb soil and associated vegetation during construction in the short-term but may include upland plantings and help reduce the amount of impervious area in the park in the long-term; however, these areas may be too small and localized in nature to create a detectable change in vegetation diversity and abundance. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. However, additional



NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). Overall, the techniques that are common to all action alternatives would result in negligible impacts to vegetation because the impacts would be at the lower levels of detection and because of the limited and localized nature of the proposed techniques.

**Alternative B – High Wetland, High Goose Management**—The resident Canada goose population would be intensively reduced as part of this alternative, which would benefit vegetation currently being grazed along the existing shoreline buffer as well as terrestrial vegetation located further inland, such as current turf feeding areas. Wetland management techniques such as the installation of coir fiber logs, flow deflectors, bog mats, and/or shoreline steepness reduction would help establish and benefit terrestrial vegetation.

Habitat modification techniques are also proposed as part of alternative B for goose management that would have a beneficial impact on vegetation. These techniques include planting 25- to 50-foot buffers along the shorelines of the River throughout the park and increasing the width of existing vegetated buffers. It has been demonstrated by Gosser et al. (1997) that restricting a goose's ability to move between water and land will deter geese from an area, especially during the molt. Therefore, physical barriers (such as vegetation) along the water's edge would restrict the movements of geese between the water and shore and would provide a beneficial impact on vegetative areas currently being grazed that have no shoreline buffers. Access from water to land would be restricted by planting thick shrubs or trees, along the shoreline of the Anacostia River to enhance existing buffers. Additionally, the new plantings would include species that are considered less desirable to geese and goose repellents would be applied to turf feeding areas yearly to protect the vegetation in these areas. Other vegetation techniques that are part of wetland management are proposed to improve terrestrial vegetation include managing invasive species (reducing areal coverage). By improving wetland vegetation with native species, there is less likelihood that invasive vegetative species would encroach and persist in these locations. Also, high-density plantings using persistent, native species with high root mats and variable height are also included as part of alternative B.

Vegetation may be temporarily affected during land disturbance activities such as the re-grading of sites or construction activities associated with hydrology techniques, vegetation techniques, and wetland restoration techniques. These techniques would have a negligible to minor, adverse impact on vegetation, depending on the area disturbed. However, vegetation disturbance impacts would be minimized as much as possible and the areas would be revegetated immediately following site preparation. Mitigation may include appropriate BMPs such as vegetation buffers, a revegetation plan, or other required documents in the District, depending on the total area disturbed. Even through some wetland management techniques may require land disturbance activities, alternative B would result in overall beneficial impacts to terrestrial vegetation as a result of wetland management and goose management techniques because native vegetation coverage would increase and invasive vegetation coverage would decrease at the park.

**Cumulative Impacts**—The beneficial impacts on terrestrial vegetation as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on terrestrial vegetation, these adverse effects would be offset when added to the beneficial impacts from alternative B, resulting in a negligible cumulative impact to terrestrial vegetation.

**Conclusion**—Alternative B would result in overall beneficial impacts on vegetation due to wetland management practices, new plantings, and a reduction in herbivory, which would improve native

vegetation communities. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C includes many of the same wetland management and goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, least invasive stream/stormwater outfall modifications, would not include creating tidal guts, would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Like alternative B, alternative C would also manage invasive species, the 25- to 50-foot buffers along the shorelines of the River throughout the park would be planted, and the width of existing vegetated buffers would be increased. A reduced goose population would decrease the amount of grazing of shoreline areas so less turf and terrestrial vegetation would be lost from grazing. Land disturbance would still occur during construction activities, and would have a negligible impact on vegetation. Overall impacts to vegetation as a result of alternative C would be the same as alternative B: beneficial because the wetland management and goose management techniques would increase native vegetation coverage and would decrease invasive vegetation coverage at the park. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (beneficial) to the vegetation at the park.

**Cumulative Impacts**—The beneficial impacts on terrestrial vegetation as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on terrestrial vegetation, these adverse effects would be offset when added to the beneficial impacts from alternative C, resulting in a negligible cumulative impact to terrestrial vegetation.

**Conclusion**—Alternative C would result in overall beneficial impacts on vegetation due to wetland management practices, invasive species management, and a reduction in herbivory, which would improve native vegetation communities. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques proposed, including no initial lethal reduction activities and a minor level of invasive species management (similar to current program). Alternative D includes new and increased vegetative buffers proposed along the shoreline, but the low goose management would allow turf and terrestrial vegetation to be lost as a result of grazing. The limited, current management of invasive species would be continued with alternative D, which would increase the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially reduce native vegetation. A reduction in the abundance and diversity of vegetation would occur (including invasive plant species increase in coverage) that would be measurable but would not necessarily affect the overall functionality of the plant community in Anacostia Park. Therefore, alternative D results in long-term minor adverse impacts to vegetation because invasive vegetation coverage at the park may increase and a reduction in the abundance and diversity of vegetation may occur due to goose herbivory.

**Cumulative Impacts**—The long-term minor adverse impacts on terrestrial vegetation in and near Anacostia Park under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since these projects would have long-term minor adverse impacts to terrestrial vegetation, the added adverse effects of alternative D would result in a long-term moderate adverse cumulative impact on terrestrial vegetation.

**Conclusion**—Alternative D would result in overall long-term minor adverse impacts on vegetation because there would be a measurable minor but limited reduction in vegetation diversity and abundance, which would be of little consequence to the functionality of the plant community in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate adverse.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—

Alternative E has numerous wetland management and goose management techniques proposed, including an invasive species management program and new and increased vegetative buffers, but no lethal reduction activities. Invasive species would be managed under alternative D the same as under alternative B, which would decrease the coverage of invasive plant species in the terrestrial areas over the life of this plan/EIS and would consequentially increase native vegetation. However, alternative D results in overall negligible impacts to vegetation because native species coverage would be increased through buffer plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change in vegetation at the park.

**Cumulative Impacts**—The negligible impacts on terrestrial vegetation in and near Anacostia Park under alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since these projects would have long-term minor adverse impacts to terrestrial vegetation, the negligible effects of alternative E would result in a long-term minor adverse cumulative impact on terrestrial vegetation.

**Conclusion**—Alternative E would result in overall negligible impacts on vegetation because a reduction in vegetation diversity and abundance may occur, but this change would not be measurable, and the cover of invasive species would remain the same. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

## **Wildlife (Not including Resident Canada Geese)**

### **Guiding Regulations and Policies**

NPS regulations and policies, including the NPS *Organic Act of 1916*, NPS *Management Policies 2006*, and NPS Reference Manual 77: *Natural Resource Management* directs the park to provide for the protection of park resources. The *Organic Act* directs national parks to conserve wildlife unimpaired for future generations and is interpreted to mean that native animal life are to be protected and perpetuated as part of the park’s natural ecosystem. Parks rely on natural processes to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities.

NPS *Management Policies 2006* make restoration of native species a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006a). The NPS will seek to protect native animal populations against destruction or harm through human actions.

The *Migratory Bird Treaty Act of 1918*, as amended, prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit (50 CFR 21.11). Additionally, the act authorizes and directs the Secretary of the Interior to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take. “Take” includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

## Assumptions and Methodologies

The evaluation of wildlife (other than resident Canada geese) was based on a qualitative assessment of how expected changes to wetlands and the resident Canada goose population would affect the habitat of other wildlife. The park's wildlife is directly affected by the natural abundance, biodiversity, and the ecological integrity of their habitat. Wildlife groups analyzed in this section include birds; mammals; reptiles, amphibians, and invertebrates, and invasive wildlife species.

Available information on known wildlife was compiled and analyzed in relation to the proposed management actions. The geographic study area for wildlife would include all upland and wetland habitats within the park boundaries.

The District WAP has identified 15 birds, five mammals, 13 reptiles, 13 amphibians, and nine invertebrates within Anacostia Park that are considered species of greatest conservation as described in table 10 of chapter 3. NPS makes every reasonable effort to conduct its actions consistent with relevant state laws and regulations. Due to the additional wildlife included on lists produced by the District WAP, impacts to these species are analyzed in this section; these species are still given equal consideration for analysis in this plan/EIS compared to federally and state listed species.

## Impact Threshold Definitions

The following thresholds were used to determine impacts to wildlife:

*Negligible:* There would be no observable or measurable impacts on species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

*Adverse: Minor:* Impacts would be detectable but would not be outside the natural range of variability. Small changes to population numbers, population structure, genetic variability, and other demographic factors might occur. Occasional responses to disturbance by some individuals could be expected but without interference to factors affecting population levels. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.

*Moderate:* Impacts to native species, their habitats, or the natural processes sustaining them would be detectable and could be outside the natural range of variability. Changes to population numbers, population structure, genetic variability, and other demographic factors would occur, but species would remain stable and viable. Frequent responses to disturbance by some individuals could be expected, with some negative impacts on factors affecting population levels. Sufficient habitat would remain functional to maintain the viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat.

*Major:* Impacts to native species, their habitats, or the natural processes sustaining them would be detectable, outside the natural range of variability, and extensive. Population numbers, population structure, genetic variability, and other demographic factors might experience large declines. Frequent responses to disturbance by some individuals would be expected, with negative impacts on factors resulting in a decrease in population levels. Loss of habitat might affect the viability of at least some native species.

## Wildlife Alternatives Evaluation

**Alternative A – No Action Alternative**—Currently, resident Canada goose herbivory is reducing the quality and quantity of wetland habitat in the watershed, but the goose population would not be intensively reduced as part of the no action alternative. Additionally, no wetland restoration techniques or habitat modifications such as buffers or new plantings are proposed as part of the no action alternative. The existing habitat to support wildlife species is not diverse due to reduced or degraded wetland areas. In addition, it is expected that over the life of this plan/EIS, the riverine wetlands will continue to erode (NPS 2010b, Curtis 2010), resulting in a further loss of wetland vegetation that would also affect wildlife species utilizing this habitat. The limited, current management of invasive species would be continued with the no action alternative. Additionally, the loss of vegetation and the subsequent erosional substrate at wetlands within Anacostia Park due to wildlife grazing (primarily resident Canada geese) negatively affects aquatic-dependent wildlife species in the park that utilize these areas such as other waterfowl and migrant Canada geese. Removal of the sheet piling would have a negligible impact on wildlife species since the impact on vegetation is negligible since the abundance and diversity of terrestrial vegetation is not expected to change.

The USFWS (1999) has stated that the presence of large numbers of resident Canada geese conflict with management of the wild, migratory Atlantic Population (AP) of Canada geese. Other migratory waterfowl such as ducks can also be affected by large concentrations of resident Canada geese. Food and habitat for AP geese become food and habitat for resident Canada geese, making it more difficult to manage for migrant populations as a result of the growing resident Canada goose population, which quickly degrades and decimates these resources that are important for the health and survival of wild geese (USFWS 1999). If left unchecked and uncontrolled, the resident Canada goose population could adversely affect other wildlife species diversity and abundance (USFWS 1999). In addition, the USFWS (2005) and McCoy (1999) state that concentrated resident Canada geese populations may threaten the health of other wildlife, especially waterfowl and state that influenza A viruses and avian tuberculosis outbreaks are exacerbated by dense populations of waterfowl, including Canada geese (McCoy 2000). Resident Canada geese can also unintentionally serve as live decoys, attracting migratory geese to problem areas, thus exacerbating existing problems, or causing new ones, and can concentrate birds in small areas, potentially facilitating the spread of avian disease (USFWS 2005). It has been specifically observed by the State of Connecticut's Department of Environmental Protection (DEP) that resident geese can serve as decoys, attracting migrant waterfowl, which can lead to crowded conditions and encourage the spread of diseases through the wild population (Connecticut DEP 2009). Although it has been specifically demonstrated by USFWS (1999), McCoy (2000), USFWS (2005), and Connecticut DEP (2009) that the resident Canada goose population could affect other wildlife, this correlation has not been measured at Anacostia Park. As suggested in USFWS (2005, IV-9), impacts of resident Canada geese on other migratory waterfowl could include resident Canada goose damage to habitat intended for wintering and migrating waterfowl. As a result of the no action alternative, continued, long-term minor adverse impacts to wildlife are anticipated due to loss of vegetation in wetlands because impacts would be detectable but would not be outside the natural range of variability; small changes to population numbers, population structure, genetic

variability, and other demographic factors might occur and occasional responses to disturbance by some individuals would be expected to wildlife.

**Cumulative Impacts**—Due to the numerous redevelopment projects proposed in the vicinity of Anacostia Park, including components of the AWI such as Poplar Point as well as the 11<sup>th</sup> Street Bridge Replacement Project, cumulative impacts to wildlife are anticipated. Most construction projects would require existing vegetation to be removed, which would reduce the existing habitat available to wildlife. The greatest potential for impact to terrestrial habitats would come from the redevelopment project at Poplar Point, which is a large tract of natural habitat types within and adjacent to Anacostia Park. Other projects in the area are redevelopments of urbanized areas that contribute little to the naturalized habitat of the area. The Poplar Point project could potentially impact from 30 to 100 acres, but impacted habitat types are unknown at the time. The 11th Street Bridge Replacement Project would directly affect about 8 acres of woodland and scrub habitats. Although AWI projects and the 11<sup>th</sup> Street Bridge Replacement Project would affect terrestrial vegetation, planting vegetation and trees in the area is proposed as mitigation. It is unknown whether these plantings would be landscaped areas for aesthetic purposes that would provide little wildlife value or if they would include more natural terrestrial habitats to support wildlife. The District DOT and FHA have committed to providing plantings in select areas of the park where impacts from the 11<sup>th</sup> Street Bridge Replacement Project are anticipated (DCDOT and FHWA 2007) and a goal of the AWI is to restore riparian function in the watershed in both urban and natural environments (DCOP 2009). As a result of the many redevelopment projects described above, a long-term minor adverse impact to wildlife would occur.

The long-term minor adverse impacts on wildlife in and near Anacostia Park under alternative A were considered together with the effects of the projects mentioned above. Since the projects listed above would have long-term minor adverse impacts to wildlife, the adverse effects of alternative A when added to these projects would result in a long-term moderate adverse cumulative impact on wildlife.

**Conclusion**—Alternative A would result in overall long-term minor adverse impacts on wildlife because impacts would be detectable, but would remain within the range of natural variability, though there may be small changes to demographics and genetic variation, and some individuals may have responses to disturbance without impacting the population as a whole. Impacts would not occur during key reproduction periods and habitats for sensitive native species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

### **Wildlife Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe Wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. Installing new rain gardens would disturb soil and associated vegetation during construction in the short-term but may include upland plantings to help reduce the amount of impervious area in the park in the long-term, thereby providing additional habitat to wildlife species. However, these areas may be too small and localized in nature to create a detectable change in wildlife species or populations. Potential areas for rain gardens include Kenilworth Parkside, Langston Golf Course parking areas, parking lots surrounding the Anacostia Park Pavilion, and parking areas north and south of Pennsylvania Avenue. At this time, it is largely unknown what size and how many rain gardens are proposed. Additional NEPA compliance would be required prior to construction of rain garden areas to adequately analyze the effects associated with the implementation of this element (see table 1 in chapter 2). The techniques that are common to all action

alternatives would result in short-term minor adverse impacts to wildlife because the impacts would be detectable but would not be outside the natural range of variability; occasional responses to disturbance by some individuals would be expected but sufficient habitat would remain functional to maintain viability of all species. Following construction activities, a negligible impact would occur to wildlife as a result of impacts common to all action alternatives because there would be no measurable impacts on wildlife species, their habitats, or the natural processes sustaining them.

**Alternative B – High Wetland, High Goose Management**—The resident Canada goose population would be intensively reduced as part of this alternative, which would improve wetlands and provide benefits to wildlife species. Because wetlands provide habitat and the essentials necessary for a diversity of types and abundance of wildlife species typically associated with wetlands, improvements to wetlands would benefit wildlife species, including the numerous, urban-tolerant wildlife species that are found within the park. Wetland plants serve as a food source (seeds, roots, leaves) for many wildlife species. Similarly, wildlife species would also indirectly benefit through improved macroinvertebrate and finfish resources, which are also a major food source for aquatic-dependent wildlife species. Specifically, aquatic birds (ducks and geese, loons, grebes, coots, rails), wading birds (herons, bitterns, egrets), gulls/terns, and other permanent residents (osprey, kingfisher, double-crested cormorant) that utilize wetlands and their fringe habitat would benefit from improved wetland areas as would mammals (beaver, river otter, muskrat, mink, raccoon), reptiles (turtles, snakes, lizards, skinks), amphibians (toads, frogs, salamanders) and numerous invertebrates such as butterflies and dragonflies. Additionally, beneficial impacts to the species listed by the District WAP (birds, reptiles, mammals, amphibians, and invertebrates) as species of greatest conservation need and observed at Anacostia Park (table 11) would also occur as a result of alternative B.

Habitat modification techniques are also proposed as part of this alternative for goose management that would have a beneficial, impact on wildlife species. These techniques include planting 25- to 50-foot buffers along the shorelines of the river throughout the park and increasing the width of existing vegetated buffers. Vegetation techniques that are part of wetland management are proposed to improve terrestrial vegetation include managing invasive species. These plantings would benefit wildlife by providing additional and enhanced habitat along the river available for cover, nesting, and foraging. Also, high density plantings using persistent, native species with high root mats and variable height are also included as part of alternative B. Hydrology techniques that include removing or modifying structures that result in erosion and clogging of marsh and creating tidal guts would have an overall beneficial impact on wildlife by creating improved and additional habitat. Improved quality and quantity of habitat would indirectly benefit wildlife species as well as support food sources (seeds, roots, leaves, benthic macroinvertebrates, and finfish) for wildlife species.

Techniques considered as part of goose management are proposed to reduce goose herbivory and improve wetland vegetation, thereby providing benefits to wildlife. There would be no indirect or direct adverse impacts to non-target species from egg addling/oiling/replacement, capture, or euthanasia (which would only take place in controlled environments). As stated in USFWS (2005, IV-3): “All capture and removal methods allow for positive identification of target species and there has been no impact observed on non-target, threatened, and endangered species.” There will also be no adverse impacts to wildlife species as a result of shooting resident Canada geese to reduce the population. Only qualified federal employees that are trained, experienced, and licensed to use a firearm would be used for this action. Because the USFWS (1999) has stated that the presence of large numbers of resident Canada geese conflict with management of the wild, migratory AP of Canada geese, a reduced resident Canada goose population may have beneficial impacts on the migratory AP of Canada geese through reduced competition of habitat and food sources.

All wildlife, including the species described above, may be temporarily affected during land disturbance activities such as the re-grading of sites or construction activities including hydrology, vegetation, and wetland restoration techniques that increase noise. These techniques would have a negligible impact on wildlife at the area disturbed and during the period of activity. Disturbance impacts would be minimized as much as possible; the disturbed areas would be revegetated immediately following site preparation. However, the wildlife species that currently inhabit the park are accustomed to urban sounds and disturbances and should be able to acclimate to short-term construction impacts. Overall, alternative B would have a beneficial impact on wildlife because improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/structure of wildlife species in the park.

**Cumulative Impacts**—The beneficial impacts on wildlife as a result of alternative B were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on wildlife, these adverse effects would be offset when added to the beneficial impacts from alternative B, resulting in a negligible cumulative impact to wildlife.

**Conclusion**—Alternative B would result in overall beneficial impacts on wildlife because improvements to habitat and food sources would positively impact population structure and numbers in the park. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C includes many of the same wetland management and goose management techniques proposed as alternative B, although in general less intensive techniques. Compared to alternative B, alternative C includes only limited removal of structures, both mechanical and passive seedbank regeneration, least invasive stream/stormwater outfall modifications, would not include creating tidal guts, would not consider stream daylighting or seawall breaks and planting efforts would be at a lower density than alternative B. Like alternative B, alternative C would also manage invasive species, the 25- to 50-foot buffers along the shorelines of the River throughout the park would be planted, and the width of existing vegetated buffers would be increased. Additionally, a reduced resident Canada goose population may have beneficial impacts on the migratory AP of Canada geese through reduced competition of habitat and food sources as well as other waterfowl. Overall impacts to wildlife for alternative C would be the same as alternative B: beneficial because improvements to habitat (both terrestrial and wetlands) and food sources could positively affect population numbers/structure of wildlife species in the park, including the species listed by the District WAP. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity.

**Cumulative Impacts**—The beneficial impacts on wildlife as a result of alternative C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would result in a long-term minor adverse impact on wildlife, these adverse effects would be offset when added to the beneficial impacts from alternative C, resulting in a negligible cumulative impact to wildlife.

**Conclusion**—Alternative C would result in overall beneficial impacts on wildlife because improvements to habitat and food sources would positively impact population structure and numbers in the park, including species listed by the district WAP. The cumulative impacts of this project when considered together with other projects in proximity to the park would be negligible.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques proposed, including no initial lethal reduction activities



and a minor level of invasive species management (similar to current program). Alternative D includes new and increased vegetative buffers, which would create/improve habitat and food sources for wildlife species, but low goose management. Low goose management would still allow resident Canada geese to compete for habitat and food sources with the migratory AP of Canada geese and/or other waterfowl at the park. As suggested in USFWS (2005, IV-9), impacts of resident Canada geese on other migratory waterfowl could include resident Canada goose damage to habitat intended for wintering and migrating waterfowl. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity. Overall, alternative D results in long-term minor adverse impacts to wildlife because food sources and habitat quality would be improved through plantings, but may be offset or reduced by the lack of lethal reduction activities, resulting in detectable impacts that would not be outside the natural range of variability; small changes to population numbers, population structure, genetic variability, and other demographic factors might occur and occasional responses to disturbance by some individuals would be expected.

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

**Conclusion**—Alternative D would result in overall long-term minor adverse impacts on wildlife because impacts would be detectable, but would remain within the range of natural variability, though there may be small changes to demographics and genetic variation, and some individuals may have responses to disturbance without impacting the population as a whole. Impacts would not occur during key reproduction periods and habitats for sensitive native species. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—

Alternative E has the same wetland management techniques proposed as alternative B including an invasive species management program and high density planting efforts, but no lethal reduction activities. The lack of lethal reduction activities would still allow resident Canada geese to compete for habitat and food sources with the migratory AP of Canada geese and/or other waterfowl at the park. Overall, alternative E results in negligible impacts to wildlife because food sources and habitat quality would be improved through plantings, but may be offset by the lack of lethal reduction activities, resulting in an immeasurable change to population numbers or structure of wildlife in the park. Land disturbance would still occur during construction activities, and would have a negligible impact on wildlife at the area disturbed and during the period of activity.

**Cumulative Impacts**—The negligible impacts on wildlife in and near Anacostia Park under alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term minor adverse impacts to wildlife, the negligible effects of alternative E would result in a long-term minor adverse cumulative impact on wildlife.

**Conclusion**—Alternative E would result in overall negligible impacts on wildlife because there would be no measureable impacts on species, their habitats, or natural processes that sustain them and any impacts would be within the limits of natural fluctuation. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term minor and adverse.

## **Resident Canada Geese**

### **Guiding Regulations and Policies**

According to NPS *Management Policies 2006*, whenever a park removes native plants or animals, manages plant or animal populations to reduce their size, or allows others to remove plants or animals for an authorized purpose, the NPS will seek to ensure that such removals will not cause unacceptable impacts on native resources, natural processes, or other park resources. If the NPS identifies a possible need for reducing the size of a park plant or animal population, the park will use scientifically valid resource information obtained through consultation with technical expert literature review, inventory, monitoring, or research to evaluate the identified need for population management. There are specific sections in NPS *Management Policies 2006* that are applicable and supportive of the management of resident Canada geese, as described in the paragraphs that follow.

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

As stated previously in chapter 1, Canada geese are federally protected by the MBTA (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the MBTA, promulgated in Title 50 CFR parts 13 and 21, and issued by the USFWS. As promulgated in 1999, subpart C of part 21, Specific Permit Provisions, section 21.26 is the Special Canada Goose Permit, issued only to State wildlife agencies, authorizing certain resident Canada goose management and control activities. Section 21.27 pertains to special-purpose permits, which allow for the taking of migratory birds with compelling justification. In subpart D of part 21, section 21.41 pertains to general depredation permits and section 21.42 authorizes the Director of the USFWS to issue depredation orders to permit the killing of migratory game birds. The USFWS adopted special federal regulations (called “depredation orders” and “control orders”) in 2006 authorizing take of Canada geese without a federal permit in certain situations and is described in detail in Title 50, CFR, Part 21, Subpart D (50 CFR 21D: Control of Depredating Birds). Therefore, the take of resident Canada geese by NPS in this plan/EIS would require obtaining a permit from USFWS.

### **Assumptions and Methodologies**

The evaluation of resident Canada geese was based on an assessment of how expected management actions would affect the current Anacostia Park resident Canada goose population at the park, currently estimated at 564 geese in 2010 (NPS 2009b; Bates 2010a). Available information on the population size, habitat preference, and life history were compiled and analyzed in relation to the management actions. Egg oiling is occurring at the park, which represents the existing conditions; it is unknown whether this action is reducing the resident Canada goose population within Anacostia Park. The geographic study area for the resident Canada goose includes Anacostia Park and the area beyond park boundaries used by the resident Canada geese population.

## Impact Threshold Definitions

The following thresholds were used to determine impacts to the resident Canada goose population:

*Negligible:* There would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Statewide Maryland resident Canada goose population. Any changes to the resident Canada goose population would be similar to current conditions.

*Adverse: Minor:* Impacts to the population of resident Canada geese within the park would be detectable, but impacts to the Maryland, DC, or Atlantic Flyway resident Canada goose population would not occur.

*Moderate:* Impacts to the population of resident Canada geese within the park would be detectable, and these impacts would be perceptible at the Maryland and DC resident Canada goose population level, but not at the Atlantic Flyway resident Canada goose population levels.

*Major:* Impacts to the population of resident Canada geese would occur, and these impacts would be perceptible at both the population level within the park and would be perceptible at the Maryland, DC, and Atlantic Flyway resident Canada goose population levels.

## Resident Canada Goose Alternatives Evaluation

**Alternative A – No Action Alternative**—Under alternative A, no change from current management techniques and/or current conditions would occur. Park staff would continue goose management activities at the same level as current, including (since 2004) maintaining current goose exclusion fencing and yearly egg oiling. Lethal population reduction strategies and scare/harassment techniques are not included as part of alternative A. The removal of sheet piling would have a negligible impact on resident Canada geese because there would be no observable or measurable changes to the population of resident Canada geese within the park or beyond park boundaries as a result of this action.

The Atlantic Flyway Council's Canada Goose Committee estimates that if 95 percent of the eggs in the local population are found and destroyed each year, it would result in only a 25 percent reduction [of the local population] in the next 10 years, which would not relieve the overgrazing pressure on the wetland communities at Anacostia Park (AWS 2006). Ground-based resident Canada goose count surveys have been conducted within Anacostia Park (includes Kenilworth, Kingman, Heritage, and Anacostia Park East locations) since 2004, and take place four times throughout the year in the months of April, July, September, and December. Survey data from the month of June or July have been presented in this document because most, if not all geese, are resident Canada geese during these months and because geese are flightless during this molting period (NPS 2009b). Within Anacostia Park, the mean resident Canada goose population was 664 in 2004, 617 in 2005, 499 in 2006, 783 in 2007, 696 in 2008, 492 in 2009, and 564 in 2010 (NPS 2009b; Bates 2010a).

Goose count surveys have been conducted at the park (including Bladensburg, Kenilworth, Kingman, Heritage, and Anacostia Park, East) since 2004. Based on the June 2010 five-day goose count conducted in the park, the average resident Canada goose population within park boundaries is approximately 564 geese (Bates 2010a). The wildlife population level is the number of individuals that the land or habitat can support without degradation to the population health, individual bird health, or the environment over an

extended period of time (Decker and Purdy 1988). The goose count population data were reviewed by the Science Team and it was determined that wetlands within Anacostia Park are being [statistically] significantly impacted when the resident Canada goose population exceeds 30.5 geese per wetland square mile and 1 goose per 15 acres of grassland habitat (NPS 2010c; NPS 2009b; Kearns personal communication 18 June 2009). Therefore, the goose population goal for taking action to protect vegetation within Anacostia Park is 54 resident Canada geese within the park. The current population estimate of resident Canada geese within the park (564 geese from 2010 data) demonstrate that the population is well over the recommended size (54 geese) to allow for successful wetland restoration [and conservation] in Anacostia Park (NPS 2009b). With little control on the resident Canada goose population in Anacostia Park as proposed in alternative A, the population would continue to fluctuate and vary depending on other conditions; however, an increased population above the recommended size could continue.

In general, when populations are greater than the recommended size, adverse effects to the population itself can occur as a result of crowded conditions, including reduced food sources, reduced or less than desirable available habitat, the spread of disease, and the reduced opportunity for other wildlife to occupy the same space. However, the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005). It is expected that the reproductive control techniques continued as part of alternative A (yearly egg oiling) would not limit growth enough to reach the initial resident Canada goose goal (54 geese) within the life of this plan/EIS.

The biological carrying capacity is the land or habitat's limit for supporting healthy populations of wildlife without degradation to the animal's health or environment over an extended period of time (from USFWS 2005 in Decker and Purdy 1988). As is presented in the FEIS for Resident Canada Goose Management (USFWS 2005), based on known population growth curves, it was estimated that it was likely that almost all areas were well below their carrying capacity for Canada geese. Therefore, the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers. At some point in the future, the size of the Anacostia Park population of resident Canada geese may ultimately be limited by available food, water, sanctuary, or other resource needs. When this happens, it is possible that a density-dependent (self) regulation of the population would occur and it is possible that the geese would so deplete their food resources that a population decline would begin. However, as stated by USFWS (2005) in the *Final EIS for Canada Goose Management*, the timing, likelihood, and scale of a population decline of this nature is unpredictable.

It has been demonstrated that the health of resident Canada goose populations can be further complicated through the feeding of geese by the public (Connecticut DEP 2009). The Connecticut DEP (2009) states that geese fed nutritionally deficient food, such as bread, may be more susceptible to disease. Goose management techniques continued as part of alternative A do not include installing *No Feeding* signage or enforcing the feeding wildlife CFR (through fines for violations). Therefore, the public would continue to feed resident Canada geese at Anacostia Park.

Therefore, it is expected that alternative A would continue to result in overall negligible impacts to the population of resident Canada geese in Anacostia Park because current goose management practices (yearly egg oiling) are not limiting the growth of the goose population.

**Cumulative Impacts**—In 1989, the Maryland State resident Canada goose population was estimated at 25,000 (USFWS 1999). From 1990 to 2005, the population in Maryland increased from 17,000 to 83,000 and in Virginia it increased from 35,000 to 156,000 (AWS 2006). The resident Canada goose population in Maryland from spring population estimates (2001 through 2003 averages) was 69,467 geese. The USFWS (2005) states that Maryland's population objective for resident Canada geese is 30,000. Therefore, the current resident Canada goose population in Maryland is over 600 percent greater than the

population objective (USFWS 2005). The Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment [20 to 30 percent of the current adult population] of goslings and new adults (Atlantic Flyway Council 1999). The District is located within the Atlantic Flyway, and the Atlantic Flyway Council as well as the USFWS, MDNR, and the District's WAP have all recommended reducing the resident Canada goose population. Because the resident Canada goose population will not be reduced in Anacostia Park as a result of alternative A, the NPS would not be following directives proposed by the agencies listed above, as well as meeting a conservation action of the District's WAP (establish a goose management plan).

Hunting for migratory Canada geese was closed across the Atlantic flyway after populations plummeted in the early 1990s; the decline was then accompanied by a dramatic increase in the number of resident Canada geese in Maryland. As a result, hunting seasons for resident Canada geese were reopened in Maryland in 1999 and resident goose hunting regulations set forth by the Maryland DNR Wildlife and Heritage Service were then liberalized in 2002 (and have continued ever since) to reduce the resident population (MDNR 2009). The Maryland DNR liberalization expanded the Late Resident Canada Goose Hunt Zone in Maryland (including portions of Prince George's County), including extending the season length, and increasing the bag limit of geese in response to continued growth of the resident population of Canada geese (MDNR 2009). MDNR states that the objective of the zone expansion and liberalization of bag limits is to provide greater opportunities to harvest overabundant resident Canada geese and to reduce nuisance, depredation, public safety, and health problems caused by these birds (MDNR 2009). During the 2006 September season, hunters bagged an estimated 12,700 resident Canada geese, which was a slight increase over the 10,400 taken in 2005 (USFWS 2007). Previously, growth within the Atlantic Flyway of the residential Canada goose population occurred despite an average annual sport harvest of approximately 240,000 resident birds (1997 through 1999), the reported take of over 60,000 eggs (1995 through 1999), and the reported permit take of 7,840 adult geese (1995 through 1999) (USFWS 2005).

As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the *Final EIS for Canada Geese* would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas, especially airports and military airfields, agricultural areas, urban/suburban areas subjected to nest and egg removal, and public health threat areas; expanded hunting opportunities inside the existing hunting frameworks and additional take outside the sport hunting frameworks would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term major adverse impact to the resident Canada goose population is already occurring as a result of other activities as specified by USFWS (2005).

The negligible impacts to the resident Canada goose population under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to the resident Canada goose population, there would be long-term, major adverse cumulative impacts on the resident Canada goose population when added to the negligible impacts from alternative A.

**Conclusion**—Alternative A would continue to result in overall negligible impacts to the population of resident Canada geese in Anacostia Park because current goose management practices (yearly egg oiling) are not limiting the growth of the goose population. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

## **Resident Canada Goose Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. The techniques described above that are common to all action alternatives would have a negligible impact on resident Canada geese because there would be no observable or measurable changes to the population of resident Canada geese within the park or beyond park boundaries as a result of these techniques. Generally, it is the combination of numerous wetland and goose management techniques (discussed as action alternatives below) that would be expected to create a change to the population of resident Canada geese within the park or beyond park boundaries.

**Alternative B – High Wetland, High Goose Management**—Under alternative B the most aggressive wetlands management techniques are combined with intensive goose population reduction techniques (lethal control combined with other techniques). As stated above in alternative A, the resident Canada goose population goal within Anacostia Park is 54 resident Canada geese. Current population estimates of resident Canada geese within the park demonstrate that the population of 564 resident geese is well over the recommended size (54 geese) that would allow for successful wetland restoration (and conservation) in Anacostia Park.

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

1. Lethal control would begin at 40 to 60 percent removal of the resident Canada goose population in the park (based on the annual spring count) and this removal range would continue until the goose population goal of 54 is reached or vegetation monitoring and adaptive management indicate a different goose population goal is appropriate.
2. If after 5 years of removing 40 to 60 percent of the resident Canada goose population does not result in sustainable vegetation, the lethal control would increase up to a 90 percent removal of the resident Canada goose population in the park.
3. If after 2 years of removing 40 to 60 percent of the resident Canada goose population, the influx of resident Canada geese in the park causes the population level to remain within 50 percent of the population prior to implementing this plan/EIS, the lethal control would increase by up to 10 percent each year to a maximum of 90 percent.

In addition to lethal control, other options may also be used to achieve plan goals as described in more detail in the paragraphs that follow.

Under this alternative, it is estimated that 40 to 60 percent of the resident Canada goose population would be removed from Anacostia Park during the first year of the plan/EIS as the first phase towards meeting the initial goal of 54 resident Canada geese. Resident Canada goose monitoring would occur for the life of this plan/EIS (15 years as stated in chapter 1) and the goose population would be maintained using methods described in this section on a regular basis for the life of this plan/EIS. As a result, a discrete number of geese would be removed in subsequent years as determined by monitoring results. As stated previously, the goal of 54 resident Canada geese may be adjusted to meet management goals based on the

results of vegetation and resident Canada goose population monitoring, as described in more detail in the “Adaptive Management” section of chapter 2. Techniques used to reduce the population would include round-up, capture, and euthanasia as well as lethal removal by shooting as described in more detail in chapter 2. It is important to note that although at a percentage of the resident Canada goose population would be removed from the park as a result of this plan/EIS, it is the intent of the NPS to maintain a population of resident Canada geese in Anacostia Park. Although many of the impacts resulting from geese are detrimental, the birds themselves are not undesirable, and in fact, are recognized as providing a large number of public benefits, as discussed in more detail in the “Visitor Experience” and “Aesthetics” sections of this chapter. It is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative B because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005).

Alternative B would have a long-term major adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers throughout the life of the plan/EIS. Resident counts and vegetation monitoring will determine if the population needs to be reduced through lethal methods after the initial goose removal conducted during the first year of the plan/EIS. In subsequent years, the percent of the population to be removed would be dependent upon results of the vegetative monitoring, and if the initial density goal of 54 geese per square mile within the park was achieved. Geese would be removed through round-up, capture, and euthanasia or by shooting as part of alternative B. Using the current population estimate of 592 geese as an example, it is possible that the goal of 54 resident Canada geese within Anacostia Park could be met after 3 years (following three separate 60 percent removals of a population of 592 geese). As stated previously, relocating or removing resident Canada geese has been described by Gosser et al. (1997) as a stop-gap effort because the site must be modified to make it less attractive to resident Canada geese, or the removed geese would be replaced with new geese. This plan/EIS integrates wetland management techniques along with goose management techniques and integrates adaptive management as well. Habitat modification techniques are proposed as part of alternative B to make the sites less attractive to resident Canada geese, including planting buffers, applying goose repellents, installing and maintaining exclusion fencing, and making new plantings less desirable to geese through plant species selection. These techniques could be employed in conjunction with population reduction techniques. Additional goose management techniques that are proposed as part of alternative B include installing *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations).

Although it is known that resident Canada geese stay within a 5 to 10 mile radius during non-breeding and 0.25 to 0.5 mile radius during breeding season (NPS 2010a), as the population within Anacostia Park is reduced, other resident geese from adjoining lands and waters may be expected to fill the vacant habitat made available over time, although a lag time may be expected. However, the local resident Canada goose population would remain at or near the initial goal because under alternative B, NPS proposes to conduct lethal management on a regular basis in combination with other goose management and wetland management techniques. In addition to lethal means of reducing the resident Canada goose population, alternative B could also include an intensive scare/harassment program as well as the following reproductive control techniques: increased egg oiling, egg addling, and egg replacement (if population increases after initial reduction); apply goose hatch material (if population increases greater than 20 percent in one year). The local Anacostia Park residential Canada goose population would remain low, but stable in number if lethal management were conducted on a regular basis as proposed as part of alternative B. The resident Canada goose population beyond park boundaries or regionally may also be affected by alternative B. As stated above, alternative B would have a long-term major adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers throughout the life of this plan/EIS. Even though a long-term major adverse effect would occur to the population of resident Canada geese in the park, an overall,

long-term moderate adverse impact on the resident Canada geese population would occur regionally because impacts to the population of resident Canada geese within the park would be detectable, and these impacts would be perceptible at the Maryland or DC resident Canada goose population level, but not at the Atlantic Flyway resident Canada goose population levels. Detectable reductions of resident Canada geese within Anacostia Park would occur over the life of this plan/EIS.

**Cumulative Impacts**—The same past, present, and future actions described under alternative A would also occur under alternative B. As stated above for alternative A, the current resident Canada goose population in Maryland is over 600 percent greater than the population objective described by the USFWS (2005). The USFWS has recognized that since Canada goose populations have demonstrated the ability to sustain annual harvest rates in excess of 20 percent (USFWS 1999), it is expected that alternative B, which includes proposed lethal reduction activities, would have little to no cumulative impact on the Statewide population of resident Canada geese for Maryland. Additionally, in 1999, before the Final EIS for Canada Geese was even drafted, the Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment (20 to 30 percent of the current adult population) of goslings and new adults (Atlantic Flyway Council 1999). The District is located within the Atlantic Flyway, and the Atlantic Flyway Council as well as the USFWS, MDNR, and the District's WAP have all recommended reducing the resident Canada goose population. If the resident Canada goose population is reduced in Anacostia Park, the NPS would be following directives proposed by the agencies listed above, as well as meeting a conservation action of the District's WAP (establish a goose management plan).

Population objectives for resident Canada geese have been described by both the Atlantic Flyway Council (1999) and the USFWS Final EIS for Canada Geese (2005). Resident Canada geese are not only a nuisance within Anacostia Park but in all the Mid-Atlantic states as well as regionally in the Atlantic Flyway. There are large numbers of resident Canada geese in each Flyway, and accordingly cooperative Flyway management plans have been developed to address these populations (USFWS 2005). Each plan presents an overall goal and associated objectives/strategies; a commonality among the goals is the need to balance the positive aspects of resident Canada geese with the conflicts they can cause (USFWS 2005). Based upon resident Canada goose population estimates and population objectives by Flyway, the USFWS (2005, I-20) suggests a 54 percent reduction in the Atlantic Flyway, a 73 percent reduction in the Mississippi Flyway, a 70 to 85 percent reduction in the Central Flyway, and a 25 to 42 percent reduction in the Pacific Flyway. In summary, USFWS (2005) recommends a 25 to 85 percent reduction of resident Canada geese. Additionally, in 1999, before the *Final EIS for Canada Geese* was drafted, the Atlantic Flyway Council recommended that a 60 percent reduction in resident Canada geese be undertaken to decrease the population, assuming a moderate recruitment (20 to 30 percent of the current adult population) of goslings and new adults (Atlantic Flyway Council 1999).

As stated above in alternative A, hunting for resident Canada geese occurs in Maryland to harvest overabundant resident Canada geese and to reduce nuisance, depredation, public safety, and health problems caused by these birds (MDNR 2009). During the 2006 September season, hunters bagged an estimated 12,700 resident Canada geese, which was a slight increase over the 10,400 taken in 2005 (USFWS 2007). Previously, growth within the Atlantic Flyway of the residential Canada goose population occurred despite an average annual sport harvest of approximately 240,000 resident birds (1997 through 1999), the reported take of over 60,000 eggs (1995 through 1999), and the reported permit take of 7,840 adult geese (1995 through 1999) (USFWS 2005).

As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other Mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS



for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to the resident Canada geese population is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

The long-term, moderate to major, adverse impacts to the resident Canada geese population under alternative B were considered together with the effects of the projects and actions mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to the resident Canada geese population, there would be long-term major adverse cumulative impacts on resident Canada geese when added to the long-term moderate to major adverse impacts from alternative B. However, the maximum of 40 to 60 percent of the geese proposed for removal in the first year of this plan in Anacostia Park (and removing a discrete number determined through monitoring in subsequent years) is small compared to the tens of thousands removed by hunters in Maryland every year.

**Conclusion**—Even though a long-term major adverse effect would occur to the Anacostia Park population of resident Canada geese under alternative B, an overall long-term moderate adverse impact on resident Canada geese would occur regionally because impacts to the population of resident Canada geese within the park would be detectable, and these impacts would be perceptible at the Maryland or DC resident Canada goose population level, but not at the Atlantic Flyway resident Canada goose population levels. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C has similar goose management techniques proposed as alternative B, with a few exceptions. Alternative C proposes population reduction for the resident Canada goose within the park, through removal of 40 to 60 percent of the resident Canada goose population within the first year of the plan/EIS as the first phase towards meeting the initial goal of 54 resident Canada geese. Resident Canada goose monitoring would occur for the life of this plan/EIS (15 years as stated in chapter 1). Although monitoring may be conducted yearly, lethal control of 40 to 60 percent of the resident Canada goose population would only be used up to five times throughout the life of this plan/EIS following the initial reduction, and only if the population exceeds the initial goal of 54 resident Canada geese within the park or if vegetation monitoring and adaptive management indicate a different goose population goal is appropriate. Therefore, a discrete number of geese may be removed up to five times in subsequent years as determined by monitoring results. Similar to alternative B, the goal of 54 resident Canada geese may be adjusted through adaptive management to meet management goals based on the results of vegetation and goose population monitoring. For this alternative, the current resident Canada goose population may be reduced through round-up, capture, and euthanasia, but no shooting of resident Canada geese would be included as part of alternative C (see chapter 2). Using the current population estimate of 592 geese as an example, it is possible that the goal of 54 resident Canada geese within Anacostia Park could be met after 3 years (following three separate 60 percent removals of a population of 592 geese). It is important to note that although at a percentage of the resident Canada goose population would be removed from the park as a result of this plan/EIS, it is the intent of the NPS to maintain a population of resident Canada geese in Anacostia Park.

Alternative C would have a long-term moderate adverse impact on the resident Canada goose population within the park because the population would be reduced at a lower level than current numbers up to five times throughout the life of this 15-year plan/EIS. Alternative C allows for the lethal reduction of the resident Canada goose population one time in the first year of the plan/EIS and a maximum of five times

throughout the plan to meet the initial population goal. It has been demonstrated that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). It is possible that the resident Canada goose population may readjust following the maximum five-time population reduction. That said, it has been demonstrated that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese, including making sites less attractive to geese in comparison to other sites (Gosser et al. 1997). Therefore, other goose management techniques proposed as part of alternative C such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) work in combination with the population reduction techniques. As stated above for alternative B, it is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative C because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005).

As a result of alternative C, the local Anacostia Park residential Canada goose population would remain low, but could fluctuate in number if lethal management was conducted a maximum of five times as proposed as part of this alternative. The resident Canada goose population beyond park boundaries or regionally may also be affected by alternative C. As stated above, alternative C would have a long-term moderate adverse impact on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers up to five times throughout the life of this plan/EIS. Even though a long-term moderate adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall long-term minor adverse impact on the resident Canada goose population would occur regionally because impacts to the population of resident Canada geese within the park would be detectable, but these impacts would not be perceptible at the Maryland, DC, or at the Atlantic Flyway resident Canada goose population levels during the life of this plan/EIS. In contrast, detectable reductions of resident Canada geese within Anacostia Park would occur over the life of this plan/EIS.

**Cumulative Impacts**—The same past, present, and future actions described under alternative A would also occur under alternative C. Cumulative impacts to resident Canada geese under alternative C would be very similar to those described above for alternative B, because both alternatives B and C propose lethal controls for the population reduction of the resident Canada geese within Anacostia Park. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS's *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other Mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005).

Therefore, a long-term major adverse impact to resident Canada geese is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999). The overall long-term minor adverse impacts to resident Canada geese under alternative C were considered together with the effects of the projects mentioned above. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term major adverse cumulative impacts on resident Canada geese when added to the long-term minor to moderate adverse impacts from alternative C. However, the maximum of 40 to 60 percent of the geese proposed for removal in the first year of this plan in Anacostia Park (and removing a discrete number determined through monitoring in subsequent years) is small compared to the tens of thousands removed by hunters in Maryland every year.

**Conclusion**—Alternative C would have a long-term moderate adverse effect on the resident Canada goose population within the park because the population would be reduced and maintained at a lower level than current numbers up to five times throughout the life of this plan/EIS. Even though a long-term moderate adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall, long-term minor adverse impact on the resident Canada geese population would occur regionally as a result of alternative C because impacts to the population of resident Canada geese within the park would be detectable, but these impacts would not be perceptible at the Maryland, DC, or at the Atlantic Flyway resident Canada goose population levels during the life of this plan/EIS. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D proposes a primarily non-lethal, low goose management option. Under alternative D, there would be no initial lethal resident Canada goose population reduction activities, but the resident goose population would be monitored annually. Other goose management techniques are proposed (including planting buffers, applying goose repellents, a less intensive scare/harassment program, and egg oiling) as part of alternative D as discussed in “Chapter 2: Alternatives.” If these techniques do not keep the goose population at the initial goal of 54 resident Canada geese within the park, a one-time population reduction using goose management techniques of 40 to 60 percent of the resident goose population would be performed during the life of this plan/EIS. This lethal population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. The population would be monitored annually throughout the life of the plan but the population would not be reduced in subsequent years even if the population exceeds the initial goal of 54 resident Canada geese within the park.

Alternative D would have a short-term major adverse effect on the resident Canada goose population within the park because a one-time, lethal population reduction would occur, but would not be maintained over the long-term. It is possible that, due to the nature of urban-dwelling geese, other geese would capitalize on the newly void habitat. It has been demonstrated that a cull (gathering and removing) of breeding Canada geese may simply create vacant territories for other birds to move into and repeat culls may be necessary for a number of years before the problem is finally brought under control (Allan 1999). Future population reduction strategies beyond the one-time reduction are not proposed as part of alternative D. Studies have shown that a combination of techniques (besides just goose removal) are the most successful in controlling damage to sites by resident Canada geese (Gosser et al. 1997). Therefore, other goose management techniques proposed as part of alternative D such as habitat modification (planting buffers, applying goose repellents, etc.), less intensive scare/harassment techniques, and reproductive control techniques (egg oiling and applying goose hatch material) may work in combination with the one-time population reduction, although these techniques are similar to current actions which have not had an overall reduction on the resident Canada goose population in Anacostia Park. Although an initial goal of 54 resident Canada geese within the park was determined by the science team, it is not likely that this goal would be met after 15 years due to the one-time, lethal population reduction proposed as part of alternative D and even considering the other goose management techniques proposed under alternative D. As stated above for alternatives B and C, it is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative D because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005).

As a result of alternative D, the local Anacostia Park residential Canada goose population could fluctuate or increase in size if lethal management was only conducted a maximum of one time as part of this alternative. The resident Canada goose population beyond park boundaries or regionally would not be affected by alternative D. As stated above, alternative D would have a short-term major adverse effect on the resident Canada goose population within the park because the population would be reduced one time

at a lower level than current numbers. Even though a short-term major adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall, negligible impact on the resident Canada geese population would occur in the park and regionally if the population readjusts following the maximum one-time population reduction because over the life of this plan/EIS because there would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Maryland, DC, or Atlantic Flyway resident Canada goose populations; any changes to the resident Canada goose population would be similar to current conditions.

**Cumulative Impacts**—The same past, present, and future actions described under alternative A would also occur under alternative D. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS’s *Final EIS for Canada Geese* (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the Final EIS for Canada Geese would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to resident Canada geese is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

Under alternative D, although a short-term major adverse impact would occur to the Anacostia Park population of resident Canada geese, an overall, negligible impact on the resident Canada geese population would occur in the park and regionally if the population readjusts following the maximum one-time population reduction because over the life of this plan/EIS there would be no observable or measurable impacts to the population of resident Canada geese within the park or to the Maryland, DC, or Atlantic Flyway resident Canada goose populations; any changes to the resident Canada goose population would be similar to current conditions. The overall negligible impacts to the resident Canada geese population under alternative D were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term major adverse cumulative impacts on the resident Canada geese population when added to the negligible impacts from alternative D. However, the maximum of 40 to 60 percent of the geese proposed for a one-time removal in this plan in Anacostia Park is small compared to the tens of thousands removed by hunters in Maryland every year.

**Conclusion**—Alternative D would have a short-term major adverse impact on the resident Canada goose population within the park because the population would be reduced one time at a lower level than current numbers by lethal reduction. Even though a short-term major adverse effect would occur to the Anacostia Park population of resident Canada geese, an overall negligible impact on the resident Canada geese population would occur in the park and regionally as a result of alternative D if the population readjusts following the maximum one-time population reduction. Over the 15-year life of this plan/EIS there would likely be no observable or measurable impacts to the population of resident Canada geese within the park or to the Maryland, DC, or Atlantic Flyway resident Canada goose populations as a result of alternative D; any changes to the resident Canada goose population would be similar to current conditions. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term major and adverse.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—This alternative includes intensive goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park, but the population would be monitored during the life of the plan/EIS. Although an initial goal of 54 resident

Canada geese within the park was determined by the science team, it is not likely that this goal would be met since a population reduction would not occur as part of alternative E.

Alternative E would have a negligible effect on the resident Canada goose population within the park because no lethal population reduction strategies would not occur; the Maryland, DC, or Atlantic Flyway populations of resident Canada geese would not be affected by alternative E. Other goose management techniques are proposed as part of alternative E and include habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material). These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and thus substantiate a negligible impact.

**Cumulative Impacts**—The same past, present, and future actions described under alternative A would also occur under alternative E. As a result of the objectives for reducing the resident Canada goose population as stated in the USFWS’s Final EIS for Canada Geese (2005) and recommendations by the Atlantic Flyway Council (1999), resident Canada geese are being harvested in Maryland and other mid-Atlantic states in the Atlantic Flyway. The USFWS has stated it is possible that lethal and non-lethal activities defined in the *Final EIS for Canada Geese* would be expected to significantly decrease the number of injurious resident Canada geese in specific localized areas and that expanded hunting opportunities would help decrease populations on a more regional and statewide scale, compared to site-specific management activities (USFWS 2005). Therefore, a long-term, major adverse impact to the resident Canada goose population is already occurring as a result of other activities as specified by USFWS (2005), the MDNR, and the Atlantic Flyway Council (1999).

The overall, negligible impacts to the resident Canada goose population under alternative E were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term major adverse impacts to resident Canada geese, there would still be long-term, major adverse cumulative impacts on resident Canada geese when added to the negligible impacts from alternative E. Other goose management techniques are proposed as part of alternative E and are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and any geese managed under these techniques would be small compared to the tens of thousands removed by hunters in Maryland every year.

**Conclusion**—Alternative E would have a negligible impact on the resident Canada goose population within the park because no lethal population reduction strategies would occur; the Maryland, DC, or Atlantic Flyway populations of resident Canada geese would not be affected by alternative E. Other goose management techniques are proposed as part of alternative E. These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose population in Anacostia Park and thus substantiate a negligible impact as a result of alternative E. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term, major, and adverse.

## CULTURAL RESOURCES

### GUIDING REGULATIONS AND POLICIES

The NPS is charged with the protection and management of cultural resources in its custody. This is furthered through the implementation of *Director’s Order #28: Cultural Resources Management Guidelines* (NPS 1998), *NPS Management Policies 2006* (NPS 2006a), and the 2008 *Servicewide Programmatic Agreement with the Advisory Council and the National Conference of State Historic*

*Preservation Officers.* These documents charge NPS managers with avoiding, or minimizing to the greatest degree practicable, adverse impacts on park resources and values. Although the NPS has the discretion to allow certain impacts in parks, that discretion is limited by the statutory requirement that park resources and values remain unimpaired, unless a specific law directly provides otherwise.

Federal actions that have the potential to affect cultural resources are subject to a variety of laws and regulations. Generally, Section 106 of the NHPA requires all federal agencies to consider the effects of their actions on cultural resources listed and/or determined eligible for listing in the NRHP. Such resources are termed “historic properties.” Agreement on mitigation of adverse effects to historic properties is reached through consultation with the SHPO; Tribal Historic Preservation Officer, if applicable; and, as required, the Advisory Council on Historic Preservation (Advisory Council). In addition, the NHPA requires that federal agencies take actions to minimize harm to historic properties that would be adversely affected by a federal undertaking. Among other things, Section 110 of the NHPA also charges federal agencies with the responsibility for establishing preservation programs for the identification, evaluation, and nomination of historic properties to the NRHP.

Other important laws and regulations designed to protect cultural resources are:

- Native American Graves Protection and Repatriation Act, 1990
- American Indian Religious Freedom Act, 1978
- National Environmental Policy Act, 1969
- Archeological Resources Protection Act, 1979
- Executive Order 11593, Protection and Enhancement of the Cultural Environment,” 1971

## **METHODOLOGIES AND ASSUMPTIONS**

The NPS categorizes cultural resources by the following categories: archeological resources, cultural landscapes, historic districts and structures, museum objects, and ethnographic resources. As noted in the “Issues and Impact Topics” section of the “Purpose and Need” chapter, only impacts to historic districts and structures and archeological resources are of potential concern for this plan. There will be no impacts to cultural landscapes, ethnographic resources, or museum objects, so these topics were dismissed from consideration. The analyses of effects on cultural resources that are presented in this section respond to the requirements of both NEPA and Section 106 of the NHPA in a general and programmatic documentation. Where NEPA analysis is suggested or required for site-specific management or techniques carried out under the guidance of this document, future analyses, including detailed Section 106 compliance will “tier to” or reference this plan/EIS. Site-specific NEPA analysis, when required, will focus on issues, alternatives, and environmental effects unique to the study area.

In accordance with the Advisory Council’s regulations implementing Section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were identified and evaluated by (1) determining the Area of Potential Effects (APE); (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP (i.e., historic properties); (3) applying the criteria of adverse effect to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the implementing regulations for Section 106, a determination of either *adverse effect* or *no adverse effect* must also be made for affected historic properties. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (for example, diminishing the integrity of the resource’s location, design, setting, materials,

workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5). A determination of *no adverse effect* means there is either no effect or that the effect would not diminish, in any way, the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

CEQ regulations and the NPS *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

The NPS guidance for evaluating impacts (Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision Making*) (NPS 2001) requires that impact assessment be scientific, accurate, and quantified to the extent possible. For cultural resources, it is seldom possible to measure impacts in quantifiable terms; therefore, impact thresholds must rely heavily on the professional judgment of resource experts.

Broadly defined, the study area coincides with the entire length of Anacostia Park, which encompasses 1,300 acres along 5 miles of the Anacostia River shoreline (see figure 1). For purposes of analysis of impacts to cultural resources, the geographic study area is limited to approximately 100 acres of restored tidal wetlands within Anacostia Park including Kenilworth Marsh, Kingman Marsh, and Fringe Marshes (see figure 4).

## **HISTORIC STRUCTURES AND DISTRICTS**

The proposed activities have the potential to impact four NRHP-listed or NRHP-eligible properties and six properties that may be NRHP-eligible but have not been formally evaluated. These properties include:

- Kenilworth Aquatic Gardens (NRHP-listed)
- Langston Golf Course Historic District (NRHP-listed)
- Anacostia Park (NRHP-eligible)
- Anacostia Shoreline Pump Station (NRHP-eligible)
- Anacostia Field House (potentially NRHP-eligible)
- Anacostia River Seawall (potentially NRHP-eligible)
- Seafarer's Boat Club (potentially NRHP-eligible)
- Water Street Quonset Huts (potentially NRHP-eligible)
- Bonus Marchers Campsite (potentially NRHP-eligible)
- Stones of the Old United States Capitol Building (potentially NRHP-eligible)

## Impact Threshold Definitions

For an historic district or structure to be listed on the NRHP, it must possess significance (the meaning or value ascribed to the historic district or structure) and have integrity of those features necessary to convey its significance. For purposes of analyzing potential impacts to historic districts and structures, the thresholds of change for the intensity of an impact are defined as follows:

*Beneficial:* No levels of intensity for beneficial impacts are defined. Beneficial impacts can occur under the following scenarios: when character-defining features of the historic district or structure would be stabilized/preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (NPS 1995), to maintain its existing integrity; when the historic district or structure would be rehabilitated in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to make possible a compatible use of the property while preserving its character defining features; or when historic district or structure would be restored in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, a beneficial effect is equivalent to *no adverse effect*.

*Negligible:* The impact is at the lowest level of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

*Adverse: Minor:* Alteration of a pattern(s) or feature(s) of a historic district or structure listed on or eligible for the NRHP would not diminish the integrity of a character-defining feature(s) or the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *no adverse effect*.

*Moderate:* The impact would alter a character-defining feature(s) of a historic district or structure and diminish the integrity of that feature(s) of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

*Major:* The impact would alter a character-defining feature(s) of the historic district or structure and severely diminish the integrity of that feature(s) and the overall integrity of the historic property. For purposes of Section 106, the determination of effect would be *adverse effect*.

*Duration:* Short-term impacts would last for the duration of construction activities associated with the proposed alternative; long-term impacts would last beyond the construction activities.

## Historic District and Structures Alternatives Evaluation

**Alternative A – No Action Alternative**—The no action alternative would continue the existing practices for wetland management and goose management at their current levels. The removal of sheet piling would have no impact on historic structures and districts. There would be no additional changes to improve the hydrological conditions or to restore wetlands under alternative A. Control of invasive species would continue. Goose management strategies, which include egg oiling, population monitoring,



fencing, and wetland vegetation planting, would not change. None of these activities has had any effect on historic structures and districts, nor is it expected that continued practices would result in any impacts to historic structures and districts. Therefore, alternative A would have no impacts (corresponds to *no adverse effect* for Section 106) on historic structures and districts.

**Cumulative Impacts**—Among the various other projects considered for assessment of potential cumulative impacts to historic districts and structures, the following previously completed and present projects within Anacostia Park have had no impacts to historic districts and structures: Kenilworth Marsh, Kingman Marsh, Anacostia Riverwalk Trail, and Anacostia Skating Pavilion.

However, some future projects would affect the historic districts and structures in the study area and include the 11<sup>th</sup> Street Bridges Project and the Poplar Point Redevelopment, and the Poplar Point Restoration Project. The NEPA compliance for the Poplar Point Redevelopment and the Poplar Point Restoration projects is not yet available, but the EIS for the 11<sup>th</sup> Street Bridges Project determined that the project would result in an *adverse effect* to Anacostia Park since 1.5 acres of open recreation area would be lost. While the project would not impact the seawalls themselves, it would impact land close to the seawalls on both sides of the Anacostia River. Thus, a finding of *adverse effect* was recommended. It was determined that the 11<sup>th</sup> Street Bridges Project would have *no adverse effect* on the Bonus Marchers Campsite. Given the magnitude of these three projects within Anacostia Park, especially the 11<sup>th</sup> Street Bridges Project, adverse impacts to historic districts and structures are expected to Anacostia Park, the Anacostia Seawalls, the Anacostia Shoreline Pump Station, and the Water Street Quonset Huts, are located within the study area. Therefore, the impact from these cumulative projects would be a long-term moderate, adverse impact (*adverse effects*) to historic districts and structures and would be dependent upon the extent of the resources' loss of integrity.

The effect determinations to historic districts and structures under alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since the cumulative projects listed above would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the impacts from alternative A, which are *no adverse effect*.

**Conclusion**—None of the current goose and wetland management practices that would be continued under alternative A would have any impact on historic structures and districts. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

### **Historic District and Structures Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. These techniques would not noticeably alter the setting of Kenilworth Gardens, Langston Golf Course, or Anacostia Park and would not diminish the character-defining features or the overall integrity of these historic resources. Thus, these actions would have negligible impacts on historic districts and structures, equivalent to *no adverse effect* under Section 106.

**Alternative B – High Wetland, High Goose Management**—Alternative B represents the highest level of effort to control the resident Canada goose populations through various goose management and wetland management techniques. A number of these techniques under alternative B would occur adjacent to National Register-listed or eligible historic structures or districts or within the boundaries of historic districts. Wetland management techniques include the management of invasive species, the buffering of the shoreline, and high density planting. While these techniques would somewhat alter the setting in the vicinity of Kenilworth Gardens, and in Langston Golf Course and Anacostia Park, these actions would not diminish the character-defining features or the overall integrity of these historic resources. Therefore, these activities would have negligible impacts on historic structures and districts. Future goose management techniques under alternative B could include shoreline buffers throughout Anacostia Park, installation of goose exclusion fencing, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers. These actions would occur adjacent to Kenilworth Gardens and within the boundaries of Langston Golf Course and Anacostia Park, including the potentially eligible resources within Anacostia Park. While these actions would alter aspects of the setting, they would not diminish the integrity of character-defining features or compromise the overall integrity of these historic resources. Thus, these actions would have negligible impacts on historic districts and structures. Seawall breaks and daylighting, future wetland management techniques considered under alternative B, could have a long-term moderate adverse impact on the Anacostia River Seawall, which is potentially eligible for the NRHP. For purposes of Section 106, the impact would be *no adverse effect* or *adverse effect*, depending on the loss of integrity to any of the resources' character-defining features. Future NEPA compliance would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Assuming that the loss of integrity to the seawall was found to be of such magnitude that resulted in a finding of adverse effect under Section 106, NPS would consult with the District of Columbia State Historic Preservation Office and the Advisory Council to develop mitigation measures that would be stipulated in a formal Memorandum of Agreement. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during future Section 106 consultation.

**Cumulative Impacts**—The assumed finding of *adverse effect* that would result from the loss of integrity to the Anacostia River Seawall under alternative B was considered together with the effects of the projects mentioned in alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would have long-term moderate adverse impacts (*adverse effect*) to historic districts and structures, there would be a long-term, moderate adverse cumulative impacts (*adverse effect*) on historic districts and structures when added to the negligible to moderate, adverse impacts from alternative B.

**Conclusion**—Alternative B would result in overall negligible to moderate adverse impacts on historical structures and districts. Wetland and goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. Depending on the implementation of seawall breaks and daylighting, activities that would be assessed in future NEPA and Section 106 compliance, moderate impacts could occur to the Anacostia River Seawall, a resource that is potentially eligible for the NRHP. Seawall breaks and daylighting, future wetland management techniques will alter a character-defining feature of the Anacostia River Seawall, and may diminish the integrity of the seawall, resulting in long-term moderate adverse impact, equivalent to an *adverse effect* under Section 106. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse, corresponding to an *adverse effect* for Section 106. Since the cumulative projects listed previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and

structures (corresponds to *adverse effect* for Section 106) when added to the negligible to long-term moderate adverse impacts from alternative B.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C has similar wetland management techniques proposed as alternative B and a moderate level of Goose management techniques. A number of these techniques under alternative C would occur adjacent to historic structures or districts or within the boundaries of historic districts. Wetland management techniques include the management of invasive species, the buffering of the shoreline, and low density planting. While these techniques would somewhat alter the setting in the vicinity of Kenilworth Gardens, around within Langston Golf Course and Anacostia Park, these actions would not diminish the character-defining features or the overall integrity of these historic resources. Therefore, these activities would have negligible impacts on historic structures and districts, equivalent to a *no adverse effect* finding under Section 106. Future goose management techniques under alternative C include shoreline buffers at Kingman Marsh and fringe marshes, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers while future wetland management techniques include new rain garden areas. These actions would occur adjacent to Kenilworth Gardens and within the boundaries of Langston Golf Course and Anacostia Park and would slightly alter aspects of the setting. The impacts to historic districts and structures under alternative C would be negligible (*no adverse effect*) as none of the proposed activities would result in any loss of integrity to any of the historic districts and structures.

**Cumulative Impacts**—The negligible (corresponds to *no adverse effect* for Section 106) impact to historic districts and structures under alternative C was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects listed previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term, moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the no effect impacts from alternative C.

**Conclusion**—Alternative C would result in overall negligible impacts (corresponds to *no adverse effect* for Section 106) on historical structures and districts. Wetland and goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques that would impact historic districts and structures. Wetland management techniques adjacent to or within the boundaries of historic districts or structures are limited to the passive seedbank regeneration adjacent to Kenilworth Gardens. This action would not diminish the character-defining features or the overall integrity of the historic resource and would have negligible impacts (*no adverse effect*) on Kenilworth Gardens, as it would take place outside the boundaries of the historic district. Future goose management techniques under alternative D include the planting of vegetative buffers along the shorelines at Kingman Marsh and fringe marches excluding Langston Golf Course, and the increasing of the width of vegetative buffers. Future wetland management techniques under alternative D include the modification of structures that result in erosion and clogging of marsh, the addressing of upland runoff, invasive species management, and passive seedbank regeneration. As in the previous alternatives, these actions would take place adjacent to Kenilworth Gardens and adjacent to or within the boundaries of Langston Golf Course, Anacostia Park, including the potentially eligible resources within Anacostia Park. Since these activities would not diminish the character-defining features of the overall integrity of these historic resources, these actions would have negligible impacts (corresponds to *no adverse effect* for Section 106) on historic districts and structures.

**Cumulative Impacts**—The *no adverse effect* determination to historic districts and structures under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effects*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts on historic districts and structures (corresponds to *adverse effect* for Section 106) when added to the no effect impacts from alternative D.

**Conclusion**—Alternative D would result in overall negligible, adverse impacts on historical structures and districts (*no adverse effect*). Wetland and goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse, equivalent to *adverse effects* under Section 106.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—In terms of activities that could potentially impact historic districts and structures, alternative E is identical to alternative B. While goose management techniques are proposed to take place in vicinity to Kenilworth Gardens and within Langston Golf Course and Anacostia Park, these actions would somewhat alter the setting, but would not compromise the integrity of the resources. Therefore, these actions would have negligible impacts on these resources (corresponds to *no adverse effect* under Section 106).

Future goose management techniques under alternative E, which includes shoreline buffers, goose exclusion fencing, soft armoring around the perimeter of restored wetlands, and an increased width of vegetative buffers, would take place adjacent to/within the boundaries of Kenilworth Gardens, Langston Golf Course, Anacostia Park, and the potentially eligible resources within Anacostia Park. While these actions would change aspects of the setting, they would not compromise the overall integrity of these historic resources. Thus, these actions would have direct negligible impacts on these historic districts and structures, equivalent to *no adverse effect* under Section 106. Seawall breaks and daylighting, a future wetland management technique planned under alternative B, could have a long-term moderate adverse impact the Anacostia River Seawall, which is potentially eligible for the NRHP. As discussed above under alternative B, it is assumed that the loss of integrity to the Anacostia River Seawall would result in an *adverse effect* under Section 106. Future NEPA compliance and Section 106 consultation would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting associated with the alternative. Section 106 consultation would involve the District of Columbia SHPO and the Advisory Council to develop a Memorandum of Agreement that would provide for appropriate mitigation measures. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during Section 106 consultation. Overall, alternative E would result in overall negligible to long-term moderate adverse impacts (corresponds to *no adverse effect* or *adverse effect* for Section 106) on historical structures and districts.

**Cumulative Impacts**—The assumed finding of *adverse effect* that would result from the loss of integrity to the Anacostia River Seawall under alternative E was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to historic districts and structures, there would be long-term moderate adverse cumulative impacts (*adverse effect*) on historic districts and structures (corresponds to *no adverse effect* for Section 106) when added to the negligible to long-term moderate adverse impacts (corresponds to *no adverse effect* or *adverse effect* for Section 106) from alternative E.

**Conclusion**—Alternative E would result in overall negligible to moderate, adverse impacts on historical structures and districts. Goose management techniques would be at the lowest level of detection with neither adverse nor beneficial consequences. These actions would not diminish the character-defining features or the overall integrity of these historic resources they would potentially impact, and thus would have negligible impacts. Depending on the implementation of seawall breaks and daylighting, activities that would be assessed in future NEPA and Section 106 compliance, moderate impacts could occur to the Anacostia River Seawall, a resource that is potentially eligible for the NRHP. Seawall breaks and daylighting, future wetland management techniques will alter a character-defining feature of the Anacostia River Seawall, and may diminish the integrity of the seawall, resulting in long-term moderate adverse impact and an *adverse effect* under Section 106. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

## ARCHEOLOGICAL RESOURCES

### Assumptions and Methodologies

As archeological resources exist essentially in subsurface contexts, potential impacts to archeological resources are assessed according to the extent to which the proposed alternatives would involve ground-disturbing activities such as excavation or grading. Analysis of possible impacts to archeological resources was based on a review of previous archeological studies, consideration of the proposed design concepts, and other information provided by the NPS.

Impacts to archeological resources occur when the proposed alternative results in whole or partial destruction of the resource, which is termed a loss of integrity in the context of Section 106. Impact thresholds for archeological resources consider both the extent to which the proposed alternative results in a loss of integrity and the degree to which these losses can be compensated by mitigating activities, such as preservation or archeological data recovery. The process begins with assessment of a resource according to its eligibility for the NRHP, as only sites considered significant enough for listing on the NRHP are protected by federal regulations.

Under federal guidelines, resources are eligible for the NRHP if they possess integrity and they meet one or more of the criteria of eligibility for inclusion in the NRHP. Most archeological resources found eligible for the NRHP are significant under criterion D because they have the potential to provide important information about the history or prehistory. However, in some circumstances, archeological resources might be found significant because (i) they are associated with events that have made a significant contribution to the broad patterns of our history (NRHP criterion A), or (ii) because they are associated with the lives of persons significant in our past (NRHP criterion B), or (iii) because they the distinctive characteristics of a type, period, or method of construction (NRHP criterion C).

### Impact Threshold Definitions

For purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based on the foreseeable loss of integrity. All of these discussions consider only the direct impacts of construction, because operation of the facilities should have no ground disturbance activities and no additional effect on archeological resources under any of the alternatives under consideration. All impacts are considered long-term (e.g., lasting longer than the period of construction).

*Beneficial:* A resource would be preserved or stabilized in its pre-existing condition or actively stabilized/preserved in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict its form, features, and character as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

*Negligible:* Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect*.

*Adverse: Minor:* Disturbance of a site(s) results in little, if any, loss of integrity. For purposes of Section 106, the determination of effect would be *no adverse effect*.

*Moderate:* Disturbance of a site(s) results in loss of integrity to the extent that there is a partial loss of the character-defining features and information potential that form the basis of the site's NRHP eligibility. Mitigation is accomplished by a combination of archeological data recovery and in place preservation. The determination of effect for Section 106 would be *adverse effect*.

*Major:* Disturbance of a site(s) results in loss of integrity to the extent that it is no longer eligible for the NRHP. Its character-defining features and information potential are lost to the extent that archeological data recovery is the primary form of mitigation. The determination of effect for Section 106 would be *adverse effect*.

*Duration:* All impacts to archeological resources are considered long-term.

## **Archeological Resources Alternatives Evaluation**

**Alternative A – No Action Alternative**—The no action alternative would continue the existing practices for wetland management and goose management at their current levels. The removal of sheet piling would have no impact on archeological resources. There would be no other changes to improve the hydrological conditions or to restore wetlands. Control of invasive species would continue through manual removal of invasive species and application of herbicides and other biological control agencies. The existing trails would be maintained at their current levels. None of these activities is having any impact on archeological resources, nor is it expected that continued practices would result in any impacts to archeological resources. Therefore, alternative A would have no impact on archeological resources, equivalent to *no adverse effect* under Section 106.

**Cumulative Impacts**—Among the various other projects considered for assessment of potential cumulative impacts to archeological resources, the following previously completed and present projects within Anacostia Park have had no impacts to archeological resources: Kenilworth Marsh, Kingman Marsh, Anacostia Riverwalk Trail, and Anacostia Skating Pavilion.

Some future projects that could have impacts on archeological resources in the study area include the 11<sup>th</sup> Street Bridges Project and the Poplar Point Redevelopment, and the Poplar Point Restoration Project. The NEPA compliance for the Poplar Point Redevelopment and the Poplar Point Restoration projects is not yet available, but the EIS for the 11<sup>th</sup> Street Bridges Project determined that the study area had a very high potential for archeological resources but the impact analysis stated that “Until archaeological surveys and testing have occurred, it is not possible to determine if resources that may be found during construction would have enough integrity to be eligible for the NRHP,” implying that construction would proceed

without further efforts to identify archeological resources. However, given the magnitude of these three projects within Anacostia Park, especially the 11<sup>th</sup> Street Bridges Project, adverse impacts to archeological resources could reasonably be expected as a result of these projects. Therefore, the impact from these projects would be a long-term moderate adverse impact (*adverse effects*) to archeological resources but would be dependent upon the character of the specific archeological resources involved and the extent of loss to the resources. Since the cumulative projects mentioned above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (*adverse effect*) to archeological resources (corresponds to *no adverse effect* for Section 106) when added to the lack of impacts (corresponds to *no adverse effect* for Section 106) from alternative A.

**Conclusion**—None of the current goose and wetland management practices that would be continued under alternative A would have any impact on archeological resources. Since the cumulative projects mentioned above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (*adverse effect*) to archeological resources (corresponds to *no adverse effect* for Section 106) when added to the lack of impacts (corresponds to *no adverse effect* for Section 106) from alternative A.

### **Archeological Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and considering new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. As archeological resources are present in subsurface contexts, impacts to archeological resources could occur only in situations that involve ground-disturbing activities, including cultural/educational techniques such as installation of signage and wetland management techniques such as removal of sheet piling along Fringe wetlands. Therefore, these techniques that would require ground-disturbing activities could result in direct, negligible to minor, adverse impacts to archeological resources. Future NEPA and Section 106 compliance would be necessary to fully evaluate impacts of creating new rain gardens and removing the sheet piling. In consultation with the District of Columbia SHPO, NPS would undertake future archeological studies to identify NRHP-eligible resources within the APE associated with the planned actions. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the NHPA, which would require future consultation with the District of Columbia SHPO and the Advisory Council.

**Alternative B – High Wetland, High Goose Management**—Alternative B represents the highest level of effort to control the resident Canada goose populations through various goose management and wetland management techniques. Some of these techniques would require ground-disturbing activities that could result in direct, long-term minor to moderate adverse impacts to archeological resources. The installation of erosion control measures and mechanical seedbank regeneration would occur near Site 51NE17, and the planting of native species/shoreline buffers would occur near Site 51NE30. Other activities planned under alternative B that could impact other, as yet undiscovered archeological resources include the stream daylighting of Pope Branch and Fort DuPont Creek, as well as seawall breaks, signage, boardwalks and trails. Additional documentation of archeological resources and NEPA compliance would be necessary to assess possible impacts to archeological resources as a result of daylighting, conducting seawall breaks, and creating new boardwalks and trails. Section 106 compliance would involve consultation with the District of Columbia SHPO regarding the evaluation of possible NRHP-eligible archeological resources, and (in the case where adverse impacts would occur to NRHP-eligible archeological resources) additional consultation with the Advisory Council. Depending on the loss of

integrity to NRHP-eligible archeological resources, alternative B would result in minor to moderate, adverse impacts to archeological resources, corresponding to a *no adverse effect* or *adverse effect* (depending upon the character of the specific archeological resources involved and the extent of loss to the resources). Assuming at least a moderate adverse impact (*adverse effect* under Section 106) to NRHP-eligible archeological resources, NPS would develop mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council, as required by Section 106 of the NHPA.

**Cumulative Impacts**—The assumed *adverse effect* determination for archeological resources under alternative B was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed above would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be cumulative long-term moderate adverse cumulative impacts (*adverse effect*) on archeological resources from alternative B.

**Conclusion**—Alternative B would result in overall long-term minor to moderate adverse impacts on archeological resources. Some of the techniques used in wetland and goose management would require ground-disturbing activities that could disturb archeological sites, and cause little loss of site integrity (minor) to loss of integrity to the extent where there is loss of character-defining features of the site that is the basis of the NRHP eligibility (moderate). In the event that these studies identify NRHP-eligible resources that would be subject to *adverse effects*, NPS would develop mitigation measures in accordance with Section 106 of the NHPA, as outlined above. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (corresponds to *adverse effect* for Section 106).

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C has similar wetland management techniques proposed as alternative B and a moderate level of goose management techniques. Some of the techniques would require ground-disturbing activities that could result in direct long-term minor adverse impacts (*no adverse effect*) to archeological resources. Additional documentation of archeological resources and NEPA and Section 106 compliance would be necessary to assess possible impacts to archeological resources. Future archeological identification and evaluation studies would be completed as outlined in the “Archeological Impacts Common to All Action Alternatives” above, and, in the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council.

**Cumulative Impacts**—The *no adverse effect* determination to archeological resources under alternative C was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term, moderate adverse cumulative impacts (corresponds to *adverse effect* for Section 106) to archeological resources when added to the long-term minor adverse impacts (corresponds to *no adverse effect* for Section 106) from alternative C.

**Conclusion**—While some of the techniques used in wetland and goose management under alternative C would require ground-disturbing activities could result in long-term, adverse impacts on archeological resources, it is expected that the loss of integrity to any archeological resources, if present, would be minor (*no adverse effect* under Section 106). Future studies would be necessary to determine whether any NRHP-eligible archeological resources are present in the areas where ground disturbing activities would occur under this alternative. The cumulative impacts of alternative C on archeological resources, when considered together with other past, present and future projects in proximity of the park would be long-term moderate and adverse (*adverse effect* for Section 106).



**Alternative D – Low Wetland, Low Goose Management**—Alternative D has limited wetland management and goose management techniques and as such has relatively few ground-disturbing activities that could have an impact on archeological resources. Goose management techniques that involve ground disturbance are limited to the planting of vegetative buffers, while the only ground-disturbing techniques of wetland management are the construction of new rain gardens, and the removal or modification of structures that cause erosion or clogging of the marsh. Alternative D would require very few ground-disturbing activities, so the likelihood of impacts to archeological resources is probably negligible (*no adverse effect* under Section 106).

**Cumulative Impacts**—The *no adverse effect* determination to archeological resources under alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the cumulative projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, there would be long-term moderate adverse cumulative impacts (corresponds to *adverse effect* for Section 106) to archeological resources when added to the negligible impacts (corresponds to *no adverse effect* for Section 106) from alternative D.

**Conclusion**—Alternative D would require very few ground-disturbing activities, so the likelihood of impacts to archeological resources is probably negligible (*no adverse effect* under Section 106). The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (*adverse effect* for Section 106).

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—In terms of ground-disturbing activities that could potentially impact archeological resources, alternative E is identical to alternative B: some of the wetland management techniques and goose management techniques could result in direct, long-term minor to moderate adverse impacts to archeological resources, equivalent to an *adverse effect* determination under Section 106. The installation of erosion control measures and mechanical seedbank regeneration would occur near Site 51NE17, and the planting of native species/shoreline buffers would occur near Site 51NE30. Other activities planned under alternative B that could impact other, as yet undiscovered archeological resources include the stream daylighting of Pope Branch and Fort DuPont Creek, as well as seawall breaks, signage, boardwalks and trails. As outlined under alternative B, additional NEPA and Section 106 compliance studies would be necessary to assess possible impacts to archeological resources as a result of daylighting, conducting seawall breaks, and creating new boardwalks and trails. In the event that that these future studies identify NRHP-eligible archeological resources that would be subject to an *adverse effect* under Section 106, NPS would develop and implement mitigation measures in consultation with the District of Columbia SHPO and the Advisory Council, as required by Section 106 of the NHPA.

**Cumulative Impacts**—The potential *adverse effect* determination for archeological resources under alternative E was considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects mentioned previously would have long-term moderate adverse impacts (*adverse effect*) to archeological resources, cumulative impacts would be long-term moderate and adverse (*adverse effect*) on archeological resources when added to the long-term minor to moderate impacts (*adverse effect* for Section 106) from alternative E.

**Conclusion**—Alternative E could result in overall long-term minor to moderate adverse impacts on archeological resources. Some of the techniques used in wetland and goose management would require ground-disturbing activities that could disturb archeological sites to the extent that would result in a moderate loss of resource integrity, equivalent to a finding of *adverse effect* under Section 106. Otherwise, potential losses to the integrity of archeological sites would range from negligible to minor, which is equivalent to *no adverse effect* under Section 106. Future NEPA and Section 106 compliance

studies will be necessary to fully evaluate potential impacts to NRHP-eligible resources. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the NHPA. The cumulative impacts of this project when considered together with other projects in proximity the park would be long-term moderate and adverse (*adverse effect* for Section 106).

## **PARK MANAGEMENT AND OPERATIONS**

This section discusses the plan impacts to park management and operations, including resource management, maintenance, education, and visitor protection.

### **GUIDING REGULATIONS AND POLICIES**

Park management and operations refers to the current staff available to adequately protect and preserve Anacostia Park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct Anacostia Park operations.

### **ASSUMPTIONS AND METHODOLOGIES**

The discussion of impacts to park operations focuses on the amount of staff available to perform wetland and resident Canada goose management practices, the amount of staff to ensure visitor and resident safety, and the ability of park staff to protect and preserve resources given current funding and staffing levels. The study area includes Anacostia Park.

Actions included in the alternatives could change the park's existing staff requirements. The evaluation considers whether or not additional workload would be added or contracted services would be required in order to accomplish a larger workload on an ongoing basis. This includes changes that may occur within all divisions of the park, including:

- **Natural Resource Management**—The natural resource management staff has limited tasks related to resident Canada goose management, including yearly egg oiling and invasive species removal.
- **Maintenance**—Maintenance requirements related to wetlands and resident Canada goose management include maintaining goose exclusion fencing, removing trash, and maintaining trails within the park.
- **Resource Education and Visitor Protection**—Staff involved in this division include coordinating and conducting park programs to educate visitors.

General impacts of the alternatives on the park's annual operating budget and funding sources are evaluated for each alternative, which considers the financial requirements for each alternative and the availability of existing or new funding sources to meet additional operating and capital costs.

### **Impact Threshold Definitions**

Reduced staffing needs and financial balances between operating costs and revenue sources or financial imbalances where revenue sources exceed operating costs would be considered beneficial impacts. The need for higher staffing levels that are not covered by increased revenues and financial imbalances where operating costs exceed revenue sources would be considered adverse impacts. The following thresholds were used to determine impacts to park operations:

*Negligible:* Park operations would not be impacted.

*Adverse: Minor:* Park operations would be impacted, and the effect would be detectable, but current levels of funding and staff would be adequate and other park operations would not be reduced.

*Moderate:* Park operations would be impacted, the effect would be readily apparent, and increased staff and funding would be needed or other park operations would have to be reduced and/or priorities changed.

*Major:* Park operations would be impacted, the effect would be readily apparent, increased staff, and funding would be needed or other park programs would have to be eliminated.

## Park Operations and Maintenance Alternatives Evaluation

**Alternative A – No Action Alternative**—Under the no action alternative, park operations would remain unchanged. At Anacostia Park, the natural resources staff devotes much of their time to wetland and goose management throughout the park, including monitoring the wetlands within the park, maintaining the goose exclusion fencing, conducting the quarterly goose counts within the Anacostia watershed (Syphax 2008), conducting the yearly egg oiling, invasive species management, limited trash removal, and limited park ranger education. The majority of these actions are currently undertaken by volunteers or are covered in existing labor costs as and estimated at approximately \$30,000 per year or a total of \$450,000 over the life of the plan/EIS (15 years), although this cost is contingent upon the availability of volunteers, funding, and materials similar to current conditions. Over the next 15 years, maintenance requirements would increase under this alternative if the resident Canada goose population within the park exhibits an overall increase. Additionally, the removal of sheet piling would require increased staff and resources necessary to complete this activity. Overall, alternative A would result in long-term minor adverse impacts to park operations and maintenance.

**Cumulative Impacts**—Many actions, plans, and programs place demands on park staff and budget, and contribute to adverse cumulative effects on park management and operations. These include the demand on staff time and resources from normal daily operational duties, as well as managing special use permits, special events in the park, and seasonal programs, such as the Student Conservation Association. Management and handling of land acquisitions, permits, vandalism, trash and river cleanups throughout the park, construction in the park, and development and oversight of visitor use opportunities such as recreational use of the river and interpretation programs all require staff time and money. The natural resources staff has additional demands at Anacostia Park, which included devoting much of their time to wetland and goose management throughout the park. The resource management staff supports the egg oiling performed during the resident Canada goose breeding season and the quarterly goose counts within the Anacostia watershed as well as conducting wetland vegetation plantings, maintaining goose enclosures, and planting trees. These tasks would likely continue at current levels and these demands are expected to continue into the future with continued and possible increased visitation and future planning needs related to general goose and wetland management and implementation of current and future activities.

Currently, the visitors experience is being enhanced in the North Field Area of Anacostia Park with a new bike/walk trail connecting the park trails with existing trails in DC and the AWI has proposed to enhance environmental education on the river's watershed and includes a proposal for a new environmental learning center on the southern portion of Kingman Island (DCOP 2009). Although the southern part of

Kingman Island and Heritage Island are outside of the park boundary, these areas are currently being redeveloped as educational and passive, low-impact recreation sites and could place demands on park management and operations at Anacostia Park if these actions increase visitor use once the projects are completed. These actions that place demands on park management and operations would have a long-term, minor adverse impact.

Actions directly related to alternative A would have long-term minor adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with the No Action Alternative, would result in long-term moderate adverse cumulative impacts to park operations and management.

**Conclusion**—Alternative A would result in overall long-term minor adverse impacts on park operations because park operations would be impacted and the effect would be detectable, but the current resources would be adequate and other operations would not be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term, moderate, and adverse.

### **Park Operations and Maintenance Impacts Common to All Action (Management) Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and education efforts regarding feeding wildlife and preparing technical brochures describing goose management techniques. All techniques described above would require additional staff and resources at the park. Regardless of the alternative adopted, there would be a need for public education as well as for public safety. Increased educational opportunities as a result of the majority of the management alternatives would benefit the surrounding community by providing visitors with a greater knowledge of wetlands and the resident Canada goose. Increased staff and resources for education would be required to educate the public and to install *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations). The increased staff and resources necessary to implement the techniques associated with all action alternatives would be required to ensure a safe and beneficial experience for park visitors and would have a long-term minor to moderate adverse impact on park operations and maintenance.

**Alternative B – High Wetland, High Goose Management**—The resident Canada goose population would be intensively reduced as part of this alternative, which would reduce the population by 40 to 60 percent in the first year of the plan/EIS. Under alternative B the most aggressive wetlands management techniques are combined with intensive goose population reduction techniques (lethal control combined with other techniques). This alternative considers new wetland restoration techniques as well. Techniques used to reduce the population could include round-up, capture, and euthanasia; and lethal removal by shooting. Alternative B includes a suite of potential techniques that would enhance existing wetland areas at the park and restore or create new wetland areas. The suite of techniques proposed as part of alternative B to improve wetlands within the park would require additional park operations resources, including maintenance, natural resource management, resident Canada goose monitoring, and visitor education. Also, many of the proposed wetland management techniques (creating tidal guts, daylighting, altering water elevations, outfall dissipation modifications, seawall breaks, reducing impervious areas, and new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements.

Techniques proposed as part of alternative B to reduce the resident Canada goose population would require qualified federal employees trained in safety and firearms use as well as additional resources such as vehicles and crates for round-up and capture of the geese. In addition to techniques proposed for reducing the population, scare/harassment programs and reproductive control techniques (increased egg oiling, egg addling, and egg replacement, applying goose hatch material), which would require additional trained staff and resources. Residents in the adjacent communities could participate in the proposed volunteer opportunities such as planting new vegetation, maintaining fencing and studying water quality in the wetlands. Alternative B would require public education and ensuring public safety if this alternative were implemented. Therefore, increased staff and resources for education would be required to educate the public and to install *No Feeding* signage and enforcing the feeding wildlife CFR (through fines for violations). Also, increased educational opportunities would benefit the surrounding community by providing visitors with a greater knowledge of wetlands and the resident Canada goose. Finally, invasive species would continue to be managed as part as alternative B, and potentially at a higher level beyond what the NCR-EPMT is currently managing, which would require additional staff and resources.

Under alternative B, vegetation monitoring and invasive plant species management would cost approximately \$386,370 annually (plus \$30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately \$10,000 annually, if quarterly surveys were conducted. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative B is approximately \$16,356,943, which assumes all proposed wetland and goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of lethal control, reproductive control and scare/harassment techniques because adaptive management will determine if technique will be required and to what extent in subsequent years. The increased staff and resources necessary to implement alternative B would be required to ensure a safe and beneficial experience for park visitors and would have a long-term moderate adverse impact on park operations and maintenance.

**Cumulative Impacts**—Actions directly related to alternative B would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative B, would result in long-term, moderate adverse cumulative impacts to park operations and management.

**Conclusion**—Alternative B would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

**Alternative C – Moderate Wetland, Moderate Goose Management**—Alternative C has similar goose management techniques proposed as alternative B, but proposes a less intensive population reduction for the resident Canada goose within the park (removal of 40 to 60 percent of the population within the first year of the plan/EIS). For alternative C, the current resident Canada goose population would be reduced through round-up, capture, and euthanasia, but no shooting of resident Canada geese would be included as part of alternative C. Therefore, techniques proposed as part of alternative C to reduce the resident Canada goose population would require qualified federal employees trained in safety (but not firearms use) as well as additional resources such as vehicles and crates for round-up and capture of the geese. The suite of techniques proposed as part of alternative C to improve wetlands within the park includes decreased wetland restoration techniques, but would still require additional park operations resources, including maintenance, natural resource management, resident Canada goose monitoring, visitor education, and ensuring public safety. Also, some of the proposed wetland management techniques

(reduce impervious areas and install new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements. Also, increased educational opportunities and increased management of invasive species are included as part of alternative C. Goose management techniques that would require additional staff and resources are proposed as part of alternative C, habitat modification, a scare/harassment program, and reproductive control techniques. Under alternative C, vegetation monitoring and invasive plant species management would cost approximately \$386,370 annually (plus \$30,125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately \$10,000 annually, if quarterly surveys are conducted; these costs are the same as alternative B. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative C is approximately \$10,442,157, which assumes all proposed wetland and goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of lethal control, reproductive control and scare/harassment techniques because adaptive management will determine if technique will be required and to what extent in subsequent years. Therefore, alternative C would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative C includes fewer wetland management techniques and a less intensive resident Canada goose population reduction compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources would be required.

**Cumulative Impacts**—Actions directly related to alternative C would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative C, would result in long-term moderate adverse cumulative impacts to park operations and management.

**Conclusion**—Alternative C would result in long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D proposes a primarily non-lethal, low goose management option to offer the lowest management effort for both wetlands and resident geese. Under wetland management techniques, there are no erosion control techniques proposed and no new wetland restoration efforts proposed as part of alternative D. Only one of the proposed wetland management techniques (install new rain gardens) would require additional NEPA analysis for implementation. The lethal control technique during the one-time population reduction would include round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. Therefore, techniques proposed as part of alternative D to reduce the resident Canada goose population would require qualified federal employees trained in safety (but not firearms use) as well as vehicles and crates for round-up and capture of the geese. Under alternative D, vegetation monitoring and invasive plant species management would cost approximately \$243,370 annually (plus \$30,125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately \$10,000 annually, if quarterly surveys are conducted; these costs less than costs estimated for alternatives B and C. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative C is approximately \$5,617,141, which assumes all proposed wetland and goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of reproductive control (no

costs associated with lethal control or scare/harassment techniques since none are proposed) because adaptive management will determine if technique will be required and to what extent in subsequent years. Therefore, alternative D would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative D includes the least amount of wetland management techniques and a less intensive resident Canada goose population reduction compared to alternatives B and C, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources would be required.

**Cumulative Impacts**—Actions directly related to alternative D would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative D, would result in long-term moderate adverse cumulative impacts to park operations and management.

**Conclusion**—Alternative D would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—This alternative includes intensive goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park, but a full suite of wetland management techniques are proposed. Many of the proposed wetland management techniques (creating tidal guts, altering water elevations, outfall dissipation modifications, daylighting, seawall breaks, reducing impervious areas, and new rain gardens) would require additional NEPA analysis for implementation and thus additional staff and resources because site-specific designs would be necessary to make these improvements. Goose management techniques that are proposed as part of alternative E include habitat modification, a scare/harassment program, and reproductive control techniques. Under alternative E, vegetation monitoring and invasive plant species management would cost approximately \$386,370 annually (plus \$30, 125 for equipment in the first year only) and resident Canada goose monitoring would cost approximately \$10,000 annually, if quarterly surveys are conducted; these costs are the same as alternatives B and C. Other costs are associated with the implementation of the wetland and resident Canada goose management techniques even though the exact year of implementation is unknown at this time. The total cost for the implementation of alternative E is approximately \$16,299,543, which assumes all proposed wetland and goose management techniques would be implemented during the life of the plan/EIS; this cost does not include maintenance or repair (if applicable) and only includes cost for year 1 of reproductive control and scare/harassment techniques because adaptive management will determine if technique will be required and to what extent in subsequent years. Therefore, alternative E would result in long-term moderate adverse impacts to park operations and maintenance as a result of a need for increased staff and resources. Even though alternative E does not include lethal population reduction of resident Canada geese compared to alternative B, this difference is not considered large enough to cause a change in the intensity of the impact (moderate, adverse) to park operations and maintenance since increased staff and resources will be required.

**Cumulative Impacts**—Actions directly related to alternative E would have long-term moderate adverse impacts on park management and operations. Therefore, the long-term minor adverse impacts of all other actions that place demands on park management and operations, along with alternative E, would result in long-term moderate adverse cumulative impacts to park operations and management.

**Conclusion**—Alternative E would result in overall long-term moderate adverse impacts on park operations because park operations would be impacted with a readily apparent effect, and additional staff and funding would be needed, our other resources would have to be reduced. The cumulative impacts of this project when considered together with other projects in proximity to the park would be long-term moderate and adverse.

## **VISITOR USE AND EXPERIENCE**

This section discusses the plan impacts to visitor use and experience, including visitation, visitor recreation and activities, soundscapes, and aesthetics as well as visitor and employee safety.

## **GUIDING REGULATIONS AND POLICIES**

NPS *Management Policies 2006* states that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks (NPS 2006a). Because many forms of recreation can take place outside of a national park setting, the NPS therefore seeks to provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in Anacostia Park. In addition, the NPS seeks to defer to others to meet the broader spectrum of recreational needs and demands that are not dependent on a national park setting. Those others can include local, state, and other federal agencies; private industry; and nongovernmental organizations.

While recreation is a key component of NPS *Management Policies 2006*, the policies also instruct park units to maintain all native plants and animals as parts of the natural ecosystem. The NPS would achieve this by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur (NPS 2006a).

NPS *Management Policies 2006* requires restoration of degraded soundscapes to the natural condition whenever possible and protection of natural soundscapes from degradation. The NPS is directed to take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored (NPS 2006a).

## **ASSUMPTIONS AND METHODOLOGIES**

The purpose of this impact analysis is to determine if wetland and resident Canada goose management under each alternative would be compatible with the desired goals for visitor experience and the purpose of Anacostia Park as identified in the enabling legislation. The impact analysis evaluates several aspects of visitor experience, including visitor perception of the presence of resident Canada geese, perception of the visual conditions during management practices, access to park resources, and understanding and appreciation of park values.

In addition, the purpose of this impact analysis is to determine if wetland and resident Canada goose management practices would degrade the soundscape of Anacostia Park. Context, time, and intensity together determine the level of impact for an activity. The time of day influences the impact a given noise may have. This analysis assumes that the periods of greatest sensitivity to noise includes sunrise, sunset, and at night. The study area for soundscapes includes all areas within the park and the neighboring communities.



The study area for visitor use and experience includes Anacostia Park and neighboring landowners outside of the park boundaries.

## IMPACT THRESHOLD DEFINITIONS

The following thresholds were used to determine impacts to visitor use and experience, including aesthetics and recreation:

*Negligible:* Visitors would not be affected, or changes in visitor experience and/or understanding would be below or at the level of detection. Visitors would not be likely aware of the effects associated with the alternative.

*Adverse: Minor:* Changes in visitor experience and/or understanding would be detectable, although the changes would be slight. Visitors could be aware of the effects associated with the alternative, but only slightly.

*Moderate:* Changes in visitor experience and/or understanding would be readily apparent. Visitors would be aware of the effects associated with management actions. Visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors would choose to pursue activities in other available local or regional areas.

*Major:* Changes in visitor experience and/or understanding would be readily apparent and the action would affect the majority of visitors. Visitors would be highly aware of the effects associated with management actions. Changes in visitor use and experience would be readily apparent. Some visitors would choose to pursue activities in other available local or regional areas.

The following thresholds were used to determine impacts to soundscapes:

*Negligible:* Human-caused or project sounds do not compete with ambient sounds. When noise is audible, it is for short duration, with significantly lengthy periods of time that are noise free.

*Adverse: Minor:* Human-caused or project sounds are detectable above ambient sounds; however, there are frequent periods of time that are noise free. Where noise is audible, impacts occur for short durations (less than one hour) during the day.

*Moderate:* Human-caused or project sounds compete with ambient sounds. The noise generated is perceptible for extended periods throughout the day. There are however short periods of time that are noise free.

*Major:* Human-caused sounds dominate the soundscape and replace natural sounds. Natural sounds in the study area are commonly impacted by noise from management activities for most of the day without periods of time that are noise free.

## **User Groups**

Many urban areas such as Anacostia Park provide excellent resident Canada goose habitat, such as the maintained lawns, golf course, recreational fields, and other areas because they provide excellent spring, summer, and fall forage and are in close proximity to the Anacostia River water source. In addition, the traditional predators of geese (foxes, coyotes, etc.) are present in low numbers or are absent in most urban areas such as Anacostia Park, and hunting pressure is nonexistent in the park. Some people enjoy seeing geese in urban areas, while others consider them a nuisance. There will be different expectations for different users of the park and the impacts as a result of the no action alternative and management alternatives will either be positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not.

### **Visitors Who Enjoy Resident Canada Geese at the Park**

Canada geese are recognized by some park visitors as providing a number of public benefits. The benefits of a resident Canada goose population in urban areas such as Anacostia Park include the aesthetic value of the presence of these birds. For some park users, the resident Canada goose population at Anacostia Park may mark the only opportunity to view wildlife. The presence of these geese therefore, provides a positive park experience for this group of users. These visitors would be pleased to see and observe goslings and adult resident Canada geese year round in large numbers.

### **Visitors Who Do Not Enjoy Resident Canada Geese at the Park**

Park users who may not enjoy the resident Canada goose population at the park include visitors who golf at Langston Golf Course. Resident Canada geese are year-round inhabitants of the golf course and their presence may reduce the visitor experience for golfers. The majority of the Anacostia Park population of geese has been located at the Kingman Marsh/Langston Golf Course sites where there is open water for waddling and the open golf course for browsing (NPS 2009a). This area provides habitat that is safer from predators during the bird's flightless period. In June 2010, a mean of 371 geese were counted at the Kingman Marsh/ Langston Golf Course site (Bates 2010a). Studies have shown that a well-fed, healthy adult Canada goose can produce up to 1.5 pounds of fecal matter per day (French 2001). Goose feces can reduce the aesthetic appeal of areas such as Langston Golf Course and could ultimately reduce public use (USFWS 2005). Visitors using other public areas at Anacostia Park in addition to Langston Golf Course are also affected by the geese, including visitors utilizing open playing fields. For example, it has been documented that public areas littered with accumulated goose feces have been closed due to the contamination or the threat of personal injury resulting from falls as people lose footing on the slippery material (French 2001). Specifically, Anacostia Park has received complaints from the unpleasant experience of goose fecal matter on golfer's shoes and from park visitors falling and/or rolling in goose fecal matter while playing ballgames (NPS 2010c). The presence of these geese therefore, provides a negative park experience for this group of users.

### **Visitors Who Do Not Care If Resident Canada Geese Are at the Park**

Some visitors of the park may not care if resident Canada geese are present within the park. This user group would continue to use Anacostia Park regardless if resident Canada geese are present or absent. The presence or absence of these geese therefore, does not impact the park experience for this group of users.

## Visitor Use and Experience Alternatives Evaluation

**Alternative A - No Action Alternative**—Park staff would continue goose management activities at the same level as current; lethal population reduction strategies and scare/harassment techniques are not included as part of the no action alternative. The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline. Therefore, the no action alternative, which includes continuing limited trash removal within the park, would continue to have a long-term minor adverse impact on aesthetics at the park.

Under alternative A, Canada geese would remain in the park and, therefore, the soundscape would remain unchanged. The site and sounds of [migratory] Canada geese in the areas surrounding the Chesapeake Bay have been described as both stunning and stirring and have occurred for generations of forebears to the Chesapeake Bay (CBGN 2009). Impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial since visitors could continue to view goslings and adult resident Canada geese year round in large numbers.

Impacts to visitors who do not enjoy resident Canada geese at the park would continue to be long-term minor and adverse since the goose population would not be drastically reduced as a result of the no action alternative. It is expected that the reproductive control techniques continued as part of the no action alternative (yearly egg oiling) would not limit growth enough to be noticeable to visitors within the life of this management plan using current technologies. Some visitors may avoid the Langston Golf Course or this area may experience lower usage because of the high number of resident Canada geese that utilize turf areas of the golf course.

**Cumulative Impacts**—The majority of projects proposed in and near Anacostia Park would enhance visitor use and experience in the area and provide additional recreational opportunities, specifically projects under the AWI. A priority of the AWI was the establishment of a continuous Anacostia Riverwalk and Trail along the east and west banks of the Anacostia River to allow 16 miles of pedestrian and cycling opportunities along both banks of the River in the park. A future benefit of the AWI is to create an integrated open-space system connecting 1,800 acres of park land, including over 100 acres of newly created public parks and new boat launching sites in Anacostia Park (DCOP 2009). East of the Anacostia River, the 11<sup>th</sup> Street Bridge Replacement Project would change the access to Anacostia Park (DCDOT and FHWA 2007). However, mitigation for this effect includes the improved access to the park and pedestrian and bicycle facilities that lead directly into Anacostia Park and the neighborhoods on either side of the river (DCDOT and FHWA 2007). Although AWI projects and the 11<sup>th</sup> Street Bridge Replacement Project would have visual impacts to the aesthetics of the park, planting vegetation and trees in the area is proposed to soften the view; tree planting is part of the Net Benefits 4(f) Programmatic Agreement with NPS (DCDOT and FHWA 2007). The projects described above would have a beneficial impact on visitor use and experience because they would enhance recreation opportunities and improve the aesthetics in and around Anacostia Park.

Other projects either underway or planned include reducing trash and debris in the Anacostia Watershed. Using funding from NOAA and led by MWCOG, Anacostia partners developed the Anacostia Trash Reduction Strategy, which improves the aesthetics of the River and the park by removing trash from the watershed (AWRP and MWCOG 2007). This project would also have a beneficial impact on visitor use and experience because it would improve the aesthetics in and around Anacostia Park.

Under alternative A, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. The beneficial impacts on these visitors as a result of alternative A were considered together with the effects of the projects mentioned above from other past, present, and reasonably foreseeable future actions. Since these projects would be beneficial to visitor use and

experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative A. Impacts to visitors who do not enjoy resident Canada geese at the park would continue to be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term minor adverse impacts as a result of alternative A, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

**Conclusion**—As described above, there will be different expectations for different users of the park and the impacts as a result of the no action alternative will be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not. For the no action alternative, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial but impacts to visitors who do not enjoy resident Canada geese at the park would continue to be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy Canada geese at the park, and long-term minor adverse for those visitors who do not enjoy geese at the park.

### **Visitor Use and Experience Impacts Common to Action Alternatives**

Wetland management techniques that are common to all action alternatives include addressing upland runoff, removing sheet piling along Fringe wetlands, and installing new rain garden areas. Goose management techniques that are common to all action alternatives include population monitoring, installing/maintaining goose exclusion fencing, and cultural/education efforts. The cultural/education techniques proposed for all action alternatives include installing *No Feeding* signage and/or enforcing the no feeding of wildlife CFR (through fines for violations) as well as preparing technical brochures describing goose management techniques. Most of the techniques described above for all action alternatives would not have an impact on visitor use and experience; however, some visitors who enjoy resident Canada geese at the park may be effected by learning of the various goose management techniques especially lethal control via the brochure resulting in a short-term minor adverse impact on visitor experience. In contrast, some visitors who do not enjoy resident Canada geese at the park may also be effected by learning of the various goose management techniques via the brochure resulting in a short to beneficial impact on visitor experience.

### **Visitor Use and Experience Impacts Common to Action Alternatives (Alternatives B – High Wetland, High Goose Management, and Alternative C – Moderate Wetland, Moderate Goose Management)**

For action alternatives B and C, the resident Canada goose population would be reduced. Geese targeted for removal through round-up, capture, and euthanasia would be taken off-site to be euthanized; lethal control would also include shooting as part of alternative B. Noise suppression devices would be used so the soundscape of the park would be affected. Areas where resident Canada geese are to be removed would be temporarily closed to the public. The public would be notified of any park closures in advance when feasible. The park closures would not affect visitor use, as only small areas in the 120-acre park would be closed at a time and only during a maximum of one time per year. Therefore, visitors would not be exposed to resident Canada geese being captured and/or shot. During implementation of any of these activities, the NPS would minimize disruption to visitor use and experience. In addition to reducing the resident Canada goose population, all management alternatives include a scare/harassment program that would be implemented in open grassy areas of the park where resident Canada geese tend to congregate.

The scare/harassment program includes visual deterrents that would be aesthetically unappealing to visitors who use the park and although alternative C proposes a less intensive scare/harassment program compared to alternative B, the visual deterrents that would be aesthetically unappealing to visitors who use the park would be similar and the same impact thresholds would be expected.

It is the intent of NPS to maintain a population of resident Canada geese within the park for all management alternatives. Impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial since visitors could continue to view goslings and adult Canada geese year round within the park, but the population would be reduced for alternatives B and C.

The resident Canada goose population in the park would be reduced but the migratory population within the park and beyond park boundaries would not be reduced as part of this plan/EIS. The site and sounds of [migratory] Canada geese in the areas surrounding the Chesapeake Bay have been described as both stunning and stirring and have occurred for generations of forebears to the Chesapeake Bay (CBGN 2009). The natural soundscape of the park would remain unchanged.

The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline. Action alternatives B and C include trash management as a wetland management technique that would have a beneficial impact on aesthetics at the park. As previously stated, the 2008 list of *Impaired District Waters and Pollutants* within and adjacent to Anacostia Park includes for the first time trash as a pollutant causing impairment (as defined by DCDE [2008]).

Impacts to visitors who do not enjoy resident Canada geese at the park would be beneficial since the goose population would be reduced for alternatives B and C. Other management strategies are also included to make sites such as the Langston Golf Course less attractive to resident Canada geese, such as habitat modification techniques, including planting buffers, applying goose repellents, and making new plantings less desirable to geese would also deter the geese from using areas such as Langston Golf Course.

Visitors who do not care if resident Canada geese are present or absent within the park would still be affected by activities proposed. As stated above, visitor use would not be affected by park closures due to the size of the park and the soundscape of the park would not be affected by shooting activities because noise suppression would be used to minimize impacts. However, the aesthetics of the park may be negatively affected by the scare/harassment program that includes visual and auditory deterrents, but would be offset by the beneficial impacts to aesthetics of the proposed trash management program.

**Cumulative Impacts**—Under alternatives B and C, impacts to all visitors would be beneficial. The beneficial impacts on visitors as a result of alternatives B and C were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to all visitors from alternatives B and C.

**Conclusion**—As described above, there would be different expectations for different users of the park and the impacts as a result of alternatives B and C. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not. For alternatives B and C, it is the intent of NPS to maintain a population of resident Canada geese within the park. For this alternative, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial. Similarly, impacts to visitors who do not enjoy resident Canada geese at the park would be beneficial since the goose population would be reduced under alternatives B and C. The cumulative impacts of this project when

considered together with other projects in proximity to the park would be beneficial for all visitors at the park.

**Alternative D – Low Wetland, Low Goose Management**—Alternative D proposes a low goose management option with a less intensive scare/harassment program. A one-time population reduction using lethal controls of 40 to 60 percent of the resident goose population could be performed during the life of this plan/EIS through round-up, capture, and euthanasia; no shooting of resident Canada geese would occur under alternative D. Compared to alternatives B and C, alternative D has a less intensive scare/harassment program and does not include trash management. The scenic value of the park is reduced by the large amounts of trash in the river and along the shoreline; therefore, alternative D, would have a long-term minor adverse impact on aesthetics at the park. However, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial for alternative D since visitors could continue to view goslings and adult resident Canada geese year round. Impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse since the goose population would not be drastically reduced due to the primarily non-lethal (one-time lethal population reduction), low goose management proposed as part of alternative D. Some visitors may avoid the Langston Golf Course or this area may experience lower usage if high numbers of resident Canada geese utilize turf areas of the golf course.

**Cumulative Impacts**—Under alternative D, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial. The beneficial impacts on these visitors as a result of alternative D were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative D. Also under alternative D, impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term minor adverse impacts as a result of alternative D, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

**Conclusion**—As described above, there would be different expectations for different users of the park and the impacts as a result of the alternative D would be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not. For the alternative D, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial, and impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy Canada geese at the park, and long-term minor and adverse for those visitors who do not enjoy geese at the park.

**Alternative E – High Wetland, Moderate Goose Management, with No Lethal Control**—This alternative includes intensive goose management activities, but no lethal control for resident Canada geese. Under this alternative, no resident Canada geese would be removed from the park. Other goose management techniques are proposed as part of alternative E and include habitat modification (planting buffers, applying goose repellents, etc.), intensive scare/harassment techniques, and reproductive control techniques (egg oiling, addling, egg replacement, and applying goose hatch material). These techniques are similar to current actions, which have not had an overall reduction on the resident Canada goose

population in Anacostia Park. Therefore, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial for alternative E since visitors could continue to view goslings and adult resident Canada geese year round. Impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse since the goose population would not be drastically reduced because no lethal population reduction strategies are proposed as part of alternative E. Some visitors may avoid the Langston Golf Course or this area may experience lower usage if high numbers of resident Canada geese utilize turf areas of the golf course. Alternative E includes trash management, which would have a beneficial impact on aesthetics at the park. Similar to alternatives B and C, the scare/harassment program includes visual deterrents that would be aesthetically unappealing to visitors who use the park.

**Cumulative Impacts**—Under alternative E, impacts to visitors who enjoy seeing resident Canada geese at the park would be beneficial. The beneficial impacts on these visitors as a result of alternative E were considered together with the effects of the projects mentioned under alternative A from other past, present, and reasonably foreseeable future actions. Since the projects listed previously would be beneficial to visitor use and experience, there would be beneficial cumulative impacts to visitors who enjoy seeing resident Canada geese at the park from alternative E. Also under alternative E, impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. Even though the projects listed previously would be beneficial to visitor use and experience, these beneficial impacts would not help to reduce the long-term, minor adverse impacts as a result of alternative E, since the issues with the geese at the golf course would still not be resolved. Therefore, long-term minor adverse cumulative impacts are expected.

**Conclusion**—As described above, there would be different expectations for different users of the park and the impacts as a result of the alternative E would be either positive or negative, depending on the user category. As a result, the impact analysis of visitor use and experience at Anacostia Park considered three user groups - visitors who enjoy seeing resident Canada geese at the park, visitors who do not enjoy resident Canada geese at the park, and visitors who do not care whether resident Canada geese are at the park or not. For alternative E, impacts to visitors who enjoy seeing resident Canada geese at the park would continue to be beneficial, and impacts to visitors who do not enjoy resident Canada geese at the park would be long-term minor and adverse due to continued issues with the resident Canada geese at Langston Golf Course. The cumulative impacts of this project when considered together with other projects in proximity to the park would be beneficial for visitors who enjoy Canada geese at the park, and long-term minor adverse for those visitors who do not enjoy geese at the park.

## SUSTAINABILITY AND LONG-TERM MANAGEMENT

This section discusses the relationship of local short-term uses of the environment versus the maintenance and enhancement of long-term productivity as well as the irreversible and irretrievable commitment of resources and climate change.

In accordance with NEPA, and as further explained in Director's Order #12 (NPS 2001), consideration of long-term impacts and the effects of foreclosing future options should be included in any NEPA document. According to Director's Order #12 (NPS 2001), and as defined by the World Commission on Environment and Development, "sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their needs." For each alternative considered in a NEPA document, considerations of sustainability must demonstrate the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. The NPS must consider if the effects of the alternatives involve tradeoffs of the long-term productivity and sustainability of park resources for the immediate short-term use of those resources. It

must also consider if the effects of the alternatives are sustainable over the long term without causing adverse environmental effects for future generations (NPS 2001).

The NPS must also consider if the effects of the alternatives cannot be changed or are permanent (if impacts are irreversible). The NPS must also consider if the impacts to park resources could not be restored, replaced, or otherwise retrieved, (NPS 2001). A resource commitment is considered irreversible when primary or secondary impacts from its use limit future options. Irreversible commitment applies primarily to nonrenewable resources, such as minerals or cultural resources, and to those resources that are only renewable over long time spans. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations.

### **RELATIONSHIP OF LOCAL SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY**

The no action alternative would trade any long-term productivity for short-term use of park resources. The resident Canada goose population would continue to grow over time and graze on the park's vegetation, including wetlands, at the expense of the long-term productivity and sustainability of the vegetation, as well as the park's visitors and their park experience.

For the management alternatives, there would be a short-term commitment of human resources and short-term impacts to the park's visitors and environment during resident Canada goose removal actions, but with the result of long-term productivity of the park's vegetation and habitat and a sustainable use of the resources in the park. Alternatives B, C, and E would require more resources due to more intense wetland and goose management techniques proposed. Alternative D proposes low wetland and goose management techniques and would require fewer resources. For any of the management alternatives to be sustainable, they would require long-term management, including monitoring and adaptive management to protect park resources.

### **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

Under the no action alternative, impacts to vegetation, including wetlands, from continued resident Canada goose herbivory could result in adverse impacts to the park's wetlands if actions are not taken to reduce the goose population, but these impacts are not regarded as irreversible. The management alternatives present the least potential for irreversible or irretrievable commitments of resources. Although resident Canada geese would be removed by lethal control under alternatives B, C, and D, a goose population would still be maintained within the park and the wetlands would be managed to a functional level. Therefore, there are no irreversible or irretrievable commitment of resources associated with the management alternatives or the no action alternative.





## Chapter 5: Consultation and Coordination



## **CHAPTER 5: CONSULTATION AND COORDINATION**

The intent of NEPA is to encourage the participation of federal and state-involved agencies and affected citizens in the assessment procedure, as appropriate. This section describes the consultation that occurred during development of this *Draft Anacostia Park Wetland and Resident Canada Goose Management plan/EIS*, including consultation with scientific experts and other agencies. This chapter also includes a description of the public involvement process and a list of the recipients of the draft document.

### **HISTORY OF PUBLIC INVOLVEMENT**

The public involvement activities for this plan/EIS fulfill the requirements of NEPA and NPS Director's Order #12 (NPS 2001).

### **THE SCOPING PROCESS**

The NPS divides the scoping process into two parts: internal scoping and external or public scoping. Internal scoping involved discussions among NPS personnel and the interdisciplinary planning team (IPT) regarding the purpose of and need for the management actions, issues, management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance and other project related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this planning document and impact statement, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given opportunities to express concerns or views and to identify important issues or even other alternatives.

Taken together, internal and public scoping are essential elements of the NEPA process. The following sections describe the various ways scoping was conducted for this plan/ EIS.

#### **Internal Scoping**

The internal scoping process began on February 14, 2007. The internal scoping meeting began with a presentation on the background of park resources and goose management issues and the purpose of the plan and current management actions. The meeting also included a discussion of the no action alternative as well as thresholds and alternative elements. At this time the NPS was proposing to write a plan/EA.

A follow up internal scoping meeting was held June 12 and 13, 2007 at the Anacostia Park Headquarters to develop alternative concepts for the wetlands restoration plan/EA. The meeting included a site visit, project background, and purpose, need, and objectives of the project. During the meeting elements of wetland restoration were also discussed.

An agency scoping meeting was held Wednesday, March 28, 2008 and included representatives from both the NPS and the District. The meeting began with a presentation on Anacostia Park, the wetlands and goose management proposed project and timeline and an overview of NEPA. The meeting utilized the roundtable discussion format to address management issues, alternatives, and resource impacts for the plan/EA.

A decision was made to complete an EIS rather than an EA for the plan. On May 21, 2008, an internal alternatives meeting was held to develop alternatives for analysis for the EIS. The meeting reviewed and updated impact topics, developed alternatives and discussed options for wetland management and goose management.

In addition, the IPT identified a group of individuals to comprise an expert science team including university professors, wildlife biologists, wetland specialists, Canada goose experts, and resource management specialists. Two science team meetings were held during the alternatives development process in September and October 2008. The expectations of the science team were to review and provide available research and data pertaining to wetland and goose management and to provide technical and scientific input on resident Canada goose management and monitoring. Members of the science team are listed with the document preparers in this chapter.

## **Public Scoping**

Public scoping efforts for this planning process focus on techniques for including the public and major interest groups. Based on past experience, park staff places a high priority on following the NEPA process for public involvement and providing the public the opportunity to comment on proposed actions.

On June 25, 2007 Anacostia Park released the Public Scoping Brochure for the plan/EA for public review and comment. The public scoping brochure explained the background, the purpose and need, and the objectives of the project. The brochure also announced the dates, locations, and objectives of two public meetings. The public was invited to submit comments on the scope of the planning process and potential alternatives through August 10, 2007. During the comment period, two public scoping meetings were held on July 17 and July 18, 2007 at the U.S. Park Police Anacostia Operations Facility. Each meeting began with an open house followed by a short presentation by the NPS explaining the current Anacostia Park wetlands restoration and resident Canada goose management strategies, as well as the project planning process. NPS staff were available to visit with the workshop participants and answer questions and concerns. A total of 31 participants attended the public scoping meetings.

During the public scoping period, forty-nine separate correspondence were received and entered into the Planning, Environment, and Public Comment (PEPC) wither from direct entry by the commenter, or uploading of emails, faxes, transcripts, and hard copy letters by NPS staff. Comments were analyzed using a process developed by the NPS to compile and correlate similar public comments into a format that was used by decision makers and the project team. Comment analysis assisted the team in organizing, clarifying and addressing technical information pursuant to NEPA regulations. It also aided in identifying the topics and issues relevant for consideration in the plan/EA. A coding structure was developed during the internal scoping process to help sort comments into logical groups by topics and issues. The NPS PEPC database was used for management of the comments. A comment analysis report was generated and was made available on the PEPC website for the public. This report included the number and type of comments received, a summary of the substantive comments received, and a list of the organization or groups that participated in the public scoping effort.

After considering the comments received during public scoping, initially evaluating potential alternatives, and continuing to analyze data, the NPS decided to complete an EIS rather than an EA for this plan. On January 8, 2008, the NPS published a second newsletter that notified the public of the change of approach to the planning process, the scope of work and the next steps of the project. The newsletter also identified the subsequent posting of the NOI and invited comments to the plan/EIS. The NPS published a NOI in the Federal Register on January 9, 2008 in Volume 73, No.6. The NOI served as an announcement of an additional 30-day public comment period. This notice specified that previous comments submitted in

regards to the EA would be considered as part of the planning process for the current proposed action and did not need to be resubmitted. Only one piece of correspondence was received.

After the IPT met in May 2008 to discuss preliminary alternatives, the NPS released a third newsletter to the public on August 29, 2008. The newsletter provided background on the Anacostia Park wetlands management and resident Canada goose management strategies and outlined proposed alternatives to be evaluated in the EIS. The public was invited to submit comments on alternatives through October 3, 2008. During the comment period, seven separate correspondences were received and entered into the PEPC system either from direct entry by the commenter, or uploading of emails, faxes, and hard copy letters by NPS staff. A public content analysis report was generated and made available to the public on November 6, 2008. The report included the number and type of comments received, a summary of the substantive comments received, and a list of the organization or groups that participated in the public scoping effort.

## **LIST OF RECIPIENTS**

This plan/EIS will be sent to the agencies and organizations listed below. This document will also be mailed to other entities and individuals who request a copy.

### **FEDERAL DEPARTMENTS AND AGENCIES**

United States Army Corps of Engineers Baltimore District

United States, Environmental Protection Agency/Chesapeake Bay Program

United States Fish and Wildlife Service, Chesapeake Bay Field Office

United States Geological Survey, Patuxent Wildlife Research Center

United States National Arboretum

USDA-APHIS Wildlife Services

### **DISTRICT OF COLUMBIA GOVERNMENT**

DC Dept. of Health

DC Dept. of Health Watershed Protection Division

DC Fisheries and Wildlife

DC Office of Planning

DC Parks and Recreation

Metropolitan Washington Council of Governments

ANCs

## **ELECTED OFFICIALS**

Executive Office of the Mayor

The Honorable Eleanor Holmes Norton

The Honorable Kwame R. Brown

The Honorable Michael Brown

The Honorable David Catania

The Honorable Phil Mendelson

The Honorable Jim Graham

The Honorable Jack Evans

The Honorable Mary Cheh

The Honorable Muriel Bowse

The Honorable Harry Thomas, Jr.

The Honorable Tommy Wells

The Honorable Yvette, M. Alexander

The Honorable Marion Barry

## **MEDIA, ORGANIZATIONS AND BUSINESSES**

Anacostia Watershed Society

Anacostia Watershed Citizen Advisory Committee

Audubon Naturalist Society

Audubon Naturalistic Society of the Central Atlantic States

Defenders of Wildlife

Chesapeake Bay Foundation

Earth Conservation Corps

Eastland Gardens Civic Association

Friends of the Earth

The Fund for Animals

Golf Course Specialists, Inc., East Potomac Park Golf Course

Kingman Park Civic Assoc.

Langston Golf Course

National Audubon Society New Columbia Chapter

National Wildlife Federation

The Humane Society of the U.S.

People for the Ethical Treatment of Animals

River Terrace Civic Association

Sierra Club

The Wilderness Society

## **AGENCY CONSULTATION**

A consultation letter was mailed to local and federal agencies and stakeholders requesting consultation and comments regarding the proposed project at Anacostia Park. On October 20, 2005, the NPS consulted with the USFWS and NOAA-Fisheries to identify any endangered or threatened species within the proposed project area. A response was received on November 10, 2005 stating that none of the federally endangered or threatened species under the USFWS jurisdiction are known to occur within Anacostia Park (appendix A). Therefore, no biological assessment or further section 7 consultation with the USFWS is required. A response was received from NOAA-Fisheries on November 22, 2005 stating that the endangered shortnose sturgeon has been documented in the Potomac River. Therefore, transient shortnose sturgeon may occur in the Anacostia River; however, the types of activities associated with this project would not affect the shortnose sturgeon. No further section 7 consultation would be required. (appendix A). A second consultation letter was sent to the USFWS on December 22, 2009 explaining that after initial consultation it was determined that an EIS was necessary for the wetland and goose management plan. The letter further described the project. A response was received on January 6, 2010 stating that except for the occasional transient individuals, no federally listed endangered or threatened species are known to exist within the project impact area and no further section 7 consultation is required. A copy of the consultation letter can be found in appendix A-1. Copies of the responses are included in appendix A-2.

A consultation letter was sent to the DC SHPO on December 22, 2009 describing the proposed wetland and resident Canada goose management plan. A response was received on February 1, 2010 indicating that Anacostia Park is eligible for listing on the NRHP and the DC Inventory of Historic Sites. The DC SHPO will review the plan/EIS and assist the NPS in its efforts to avoid, minimize, and mitigate any adverse effects on historic properties that may result from the proposed plan. Copies of the letters and responses can be found in appendices A-1 and A-2, respectively.

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## LIST OF PREPARERS AND CONSULTANTS

### NATIONAL PARK SERVICE

Employee	Title	Education/Role in Preparing EIS	Experience
Lindsay Gillham	Environmental Protection Specialist, Environmental Quality Division	B.S. Natural Resources J.D. in Law Project Manager	10 years working on NEPA documents, 4 years with NPS
Claire Riegelman	Environmental Quality Division		
Chris Ruff	Environmental Quality Division		
Kevin Noon	Natural Resource Program Center, Water Resources Division, Wetlands Program	B.L.A. Landscape Architecture M.L.A Environmental Planning M.A. Communication Research Ph.D. Wetland Ecology Provided technical input and review	31 years working with wetland ecology research, wetland restoration, permitting, NPS wetland compliance, and environmental banking
Joel Gorder	Regional Planning and Environmental Coordinator	Provided input and review	
Sue Bennett	National Capital Parks - East	Provided input and review	
Stephen Syphax	Chief of Resources, National Capital Parks – East	B.S. General Studies NPS Natural Resource Management Training Program Provided input and review, project point of contact for the park	32 years with NPS, (includes 9 years as a Natural Resource Specialist and 19 years as Chief of the Resource Management Division)
Mikaila Milton	Park Biologist, National Capital Parks – East	B.S. Biology and Chemistry M.S. Ecology Provided input and review	10 years with NPS
James Rosenstock	Park Ranger, National Capital Parks – East	Provided input and review	35 years with NPS as a Park Ranger; 16 years field experience in Natural Resources Management
Doug Curtis	Center for Urban Ecology	Provided input and review	
Scott Bates	Regional Wildlife Biologist NPS Center for Urban Ecology	B.S. Biology M.S. Wildlife Management Provided technical input	11 years with NPS NCR and 9 years with DOD as a wildlife biologist

<b>Employee</b>	<b>Title</b>	<b>Education/Role in Preparing EIS</b>	<b>Experience</b>
Jeff Runde	Aquatic Ecologist, Center for Urban Ecology	B.S. Zoology M.S. Civil and Environmental Engineering Ph.D. Aquatic Ecology Provided input and review	12 years with the University of Notre Dame; 9 years with NPS in aquatic ecology
Diane Pavek	Research Coordinator and Botanist, Center for Urban Ecology	B.S. Botany and Zoology M.S. Botany Ph.D. Botany Provided technical input and information for monitoring protocol	26 years in botany-related fields; 10 years with NPS

### **EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.**

<b>Employee</b>	<b>Title</b>	<b>Education/Role in Preparing EIS</b>	<b>Experience</b>
Suzanne Boltz	Senior Scientist/Senior Project Manager, EA Engineering	B.S. Environmental Biology; M.S. Fish and Wildlife Sciences. Provided project management, input and review; attended workshops to develop management plan for wetlands and resident Canada geese	18 years with EA Engineering; 21 years of experience overall Has NPS training for Director's Order-12, CBA, PEPC
Jeff Elseroad	Senior Environmental Scientist, EA Engineering	B.A. Chemistry; M.S. Environmental Engineering Provided senior technical review of plan/EIS	26 years with EA Engineering; 37 years of experience overall
Sarah Koser	NEPA Specialist, EA Engineering	B.S. Biology; M.S. Environmental Engineering Provided NEPA expertise and wetland support, and completed field studies; provided input and review	11 years with EA Engineering
Tracy Layfield	NEPA Specialist, EA Engineering	B.S. Biology Provided input and review; attended workshops to develop management plan for wetlands and resident Canada geese	27 years with EA Engineering
Jeannette Matkowski	Environmental Scientist, EA Engineering	B.S. Biology Utilized PEPC report to develop project alternatives; task manager for public comment database and administrative record	9 years with EA Engineering

<b>Employee</b>	<b>Title</b>	<b>Education/Role in Preparing EIS</b>	<b>Experience</b>
Rich Pfingston	Senior Ecological Restoration Scientist, EA Engineering	A.A. Wildlife Fisheries; B.S. Wildlife Fisheries Provided technical review, wetland management expertise, and study preparation for alternatives; attended roundtable meeting; provided input and review	5 years with EA Engineering; over 24 years of experience overall
Mark Gutberlet, P.E.	Senior Engineer, EA Engineering	B.S. Civil Engineering M.S. Civil Engineering (Geotechnical) Provided cost estimate for wetland and goose management techniques	16 years with EA Engineering
Laura Jo Oakes, P.E.	Junior Engineer, EA Engineering	B.S. Civil Engineering M.S. Civil Engineering Provided cost estimate for wetland and goose management techniques	5 years with EA Engineering; 8 years of experience overall

### **THE LOUIS BERGER GROUP, INC.**

<b>Employee</b>	<b>Title</b>	<b>Education/Role in Preparing EIS</b>	<b>Experience</b>
Charles Lee Decker	Assistant Director, Cultural Resources, The Louis Berger Group, Inc.	BA, Anthropology; MA, Anthropology Coordination of cultural resource sections for the EA	33 years of experience in cultural resource management
Lisa Kraus	Archaeologist, The Louis Berger Group, Inc.	B.A., Anthropology; M.A., Anthropology Characterization of existing conditions for archeological resources	6 years of experience as a professional archaeologist
Patti Kuhn	Architectural Historian, The Louis Berger Group, Inc.	B.F.A., Architectural History; M.A., Historic Preservation Characterization of existing conditions and analysis of impacts for historic structures and cultural landscapes	6 years of experience as a professional architectural historian

### **SCIENCE TEAM MEMBERS**

Dave Ankney, University of Western Ontario – Professor (Retired)

Suzanne Boltz, EA Engineering, Science, & Technology, Inc. – Project Manager

Scott Bates, NPS Center for Urban Ecology – Wildlife Biologist

Michael Conover, Utah State – Professor of Wildland Resources

Lindsay Gillham, NPS – EQD – Environmental Protection Specialist

Mark Graham, NPS – Wildlife Biologist

Greg Kearns, Maryland-National Capital Park and Planning Commission: Patuxent River Park – Naturalist

Mikaila Milton, NPS – National Capital Parks-East - Biologist

Tim Moser, FWS – Wildlife Biologist

Richard Pfingsten, EA Engineering, Science, & Technology, Inc. - Ecosystem Restoration and Management Leader

Claire Riegelman, NPS – EQD – Environmental Protection Assistant

Jim Sherald, NPS Center for Urban Ecology – Chief of Natural Resources and Science (Retired)

Stephen Syphax, NPS – National Capital Parks-East – Supervisory Resource Management Specialist







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