

## WETLANDS

Under Director's Order #77-1: *Wetland Protection*, the NPS has adopted a goal of "no net loss of wetlands" as well as established the policies, requirements, and standards through which the NPS will meet its responsibilities to protect and preserve wetlands. The Order states that "Where natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human activities, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbance conditions." Additionally, "Where appropriate and practicable, the NPS will not simply protect, but will seek to enhance natural wetland values by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions." EO 11990, "Protection of Wetlands," directs all federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such alternatives, parks must modify actions to preserve and enhance wetland values and minimize degradation.

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

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

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

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

## HISTORY OF ANACOSTIA WETLANDS

The Anacostia River was historically flanked with nearly 2,500 acres of tidal marsh. However, in the early 20th century the USACE was charged with a major "reclamation" effort designed to improve navigation by channeling and containing the river within a stone seawall. The Anacostia River was

engineered into a channeled city river from a meandering river with extensive wetlands (figure 27). Tidal flats and wetlands were drained and filled to help rid the city of mosquito-borne diseases and stench along the river. Most of the areas known today as Anacostia Park, including Kingman Marsh, Kingman Island, and Kenilworth Marsh, were created or enlarged by the USACE during the reclamation work.



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

**FIGURE 27: HISTORIC PHOTOGRAPH OF THE ANACOSTIA RIVER**

Public and government interests in restoring wetlands in the Anacostia River watershed grew in the 1980s when the NPS began working in collaboration with others concerned about the health of the watershed to restore nearly 100 acres of tidal wetlands along the Anacostia River. The restoration of tidal marshes was completed to improve the water quality of the Anacostia River, improve native plant and animal diversity, and provide a more natural recreation experience for park visitors along the river, as well as meet the Department of the Interior agreement to the Chesapeake Bay Recovery Program.

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

## DELINEATION METHODOLOGY

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

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

## EVALUATION OF WETLAND FUNCTIONS AND VALUES

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

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

**TABLE 3: COMPARISON OF FUNCTIONS AND VALUES FOR ANACOSTIA PARK WETLANDS**

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

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Cultural Values	Recreation/Economic Tourism Value	X	---	---	X	X	X	X	X	X	X	8
	Uniqueness/Heritage	---	---	---	---	---	---	---	---	---	---	0
	Education, Research/Scientific Value, and Interpretation	---	---	---	---	X	X	X	X	X	X	6
	Visual Quality/Aesthetics	X	X	X	X	X	X	X	X	X	X	10
	Historical Value	---	---	---	---	---	X	X	X	X	---	4
	Archeological Value	---	---	---	---	---	---	---	---	---	---	0
Total # of Functions and Values		12	10	11	7	12	13	14	11	14	12	N/A



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



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

## Biotic Functions

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

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

## Hydrologic Functions

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

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

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

## Cultural Values

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

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

provided historical value. None of the non-tidal or tidal wetlands provided uniqueness/heritage or archeological value.

### **TIDALLY-INFLUENCED FRESHWATER WETLANDS**

Tidally influenced wetlands at Anacostia Park include the River Fringe marshes, RFK shoreline, Kingman Marsh, and the wetlands within the Kenilworth Aquatic Gardens (figures 28 and 29). Wetland functions were evaluated in April 2008 for the following wetland areas:

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

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

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

South Kingman Marsh is located south of Benning Road and consisted of about 5 acres adjacent to RFK Stadium to the west and Heritage Island to the east. Following dewatering and consolidation, the resultant sediment flats covered about 35 acres. After sediment deposition had occurred, the site was contoured and graded and then planted with 700,000 plugs, which were comprised of seven native wetland plant species. In May of 2000 the same wetland plant species that were planted in the north Kingman Marsh were also planted in the south wetland: arrow arum, soft-stemmed bulrush, soft rush, pickerelweed, duck potato and common three-square, as well as yellow pond lily in lower spots around the restored marsh edges. Similar to the northern area, the planted marsh at the southern wetland initially performed well, but soon began to decline. The initial cause of decline is believed by many to be the herbivory of the plantings by resident

Canada Geese (USGS 2006b). Since initial restoration, the elevation of the marsh surface subsided and made the area unsuitable for re-colonization by wetland plants. The presence of the resident Canada Geese and the erosion of the marsh surface have caused the area to be dominated by mudflat habitat.

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

**River Fringe Marsh**—The River Fringe Marsh is comprised of two separate areas referred to as north and south Fringe Marsh. The north River Fringe Marsh is located in the Anacostia River approximately between Benning Road and East Capital Street. This area was created by temporarily bulkheading a portion of the mainstem of the Anacostia River with sheet piling. The sheet piling was originally installed as a temporary measure to contain the dredged material until it adequately settled and vegetation became fully established to hold the material in place. The sheet piling has been in place since the original construction of these marshes. Since these marshes are now vegetated, the NPS intends to remove the sheet piling in the near future. The tide inundates this wetland regularly and a combined sewer outfall is located within the wetland. The wetland was planted with native species, including cattail, willow species, soft rush, and jewelweed; the invasive species common reed has been observed at this wetland. The south River Fringe Marsh is located in the Anacostia River along the southeastern shoreline of Kingman Island. This wetland was not evaluated in detail during the April 2008 fieldwork.

## NON-TIDAL WETLANDS

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

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

Anacostia River and is comprised of open water, emergent, scrub-shrub, and forested wetlands. A man-made berm is present along the Anacostia River in the area of this wetland. The berm is breached at the outlet of one of the streams; however, there is little tidal influence on the system. Common reed is present within the emergent wetland areas; other plants present include reed canary grass, purple loosestrife, boxelder (*Acer negundo*), and green ash (*Fraxinus pennsylvanica*).

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

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

## WETLAND RESTORATION EFFORTS

Numerous efforts by various federal, local, and community organizations have been completed and are either currently underway or are scheduled for the restoration of the Anacostia River and its tributaries. Many of these restoration efforts are located either within or adjacent to Anacostia Park, including Kenilworth Marsh, Kingman Marsh, Fringe Wetlands, Heritage Island Wetlands, Pope Brach, Hickey Run, Watts Branch, and Poplar Point (figures 28 and 29). Although wetland habitats are being restored within Anacostia Park, they are also 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, thus reducing the survival of the plantings. Besides grazing pressures from resident Canada geese, other wetland restoration issues that have been observed at Anacostia Park include incorrect hydrologic regimes (too much inundation to vegetation or too little submersion of vegetation); planting methods including species selection and existing seed bank; insects and disease; engineered marsh soils; and removal of invasive plant species. The NPS has identified a number of potential restoration projects within Anacostia Park that could be implemented in the future that will take into consideration these wetland restoration issues. These projects were discussed in detail in chapter 2.

Additionally, the District Department of Health (DOH), Environmental Health Administration (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, the USEPA, the USGS Patuxent Wildlife Research Center, District DOE, and the USFWS. 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 (MWCOC 2007).

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

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

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

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

**River Fringe Wetlands**—The goal of this project was to restore 16 acres of tidal wetlands along the shores of the Anacostia River adjacent to Kingman Island (figure 28) (DCDOH n.d.). The River Fringe Wetlands were created by temporarily installing sheet piling that contained the dredge material until it settled and vegetation was fully established. As with the Kingman Marsh wetlands, these wetlands increased the number of beneficial plants and fish in the river and improved the water quality of the Anacostia River. Restoration of the wetlands was completed in the fall of 2003 (DCDOH n.d.).

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

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

**Hickey Run Restoration**—The objective of this project was to improve water quality and habitat conditions of Hickey Run, much of which runs through The U.S. National Arboretum (DCDOH n.d.) (figure 28). Improvements included installation of a stormwater management facility to filter pollutants such as oil and grease, trash traps to capture floatables, instream restoration to rebuild channelized portions of the stream as well as community and business outreach in the highly urbanized upper reach of

the stream in order to reduce pollutant loading. This project has not yet been completed, but is scheduled to occur in the near future (DCDOH n.d.).

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

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

## NATURAL RESOURCES

This section discusses the natural resources within the study area, including aquatic resources (benthic invertebrates, finfish, and shellfish), terrestrial resources (vegetation and wildlife) as well as resident Canada geese.

### AQUATIC RESOURCES

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

#### Benthic Invertebrates

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

Overabundant resident Canada geese have grazed and caused the major loss of vegetation and community richness at Kingman Marsh. It has been concluded that the loss of vegetation and the subsequent erosional substrate at the restored Kingman Marsh (2000) due to wildlife grazing (primarily resident Canada geese)

has affected the macroinvertebrate community development (USGS 2006a). This has created open areas in the marsh, which in turn has led to sediment scouring. Even though erosional substrates are not ideal conditions for most macroinvertebrates, and can suppress the overall taxa richness of the marsh, the substrate is ideal for pollution-tolerant macroinvertebrates such as chironomids and oligochaetes. The macroinvertebrate community present at Kingman Marsh is a good indication of a disturbed, somewhat polluted area being composed of the extremely large concentrations of pollution tolerant chironomids and oligochaete families (USGS 2006a).

## Finfish

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

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

## Shellfish

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

## VEGETATION AND WILDLIFE

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

### General Vegetation and Habitat

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

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

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- Riparian buffers which can sometimes be encompassed in the forested wetland category, exist along the shoreline of the Anacostia River in the floodplain. In particular, areas north of Benning Road are heavily forested and provide a natural riparian buffer that protects the river from erosion, filters stormwater runoff, and provides habitat for numerous wildlife species. Common plant species that have been observed along the shoreline of Kingman Marsh in the park include black cherry (*Prunus serotina*), black willow, silky dogwood (*Cornus amomum*), dwarf sumac (*Rhus copallina*), and staghorn sumac (*Rhus typhina*). Common non-native invasive species observed along the shoreline of Kingman Marsh include Asian bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) (USACE 2002).
- Upland forests are also located within Anacostia Park north of Benning Road. These habitats are generally located beyond the floodplain and the riparian buffers in the more upland (less wet) areas. Dominant plant species that have been observed within Anacostia Park in this habitat include white mulberry (*Morus alba*), black locust (*Robinia pseudo-acacia*), willow oak (*Quercus phellos*), box elder (*Acer negundo*), northern catalpa (*Catalpa speciosa*), and slippery elm (*Ulmus rubra*). Common non-native invasive species observed in upland forest habitat include tree-of-heaven (*Ailanthus altissima*), tartarian honeysuckle (*Lonicera tatarica*), princess tree (*Paulownia tomentosa*), and mimosa (*Albizia julibrissin*) (NPS 2004a).
- Landscaped areas within Anacostia Park include maintained right-of-ways along roads and bridges that span across the park, and several maintained recreational fields. Typical vegetation in these areas includes Graminaea grass species, white clover (*Trifolium repens*), and English plantain (*Plantago lanceolata*).
- Open meadows are another habitat located within Anacostia Park – there are approximately 27 acres of managed meadows within Anacostia Park, not including the 15 acres that exist at Kenilworth Gardens (NPS 2004a).

The NPS definition of an exotic species (commonly referred to as non-native, alien, or invasive) is:

1) those species that occupy or could occupy park lands directly or indirectly as a result of deliberate or accidental human activities and 2) a species that is not a natural component of the natural ecosystem at

that place (NPS 2006b). Invasive species can be plants, animals, or other organisms such as microbes. In accordance with the “Removal of Exotic Species Already Present” section of NPS *Management Policies 2006* and EO 13112, “Invasive Species,” all exotic plant species that are not maintained to meet an identified park purpose will be managed up to and including eradications if the exotic species meet any of the following situations:

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

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

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

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

Additional invasive plant species that have been identified by the park within Anacostia Park include the following: hydrilla, spotted knapweed (*Centaurea biebersteinii*), yellow star thistle (*Centaurea solstitialis*), leafy spurge (*Euphorbia esula*), medusahead rye (*Taeniatherum caput-medusae*), musk thistle (*Carduus nutans*), porcelainberry (*Ampelopsis brevipedunculata*), dalmatian toadflax (*Linaria dalmatica*), yellowflag iris (*Iris pseudacorus*), barberry species (*Berberis* sp.), euonymus species (*Euonymus* sp.), and bamboo species (*Phyllostachys aurea*) (NPS undated). In addition, the District DOE

WAP is targeting the invasive plant species known as lesser celandine (*Ranunculus ficaria*) (DCDE 2006). The District DOE WAP has stated that invasive and alien plant and animal species are the overall biggest threat across both terrestrial and aquatic habitat types within the District (DCDE 2006).

## Wildlife Species

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

### Birds

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

The largest groups of aquatic birds on the river are ducks and geese, loons, grebes, coots, and rails. Nearly 30 species represent these families in the study area, most of which are associated with Kenilworth Marsh, Kingman Marsh, and the mainstem of the Anacostia River in the upper river zone. The ducks, geese, coots, and rails are largely grazers and eat plants and insects (omnivorous). Canvasback duck (*Aythya valisineria*), ringnecked duck (*Aythya collaris*), ruddy duck (*Tadorna ferruginea*), widgeon (*Anas americana*), wood duck (*Aix sponsa*), Canada goose, and snow goose (*Chen caerulescens*) are primarily grazers of aquatic and terrestrial plants. Several other species, such as mallards (*Anas platyrhynchos*), goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), and long-tailed duck (*Clangula hyemalis*) are omnivorous, feeding on vegetation, insects, and small aquatic invertebrates. The mergansers, loons, and grebes are strong divers and swimmers and feed on fish and aquatic invertebrates. The ducks and geese primarily use the Anacostia River for overwintering, although a few species such as wood duck, mallard, and rails may breed during the spring and summer in the upper river (NOAA 2007c).

Nine species of wading birds within the family Ardeidae, which includes the herons, bitterns, and egrets, have been documented in less developed shoreline habitats along the Anacostia River. The great blue heron (*Ardea herodias*) primarily eats fish, while the smaller herons, bitterns, and egrets feed on fish, frogs, crustaceans, other aquatic invertebrates, and insects. Most of the wading birds are permanent residents, although cattle egrets (*Bubulcus ibis*) are largely an inland species that happen to breed near water. Eight species of sandpiper have been documented in the area. Most of the sandpipers breed in the Arctic or sub-Arctic and overwinter in Central to South America, so they are transient within the area.

The exception is the spotted sandpiper (*Actitis macularia*) which breeds locally. The sanderling (*Calidris alba*) and dunlin (*Calidras alpina*) also overwinter in the region, but usually occupy coastal beaches. All of the sandpipers feed primarily on benthic invertebrates found in shallow water sediments. Marsh wrens (*Cistothorus palustris*) and green herons (*Butorides virescens*) are commonly found nesting or foraging in the marsh. When mudflats are exposed at low tide, they serve as ideal feeding areas for great blue herons, great egrets (*Ardea alba*), spotted sandpiper, solitary sandpiper (*Tringa solitaria*), semi-palmated sandpiper (*Calidris pusilla*), Wilson's snipe (*Gallinago gallinago*), least sandpiper (*Calidris minutilla*), pectoral sandpiper (*Calidris melanotos*) and killdeer (*Charadrius vociferous*); yellowlegs (*Tringa* sp) are also common and semipalmated plovers (*charadrius semipalmatus*) are occasionally observed (NOAA 2007c).

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

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

The USGS Patuxent Wildlife Research Center studied the bird community at the Kingman and Kenilworth Marshes from 2001 to 2004. This study was conducted to use bird populations to track the health and progress of the reconstructed Kingman Marsh. Birds, especially marsh birds have been used as indicators for degree of wetland restoration success in the past (USGS 2004). Together 177 bird species were identified at both marshes comprising 14 taxonomic orders and 16 families, 137 species at Kingman Marsh and 164 at Kenilworth Marsh (USGS 2004). At both wetlands, winter usage was notably greater than at other seasons; however, there were more species present during spring and summer. Three functional guilds were looked at in particular: wetland users, freshwater marsh users, and mudflat/shore users. Mudflat users were greatest during the winter while marsh users were greatest in the fall (USGS 2004).

## Mammal Species

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

The most common mammal species associated with either aquatic or riparian environments that have been observed within Anacostia Park include beaver (*Castor canadensis*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), and raccoons (*Procyon lotor*). Minks (*Mustela vison*) have also been observed within Anacostia Park, but are rarer than the aforementioned species. Foxes, squirrels, and

opossums are also common mammalian residents of the surrounding woodland and white-tailed deer (*Odocoileus virginianus*) have been increasingly seen in recent years (NPS 2004a). The following paragraphs provide a more detailed description of these aquatic-dependent species, including preferred habitat (NOAA 2007c).

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

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

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

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

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

### **Reptiles and Amphibians**

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

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

### **Invertebrates**

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

### **Species of Greatest Conservation Need in the District**

In 2001, Congress addressed the need for wildlife conservation and developed new conservation funding legislation that includes the *Wildlife Conservation and Restoration Program* and *State Wildlife Grants Program*. Each of these programs required all states, including the District, to submit a WAP to the USFWS by October 2005. The District WAP identifies species of greatest conservation need and their habitats as well as listing and giving the status and trends of these species and priority habitat types. Currently there are 148 species and 13 priority habitat types listed for the District. A listing of the District species of greatest conservation need is located in appendix E, table E-4. Of the listed species of conservation need, a total of 15 birds, five mammals, 13 reptiles, 13 amphibians, four fish, and nine invertebrates have been identified within Anacostia Park. These species are listed in table 10.

**TABLE 4: SPECIES OF GREATEST CONSERVATION NEED NOTED IN THE DISTRICT WILDLIFE ACTION PLAN THAT HAVE BEEN IDENTIFIED AT ANACOSTIA PARK**

Common Name	Scientific Name
<b>Birds</b>	
Acadian Flycatcher	<i>Empidonax virescens</i>
American Bittern	<i>Botaurus lentiginosus</i>
American Black Duck	<i>Anas rubripes</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Eastern Meadowlark	<i>Sturnella magna</i>
Field Sparrow	<i>Spizella pusilla</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Least Bittern	<i>Ixobrychus exilis</i>
Northern Bobwhite Quail	<i>Corlinus virginianus</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Scarlet Tanager	<i>Piranga olivacea</i>
Wood Duck	<i>Aix sponsa</i>
<b>Mammals</b>	
Eastern Chipmunk	<i>Tamias striatus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Northern River Otter	<i>Lutra canadensis</i>
Virginia Opossum	<i>Didelphis virginiana</i>
<b>Reptiles</b>	
Common Musk Turtle	<i>Sternotherus odoratus</i>
Eastern Box Turtle	<i>Terrapene carolina</i>
Eastern Fence Lizard	<i>Sceloporus undulates</i>
Eastern Garter Snake	<i>Thamnophis sirtalis</i>
Eastern Hognose Snake	<i>Heterodon platirhinos</i>
Eastern Mud Turtle	<i>Kinosternon subrubrum</i>
Eastern Painted Turtle	<i>Chrysemys picta picta</i>
Five-lined Skink	<i>Eumeces fasciatus</i>
Northern Black Racer	<i>Coluber constrictor</i>
Northern Brown Snake	<i>Storeria dekayi</i>
Northern Ringneck Snake	<i>Diadophis punctatus edwardsii</i>

Common Name	Scientific Name
Redbelly Turtle	<i>Pseudemys rubriventris</i>
Spotted Turtle	<i>Chrysemys guttata</i>
<b>Amphibians</b>	
American Toad	<i>Bufo americanus</i>
Bullfrog	<i>Rana catesbeiana</i>
Fowler's Toad	<i>Bufo fowleri</i>
Marbled Salamander	<i>Ambystoma opacum</i>
Northern Cricket Frog	<i>Acris crepitans</i>
Northern Dusky Salamander	<i>Desmognathus fuscus</i>
Northern Spring Peeper	<i>Pseudacris crucifer</i>
Northern Two-lined Salamander	<i>Eurycea bislineata</i>
Pickerel Frog	<i>Rana palustris</i>
Redback Salamander	<i>Plethodon cinereus</i>
Red Spotted Newt	<i>Notophthalmus viridescens</i>
Upland Chorus Frog	<i>Pseudacris feriarum feriarum</i>
Wood Frog	<i>Rana sylvatica</i>
<b>Fish</b>	
Alewife	<i>Alosa pseudoharengus</i>
American Eel	<i>Anguilla rostrata</i>
American Shad	<i>Alosa sapidissima</i>
Blueback Herring	<i>Alosa aestivalis</i>
<b>Invertebrates</b>	
Crossline Skipper Butterfly	<i>Polites origenes</i>
Eastern Comma Butterfly	<i>Polygonia comma</i>
Great Spangled Fritillary Butterfly	<i>Speyeria cybele</i>
Little Glassywing Butterfly	<i>Pompeius verna</i>
Monarch Butterfly	<i>Danaus P. plexippus</i>
Question Mark Butterfly	<i>Polygonia interrogationis</i>
Red Admiral Butterfly	<i>Vanessa atalanta rubria</i>
Tidewater Mucket	<i>Leptodea ochracea</i>
Variegated Fritillary Butterfly	<i>Euptoieta claudia</i>

### Invasive Wildlife Species

The District DOE WAP has stated that invasive (and exotic or alien) plant and animal species are the overall biggest threat across both terrestrial and aquatic habitat types within the District. Invasive species can include both plant and animal species and are described as species that are not native to the area and are likely to threaten the native biodiversity of the habitat. Examples of invasive animal species within the urban areas of the District include rats, which have become invasive within the urban areas due to reasons

associated with human development, resulting in increased predation on some of the District's species of greatest conservation need (DCDE 2006).

While the threat of invasive and alien species is not unique to the District, the District does have a unique dilemma. Because all wildlife species are protected by District regulation – the Water Pollution Control Act of 1984, wildlife agencies are extremely limited in management actions for invasive animal and alien species. For example, there are few options for managing the destructive overpopulation of resident Canada Geese, as discussed earlier. Implementing deer and goose management plans is a conservation action of the WAP and supporting partners include the AWS, the USGS, and many others (DCDE 2006). Canada geese are discussed in detail in the following section.

## **RESIDENT CANADA GEESE**

<i>Canada geese are federally protected by the Migratory Bird Treaty Act (16 USC 703-711).</i>	Canada geese are federally protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the MBTA, promulgated in Title 50 CFR 13:21, and issued by the USFWS. Regulations governing the take, possession, and transportation of migratory birds under sport hunting seasons are authorized by the MBTA and annually promulgated in 50 CFR 20 by the USFWS. The MBTA provides for the protection and conservation of migratory birds (including resident Canada geese), while at the same time providing opportunities for people to use the resource for sport, recreation, and scientific endeavors (USFWS 2005). The MBTA also provides considerable flexibility for dealing with situations where birds may come into conflict with human interests, such as those posed by the increasing numbers of resident Canada geese (USFWS 2005). On August 10, 2006 a final rule was published in 50 CFR 20:21 authorizing state wildlife agencies, private landowners, and airports to conduct indirect and/or direct population control management on resident Canada goose populations. On August 20, 2007, a final rule was published expanding hunting methods during special September hunting seasons (50 CFR 20:21).
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Migratory Canada geese typically arrive in the park in the early fall and migrate north toward Canada by the end of winter (mid-March) to breed in the summer. The resident subspecies giant Canada geese were captive birds that were released to restock the depleted migratory populations along the Atlantic Flyaway. Giant Canada geese from Minnesota and Wisconsin were introduced to Pennsylvania, Georgia, Maine, West Virginia, North Carolina, and South Carolina. In addition, local hunt clubs released geese east of the Appalachians after wildlife managers restricted the use of live decoys to attract wild flocks (Harris 2002). The geese became non-migratory in their new habitats due to the length of time in captivity and formed year-round resident populations including the extensively urbanized area in the District, including Anacostia Park. For the purposes of this EIS, and for management purposes, the geese nesting within the conterminous United States in the months of March, April, May, or June or residing within the conterminous United States in the months of April, May, June, July, or August will be collectively referred to as “resident” Canada geese (USFWS 2005).

## **General Ecology**

Resident Canada geese are typically larger than the migratory type, ranging from twelve to fourteen pounds, but may be as large as eighteen pounds. In addition, resident geese have longer necks and longer wingspans than their subspecies.

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

In the spring and summer of 2000, approximately 700,000 emergent wetland plants consisting of six native species were planted over 35 acres at Kingman Marsh. Five years of post-reconstruction monitoring (2000-2004) was conducted by the USFWS and USGS for two elements: food chain accumulation of contaminants and vegetation establishment. The goals of the vegetation establishment monitoring were to measure and evaluate several parameters and processes to

document both the status and degree to which the marsh achieved a wetland condition similar to what might be expected compared to local and reference wetlands (emergent freshwater tidal wetland habitat). To determine the vegetation status and trends, 17 one-meter wide transects were randomly established at Kingman Marsh to be read each year in May, July, and September for species and cover. The following parameters were analyzed during the study: vegetation biomass, soil structure, organic material in soil, soil pH, soil redox potential, seed source potential, bird use, hydrologic and sediment deposition, sediment elevation processes, and benthic and macroinvertebrates use.

Shortly after the plantings, the resident Canada geese ate entire sections of the new plants (USGS 2006b). Fencing was placed around the vegetation to keep geese out of the vegetated areas (USGS 2006b). Once the fencing was removed the following spring, the vegetation was almost completely eaten by the resident goose population (Harris 2002). Of the species originally planted at Kingman Marsh, geese preferred



June 2009



August 2009

*Goose Herbivory at the Park*

pickerelweed and broad-leafed arrowhead (*Sagittaria latifolia*), but not arrow arum or soft rush (Harris 2002). 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. The five year monitoring project concluded that marsh establishment at Kingman was severely impacted from grazing by over-abundant resident Canada geese (USGS 2006b). In addition, longer periods of inundation reduce the ability of wetland vegetation to rebound from grazing as seedling germination is reduced and plant growth slowed, and erosion linked to grazing and subsidence led to lower than planned sediment elevations, which further hindered the ability of grazed wetlands to rebound (USGS 2006b). The District DOE WAP states that locally, one of the top five threats to emergent tidal wetlands is overbrowsing by resident Canada goose populations (DCDE 2006).

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

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

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

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

Resident Canada geese undertake short or no migration during the fall and winter. The geese that do migrate typically move to another area within the same state as their breeding ground or to a neighboring state where the weather is more feasible.

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

characteristics, most resident Canada goose populations are continuing to increase in both rural and urban areas (USFWS 2006).

## **Home Range**

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

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

## **Population Density**

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

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

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

**TABLE 5: RESIDENT CANADA GOOSE COUNTS IN KINGMAN AND KENILWORTH MARSH, 2001 o 2003**

Site and Count Period	2001	2002	2003	Annual Average
<b>Kingman Marsh</b>				
Resident Geese, April – September	171	216	139	175
Resident Geese plus Migratory Geese, October – March	230	288	261*	260
<b>Kenilworth Marsh</b>				
Resident Geese, April – September	51	26	37	38
Resident Geese plus Migratory Geese, October – March	82	31	92*	68
<b>Kingman plus Kenilworth Marsh</b>				
Resident Geese, April – September	222	242	176	213
Resident Geese plus Migratory Geese, October – March	311	319	261*	297
Weekly Average Counts/Year Both Sites	267	281	219	255

Source: NPS 2004a

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

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

The methodology for conducting goose counts has been changing since 2009 and will continue to change in the future in an attempt to reduce the coefficient of variation for the population and to concentrate on the flightless period when the majority of the Canada geese are resident geese. In July 2009, the goose counts were conducted for nine days spanning three weeks during the flightless period. The 2009 mean goose within these nine days at four sectors (Kenilworth, Kingman, Heritage, and Anacostia East locations) was 492 geese, with a range of 175 to 667 total geese per day for all sectors (NPS 2009a). In June 2010, the goose counts were conducted for five days spanning two weeks during the flightless period. The mean for 2010 within these five days at four sectors (Kenilworth, Kingman, Heritage, 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. Figures 30 through 32 present the approximate goose count locations, areas, and zones for counts at Kenilworth Marsh, Kingman Marsh, Heritage Island, and Anacostia Park East.

**TABLE 6: RESIDENT CANADA GOOSE COUNTS FROM 2004 TO 2010**

Date	Bladensburg	Kenilworth	Kingman	Heritage	Anacostia Park, East	Day Total (Relative Abundance)
4/10/2004	86	175	184	100	42	587
7/17/2004	30	133	349	93	89	694
9/11/2004	56	32	2	83	189	362
12/9/2004	No Count Occurred					
4/13/2005	14	123	266	69	71	543
7/13/2005	83	52	337	118	1107	700
8/31/2005	8	304	31	226	176	745
12/2/2005	207	627	28	34	325	1,221
4/13/2006	55	138	187	77	77	534
7/6/2006	22	0	380	13	106	521
9/7/2006	52	178	59	89	118	496
12/7/2006	268	327	51	19	371	1,036
4/6/2007	24	110	195	51	43	423
7/10/2007	0	4	640	0	139	783
9/11/2007	57	101	6	155	68	387
12/4/2007	113	144	529	0	216	1,002
4/3/2008	28	99	201	30	43	401
7/10/2008	15	0	565	14	117	711
9/16/2008	143	107	45	62	101	458
12/9/2008	320	484	494	133	514	1945
4/7/2009	16	46	162	21	47	292
<b>Flightless Period Counts, 2009 to 2010</b>						
July 2009*	No Count	8	382	10	93	492
July 2009 CV	---	0.56	0.42	1.28	0.15	0.6
June 2010**	No Count	79	362	14	110	564
June 2010 CV	---	0.04	0.19	0.26	0.2	0.17
<b>Total</b>	<b>1,597</b>	<b>3,271</b>	<b>5,455</b>	<b>1,411</b>	<b>4,162</b>	<b>14,898</b>

Source: McKindley-Ward 2008; Bates 2010a

\*Average counts from nine days in July 2009 (July 6-10, 13, 17, 21-22)

\*\*Average counts from five days in June 2010 (June 2-4, 7-8)

CV = coefficient of variation

Note: the Bladensburg counts are not located within Anacostia Park, but are presented in the table for comparison purposes

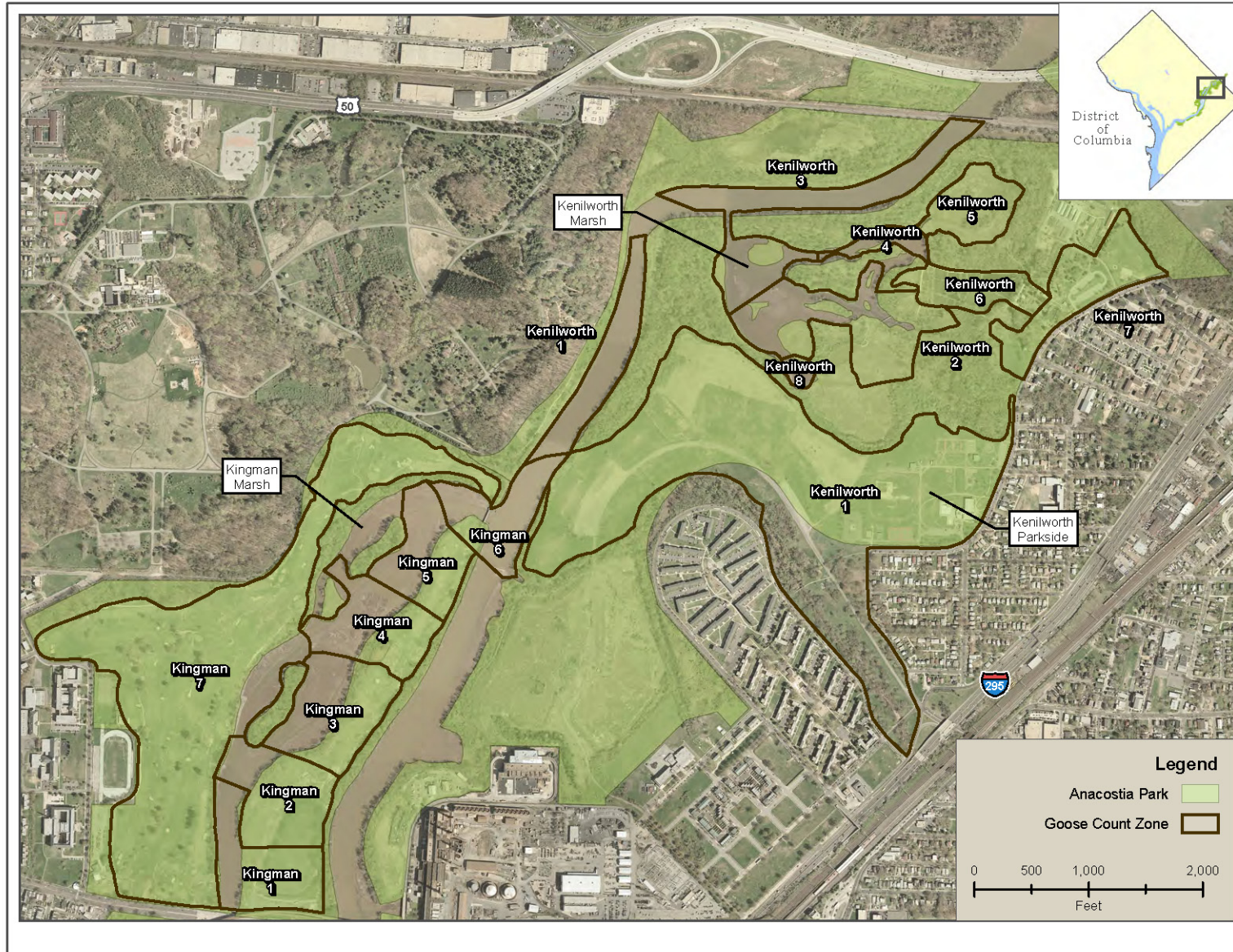


FIGURE 30: 2009 GOOSE COUNT LOCATIONS IN ANACOSTIA PARK, NORTH AREA

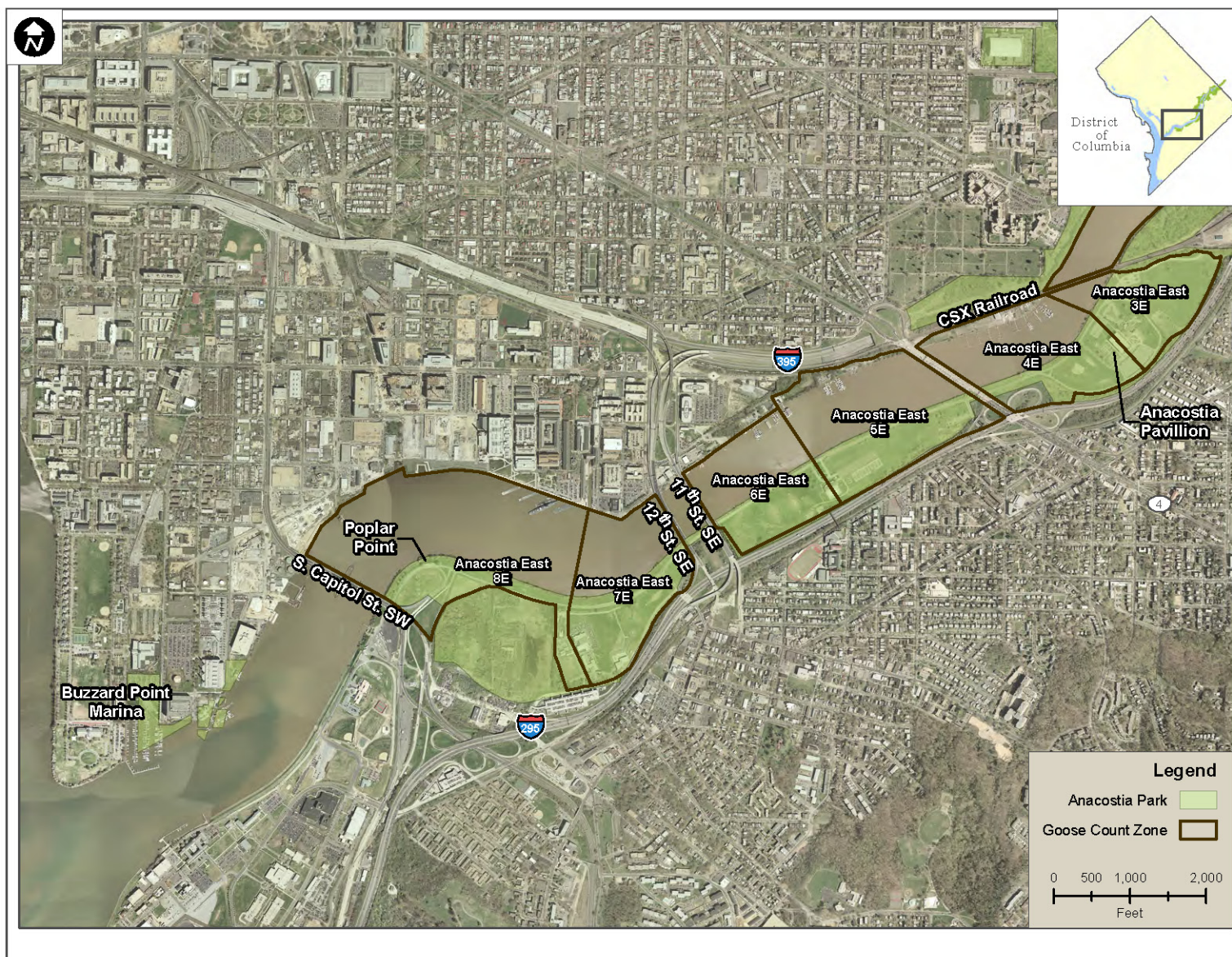


FIGURE 31: 2009 GOOSE COUNT LOCATIONS IN ANACOSTIA PARK, CENTRAL AREA



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

## Goose Management

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

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

## CULTURAL RESOURCES

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

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

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

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

## HISTORICAL BACKGROUND

When Captain John Smith explored the Potomac River in 1608, he discovered a thriving American Indian village at the junction of the Potomac River and the Anacostia River. The Nanchotank (or Nacotch tank) Indians built villages along the shorelines, and it is from the word "anaquash," meaning a village trading center, that the river derives its name. European settlers did not fully begin to claim the land along the

Anacostia River until the 1660s. The fertile soil was suitable for tobacco farming and settlers cleared the once forested land and developed farms.

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

The eastern branch affords one of the finest harbors imaginable... The channel is generally so near the city, that a wharf extended 40 or 50 feet from the bank, will have water enough for the largest ships to come up, discharge and receive their cargoes. The land on each side of the branch is sufficiently high to secure shipping from any wind that blows... while vessels in the main river, if they should be caught there by ice, are liable to receive great injury, and are sometimes totally lost by it, those in branch lay in perfect security (Lear 1793).

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

As early as 1898, Congress authorized the dredging of the Anacostia River and directed that the reclaimed material placed on the flats “with the objectives of land reclamation, sanitation, and promotion of navigation and commerce” (Gutheim 1977, 141). However, it was the McMillan Commission in 1901, led by Senator James McMillan, which set the stage for the development of Anacostia Park to provide gardens and recreational space for public use. Inspired by the *City Beautiful Movement* and L'Enfant's original Baroque Plan, the commission created a plan to guide the future development of the District towards the *City Beautiful Movement* aesthetics. In March 1901, McMillan Plan successfully passed a Senate resolution that developed plans for improvements to the District's park system. The 1902 plans discussed the development of the Anacostia Flats as a park, referred to as the “Anacostia Water Park.”

The USACE began work on dredging the river and filling the flats in 1902 and the project continued until 1925. In order to sufficiently support the dredged material, a seawall was built along the shoreline (Gutheim 1977, 141). After it was determined that the reclaimed area would be used for public purposes, Congress passed the Anacostia River Flats Act in 1914, providing for the acquisition, reclamation, and development of lands on both sides of the Anacostia River for highway and park purposes. The Commission of Fine Arts' annual report of 1914 identified the park an “important element in restoring the ‘balance in development that had tended toward the northwest.’” The park was formally declared Anacostia Park in 1919 (Gutheim 1977).

In the summer of 1932, the park was used as a camp by World War I veterans. In the midst of the Great Depression, approximately 17,000 jobless World War I veterans gathered in the District to seek early payment of their promised war bonus. The majority of the veterans, who called themselves the *Bonus Expeditionary Forces*, set up camp in Anacostia Park, at that time still commonly called the Anacostia Flats. The marchers vowed to stay in the District until the Bill passed and were encouraged when it

passed in the House of Representatives on June 15. As the number of veterans swelled to around 20,000, the Bill was ultimately defeated in the Senate. President Hoover eventually ordered the evacuation of all of the camps. On July 28, Army troops, led by General Douglas MacArthur, forced the veterans out of the camps on the western side of the river and destroyed their makeshift shelters. By the end of the day, over 100 people were injured. Hoover then sent orders to MacArthur stating MacArthur should not pursue the *Bonus Marchers* across the bridge at their main camp on the Anacostia Flats. Ignoring Hoover's orders, MacArthur crossed the bridge to the main camp in Anacostia Park, known as Camp Mark (PBS 2008). Fire erupted in the camp as the veterans retreated. Although the origin of the fire is unknown, the *Washington Post* reported, "early today the flames were burning a memorial across the sky in what may be the epitaph of the bonus army" (*Washington Post* 1932).

In 1933, the park was transferred to NPS, and additional improvements were made with the construction of golf courses, swimming areas, and playing fields. NPS facilities at that time were segregated, and Anacostia Park was no exception. While the Langston Golf Course was built in 1938 for African-Americans, the Anacostia Field House, along with its swimming pool, was built in 1936 only for whites. The park expanded in 1938 when NPS acquired the Kenilworth Aquatic Gardens. Today the park continues as a unique multi-use park that emerged from the reclaimed riverbanks of the Anacostia.

## HISTORIC STRUCTURES, DISTRICTS, AND OBJECTS

### Listed and Eligible Resources

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

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



**FIGURE 33: KENILWORTH AQUATIC GARDENS**

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

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

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

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

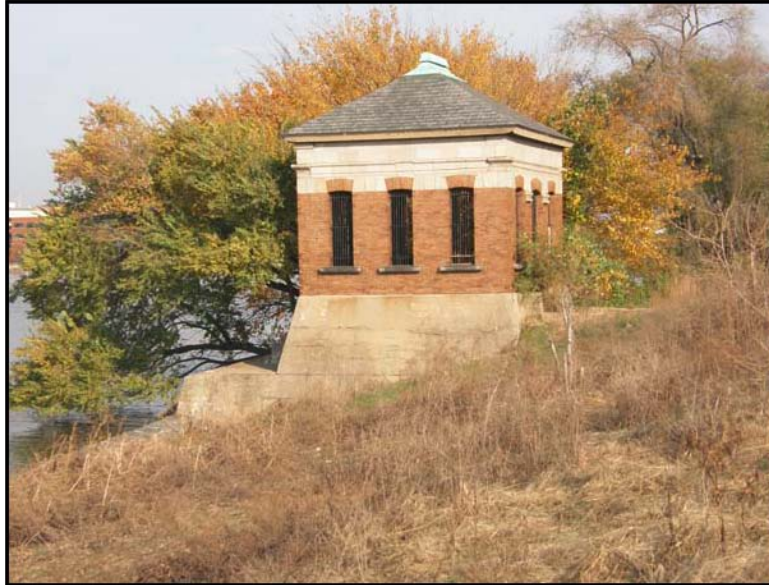
make the site eligible for its listing on the NHRP (Cole 1989, Section 8, 14, Langston Junior Boys and Girls Golf Club 2009).

Langston Golf Course Historic District is historically important because of its “symbolic association with the development and desegregation of public golfing and recreational facilities in the greater District area and with the growth of golf as a popular recreational and professional sport for African-Americans” (Cole 1989, Section 8, 1). It is also significant as the home course of the Royal Golf Club and the Wake Robin Wake Club’s home course. Both clubs were the first African-American golf clubs for men and women established in the U.S. and played an important role in the development of Langston Golf Course and the desegregation of the District’s golf clubs. Additionally, the Langston Golf Course Historic District is also significant for its association with Harold L. Ickes, Secretary of the Interior (1933-1941), and his efforts to open all NPS facilities to African-American citizens (Cole 1989, Section 8, 1).

The golf course’s entire landscape within the parkland setting is a contributing feature of the historic district. As a whole, the district consists of 145 acres on a man-made landscape of grassy, undulating terrain. The district’s boundary includes the Anacostia River on the east and Benning Road on the south. The complex western boundary consists of 26<sup>th</sup> Street, Spingarn High School, I Street, and 22<sup>nd</sup> Street. The northern boundary includes Maryland Avenue, M Street, and the southern boundary of the National Arboretum. Non-contributing features include the 1955 clubhouse, a 1977 maintenance shed, a 1985 driving range hut, the 1954 and 1977 bridges over Kingman Marsh, and the remnant of the miniature golf course built in the 1950s (Cole 1989, Section 7, 1-4). No structures within the Langston Golf Course are listed on the LCS.

**Anacostia Park**—NPS considers Anacostia Park to be eligible for the NRHP as an historic district because of its association with historic events including the 1932 *Bonus Army* marches and the desegregation movement; its design and architecture as a part of the McMillan Plan, for the reclamation and construction of the seawall by the USACE; and for the construction of park facilities by WPA workers; and as its potential for yielding both prehistoric and historic archeological sites. The District State Historic Preservation Office (SHPO) has not formally concurred with this determination, but for the purpose of this plan/EIS, Anacostia Park is considered NRHP-eligible as a result of documentation and comments made by NPS and SHPO with regard to of the South Capitol Street EIS (Parsons Brinckerhoff 2008, Chapter 3, 72). No formal historic district boundaries for the resource have been established; however, preliminary boundaries coincide with the current park boundaries.

**Anacostia Shoreline Pump Station**—The Anacostia Shoreline Pump Station was determined eligible for the NRHP in 2006 along with the Main Pump Station and the Poplar Point Pump Station (Parsons Brinckerhoff 2008, Chapter 3, 69). The Anacostia Shoreline Pump Station is a small, one-story masonry structure with a hipped roof that sits on the eastern shore of the Anacostia River at poplar point (figure 34). The pump station was probably built in 1905 in conjunction with along with the Main Pump Station (O Street Station) on the west side of the river.



**FIGURE 34: ANACOSTIA SHORELINE PUMP STATION**

### **Additional Resources**

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

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

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

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

**Anacostia River Seawall**—The seawall, which lines both sides of the Anacostia, is a result of a 50-year program implemented by the USACE in 1891 due to health and flooding issues associated with the condition of the river. As funding was made available through Congressional appropriations, the USACE dredged the river and filled the marshland that was known as the Anacostia Flats. In order to properly support the fill, a seawall of Potomac River stone was raised to an average high of four feet above mean low water. The riprap base of the wall was mostly built of salvaged stone from demolished structures

including the Old Navy Yard Bridge. By the 1920s, the majority of the structure was completed along both sides of the river and around the man-made lake on the west side of the park known as Kingman Marsh (Overbeck 1985). The wall is considered historically important as an expression of the reclamation project that created Anacostia Park.

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

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

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

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

## ARCHEOLOGICAL RESOURCES

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

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

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As early as the late 1800s, investigations along the lower Anacostia River yielded an abundance of aboriginal (defined as being the first or earliest known of its kind present in a region) material culture. Local landowners amassed substantial collections of aboriginal artifacts, which sparked an interest in local prehistory. This growing interest resulted in the formation of the Anthropological Society of

Washington in 1870. Members of this group, and other amateur archaeologists, began to investigate the Anacostia area more intensively for evidence of its earliest inhabitants.

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

**TABLE 7: ARCHEOLOGICAL RESOURCES IN ANACOSTIA PARK**

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

S.V. Proudfit, an active member in the Anthropological Society of Washington who was among the more diligent 19th-century collectors, identified many of the sites within Anacostia Park. He was also one of the first explorers of the region to speculate about the location of the village of the Nacotchtank (Anacostan) Indians. Nacotchtank was a large trading center, ideally situated for its purpose along two natural trade routes - east-west across the mountains and north-south along the fall line. Based on Captain John Smith's 1608 map and description of the village, Proudfit postulated that several sites he identified

on the east bank of the Anacostia River might be the remains of the village (Proudfit 1889). William Henry Holmes of the United States National Museum (now the National Museum of Natural History) in the late 19th and early 20th centuries was another pioneer in the study of local prehistory. Like Proudfit, Holmes speculated on the location of the village of Nacotchtank, but concluded that it could be located anywhere along the east bank of the Anacostia River, from Giesboro Point to the vicinity of the present day Benning Bridge (Holmes 1889).

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

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

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

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

considered sensitive for historic archeological sites. Specific sites included the remains of various piers, wharves, ferries, and residential structures that were historically located along the riverfront (Bromberg et al. 1989).

## **PARK OPERATIONS AND MANAGEMENT**

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

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

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

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

## **RESOURCE MANAGEMENT**

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

## **MAINTENANCE**

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

## **RESOURCE EDUCATION AND VISITOR PROTECTION**

### **Resource Education**

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

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

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

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

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

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

### **Visitor Protection**

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

### **COOPERATION AND COORDINATION**

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

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

- General Services Administration
- The Government and District of Columbia
- Office of Management and Budget
- Naval District Washington
- Military District Washington
- Commandant 11<sup>th</sup> Wing
- Commanding Officer Marine Barracks Washington
- Department of Labor
- Department of Transportation
- National Park Service
- USACE
- USEPA
- Department of Housing and Urban Development
- District of Columbia Housing Authority
- Washington Metropolitan Area Transit Authority
- Smithsonian Institution
- National Capital Planning Commission
- District of Columbia Sports and Entertainment Commission

- National Arboretum of the USDA
- U.S. Small Business Administration.

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

## VISITOR USE AND EXPERIENCE

### VISITATION

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

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

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

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

**TABLE 8: ANNUAL VISITATION IN THE NATIONAL CAPITOL PARKS-EAST AND ANACOSTIA PARK 2003-2009**

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

Source: NPS 2009c

## RECREATION AND VISITOR ACTIVITIES

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

- **Kenilworth Park and Kenilworth Marsh**—This 180-acre site is located in the northeastern portion of the park. The area was once used as a landfill, but historic and recent restoration efforts have allowed this site to be used as a multi-purpose recreational area.
- **Kenilworth Aquatic Gardens**—This site is located on the east bank of the Anacostia River. The area houses 14 acres of aquatic plants and 11 acres of ponds which provide habitat to a diversity of wildlife, including insects, reptiles, and amphibians. The mud flats at the tidal marsh during low tide are feeding grounds to many wading birds. The gardens are the only unit in the NPS dedicated to the propagation of aquatic plants. The Aquatic Garden's annual Waterlily Festival in July attracts thousands of visitors at the peak blooming season. Ranger-lead programs include a ½ mile guided tour of the ponds and gardens. A boardwalk hiking trail from the garden ponds leads visitors to the Kenilworth tidal marsh. Additionally, visitors may use the river trail that begins at the lily ponds and circles around pass the Kenilworth Marsh. In addition to viewing wildlife and the gardens, visitors have the opportunity to use the ball fields and picnic areas.
- **Langston Legacy Golf Course**—This 18-hole historic golf course is located on the west bank of the Anacostia River north of Benning Road. The golf course is open year round and green fees are \$15 for weekdays and \$19 on weekends. The facility includes a snack shop and pro shop.
- **Poplar Point**—This 60-acre site is located along the east side of the Anacostia River, just north of the South Capitol Street Bridge adjacent to the historic Anacostia District. The Poplar Point site was formerly used by the Architect of the Capitol and by the District's Lanham Tree Nursery. The wetlands, meadows, and scrub-shrub areas provide important habitat for a diversity of plants and wildlife. The area can be used for wildlife viewing and picnicking by park visitors.
- **Boating facilities**—Marinas and boat ramps located along the river provide public easy access to the water for boating, sailing, canoeing, and jet skiing. Three public marinas including the Anacostia Community Boathouse, Buzzard Point Marina, James Creek Marina; and a public boat ramp are located within the park. Additional private marinas include the Eastern Power Boat Club, the District Yacht Club, and Seafarers Yacht Club. The upper Anacostia is favored for

canoeing and kayaking through natural areas, while the lower Anacostia is favored by sculling and rowing crews for its broad, flat water.

- **Anacostia Park Pavilion**—This 3,300 square foot area is located east of the Anacostia River and north of Pennsylvania Avenue. The pavilion includes a roller skating rink and an area to host special events.
- **Urban Tree House**—This community-based environmental education center is located next to the Anacostia Park Pavilion and is made of wood planks in the shape of the United States. The Urban Tree House provides opportunities for the District urban youth to learn about and experience nature in their own backyards.
- **Aquatic Resource and Education Center**—This aquatic education center is located next to the Anacostia Park Pavilion. The education center offers a variety of live exhibits of fish and other aquatic organisms from the local river. The center also includes a fisheries hatchery for shad and herring species. Visitors may watch a presentation or receive a tour of the facility from local fisheries biologists.
- **Playing fields and courts**—Numerous playing fields and courts are scattered throughout the park. The open fields are often used by visitors for picnicking, dog walking, and sport playing, including soccer, rugby, and football. Tennis courts are located close to the Pennsylvania Avenue entrance to the park and basketball courts are located just south of Benning Road. The District Kenilworth Park immediately adjacent to the Kenilworth Aquatic Gardens offers baseball fields, a track, tennis courts, basketball courts, and swimming pools. This area is not within the Anacostia Park boundary and is not maintained by the park.
- **Playgrounds**—Two playgrounds are located throughout the park. These areas are located next to the roller skating rink and the picnic area south of the Pennsylvania Avenue entrance. These areas offer children the chance to climb, slide, and swing through ropes, tires, slides, bridges, and tires. These areas are most popular during the summer months.
- **Picnic and other passive recreation areas**—The remaining areas of Anacostia Park are used for picnicking and other activities such as hiking, biking, and wildlife viewing. Designated picnic areas are located next to the tennis courts, the Anacostia Park Pavilion, and the main building complex of the Kenilworth Aquatic Gardens, although picnicking is acceptable in any open area throughout the park. Many visitors often walk, jog, or bike along the roadway adjacent to the river.
- **Kingman and Heritage Islands**—These islands/marsh areas are located in the upper Anacostia River adjacent to RFK stadium. These areas are outside of the park boundary and are currently being redeveloped as educational and passive, low-impact recreation sites.
- **Fishing**—Recreational fishing opportunities are available along the east and west banks of the Anacostia River or by boat. A fishing permit from the District Fisheries and Wildlife department is required.

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

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

## **SOUNDSCAPES**

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

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

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

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

## **AESTHETICS AND URBAN QUALITY**

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

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

- Increase funding for trash reduction programs.

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

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

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