APPENDIX B: DRAFT DETERMINATION OF NON-IMPAIRMENT

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DETERMINATION OF NON-IMPAIRMENT

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park. That discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (NPS Management Policies 2006). Whether an impact meets this definition depends on the particular resources that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

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

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated (NPS Management Policies 2006, 1.4).

Impairment may result from visitor activities, NPS administrative activities, or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park (NPS Management Policies 2006 1.4).

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the environmental impact statement for the preferred alternative. Impairment findings are not necessary for visitor experience, public health and safety, environmental justice, and park operations. These impact areas are not generally considered to be park resources or values according to the Organic Act, and cannot be impaired the same way that an action can impair park resources and values.

ANACOSTIA PARK ENABLING LEGISLATION

Beginning with legislation passed in 1924 that established the National Capital Park Commission (Public Law 592, 43 Stat. 463), which was later renamed the National Capital Planning Commission (NCPC) in 1926 (44 Stat. 374), Anacostia Park became a part of the park, parkway, and playground system of the National Capital.

ANACOSTIA PARK SIGNIFICANCE STATEMENTS

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

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

NATURAL RESOURCE TOPICS

PHYSICAL RESOURCES

Soils

The Anacostia Watershed has seen major alterations to its soil from the past 150 years of development. Major alterations of the tidal portion of the Anacostia River by the USACE began in the 1920s and left fill materials (Udorthents soils) along much of the riparian buffer in the District portion of the Anacostia River. The majority of the soils within Anacostia Park are considered Udorthents (USDA NRCS 2006). Udorthents are comprised of very heterogeneous earth fill material that has deposited on poorly drained to somewhat excessively drained soils. Udorthents are composed of approximately 80 percent earthy material and 20 percent of other matter which may include bricks or pieces of concrete or stone. The fill is a mixture of organic and inorganic waste materials, as well as sandy, gravel, clay, or silty soil materials. The thickness of the fill is variable, but is typically more than 20 inches. Soils surrounding the park headquarters also contain urban lands (USDA NRCS 2006). The Urban Land mapping unit consists of areas where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces (DCDOT 2006b).

Other soil classifications throughout Anacostia Park include: Iuka sandy loam, Matapeake silty loam, Bibb sandy loam, Fluvaquents, Galestone and Rumford soils, Fallsington sandy loam, Christiana silt loam, Keyport fine sandy loam, Sassafrass gravelly sandy loam, Woodstone sandy loam, and Melvin silt loam.

Soil erosion occurs along the Anacostia River and its tributaries from the large amounts of stormwater rushing over the concrete and spilling out of stormwater pipes. Erosion is common along the seawall. Construction has also contributed to erosion of soils into the Anacostia River. Some small scale erosion occurs due to the tidal action on the mud flats.

Alternative B, the preferred alternative, combines the most aggressive wetlands management techniques with intensive goose management techniques (lethal control combined with other techniques). This alternative would not result in impairment of soils because most techniques employed would improve soils rather than damage soils. For example, wetland management techniques proposed would improve the existing wetlands and create new wetlands along the Anacostia River, increasing wetland vegetation and rootmass, thus stabilizing soils adjacent to the river. Stabilization would benefit soils through reducing actual soil loss during rain events. Vegetation techniques proposed, such as mechanical seedbank regeneration and high density planting efforts, would increase the width of the existing vegetative buffer along the Anacostia River and reduce bare areas where soil erosion currently occurs which would also reduce soil loss during rain events. Improvements to soils would result from increased plantings and buffers. These techniques would have a long-term, beneficial impact on soils.

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

In conclusion, the park would continue to preserve the soil resources of the park, and prevent the unnatural erosion, physical removal, or contamination of the soil. Some impacts to soils would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values.

WATER RESOURCES – HYDROLOGY AND WATER QUALITY

Hydrology

Anacostia Park is located within the greater Anacostia Watershed, estimated at approximately 170 square miles, and drains portions of Montgomery and Prince George's Counties in Maryland as well as the eastern portion of the District. The Anacostia River is formed by the confluence of the free-flowing (non-tidal) Northeast and Northwest Branches at Bladensburg, MD in Prince George's County. The tidal influence in the Anacostia River extends approximately 1,000 feet upstream of this confluence in both Branches; therefore, the entire tidal Anacostia River from Bladensburg to the Potomac River contains only freshwater. The NPS owns approximately 16 miles of shoreline along the Anacostia River. Overall, the morphology of the tidal Anacostia River system has been dramatically altered. This condition reflects the impacts of seawall construction, mainstem navigational dredging and associated filling, which collectively led to the destruction of the river's once thriving riverine fringe wetlands (DCOP 2003).

Under alternative B, the preferred alternative, hydrology would not be impaired because most actions would result in either no impact to hydrology or beneficial impacts to hydrology. This alternative includes a suite of potential techniques to improve the hydrology of the watershed including: erosion control techniques; removing/modifying structures that negatively affect the marsh; creating tidal guts; potential enforcement of no wake zones along the River; investigating the effects of extreme water level change; and considering altering water elevations. Revegetating and stabilizing areas along the river and proposed wetland restoration techniques would also benefit hydrology in the watershed. Additional wetland management techniques, such as reducing impervious areas, would also benefit hydrology. The

combination of techniques described above would benefit hydrology since infiltrating stormwater into soils mimics natural drainage processes and reduces the volume of stormwater runoff that enters the Anacostia River during rain events; stream and channel flow would also be improved by removing and/or modifying structures that impede flow, thus benefiting hydrology as well. This alternative would not result in impairment of hydrologic resources because most techniques used would improve, or have little impact on, the hydrology of the watershed area.

In conclusion, the park would continue to take all necessary actions to maintain or restore the natural hydrology within the park and to avoid, whenever possible, the alteration of park waters by human activities occurring within and outside of the park. Some impacts to hydrology would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values.

Water Quality

Although the designated use of the Anacostia River has been a Class A Water (Primary Contact Recreation) by Federal Water Quality Standards, it has been recognized for many years that water quality (as well as sediment quality) in the Anacostia River are highly degraded due to point source, non-point source pollution, and refuse (USEPA and NOAA 2009) from historic toxic contamination, sewer overflows and leaks, and urban stormwater runoff. The lower Anacostia River is essentially an embayment of the Potomac River with very low flow. Even though the lower portion of the Anacostia River located within the District is tidally influenced and exhibits a 3.0 foot average tide height twice daily, the river has a very slow flushing rate, which prevents flushing that might otherwise remove some of the contamination (USEPA and NOAA 2009). Therefore, heavy siltation, accumulation of toxic metals and organic chemicals in sediments, and sewage overflows all contribute to poor water quality in this section of the river (NPS 2004a).

Water quality conditions in the tidal Anacostia River have historically been poor. Generally, low dissolved oxygen (DO) concentrations, suspended solids, and high fecal coliform bacteria counts are characterized as major water quality issues (USACE 2002). The water quality of Kingman Marsh has also been characterized as poor due to high water temperatures, low DO concentrations, and pollution (USACE 1994). TSS have been listed by the USEPA for TMDLs as a pollutant in the Anacostia River which directly affects water quality. TSS reduces water clarity, blocks sunlight necessary for SAV, reduces oxygen levels, clogs fish gills, and smothers fish eggs and aquatic insects (CBF 2006). Other specific contaminants of concern in the Anacostia River include: lead, mercury, PCBs, PAHs, DDT and chlordane (NPS-USGS 2007).

Currently, resident Canada geese may adversely impact water quality due to herbivory of wetland plants and fecal droppings. Wetlands are generally considered nitrogen- or nitrogen and phosphorus limited, which results in the rapid uptake of nitrogen and phosphorus from the water column. The herbivory of wetland plants by the resident Canada goose population decreases the function of the wetlands, which ultimately increases the amount of nutrients within the Anacostia River. In addition, fecal droppings from the geese can degrade overall water quality, particularly in areas where the pathogens can concentrate (USFWS 1999).

Alternative B, the preferred alternative, would not result in impairment of water quality because actions under this alternative would result in improvements to wetland vegetation, thereby contributing to better water quality. Erosion and sedimentation in wetlands are integral functions of the ecosystem and can affect both vegetation and water quality including serving as depositional environments and preventing the downstream passage of excess nutrients or harmful chemicals (Drake et al. 2003). Wetland management techniques are proposed to improve the existing wetlands and create new wetlands along the Anacostia River. Wetlands can serve as a trap for nutrients and sediment (and associated pollutants and

pathogens binding to sediment) carried by runoff from surrounding uplands or contiguous wetlands. Wetlands have the ability to process these nutrients into other forms and trap pollutants, thereby improving water quality in the Anacostia River. Wetlands also function to prevent the adverse effects associated with excess nutrients entering surface waters, such as the Anacostia River. Some wetland management park operations techniques (trash management, reduction of impervious areas, new rain gardens) as well as hydrology techniques (erosion control techniques, removing/modifying structures, and addressing upland runoff) would also improve water quality as part of alternative B by reducing urban runoff and associated pollutants that enter the Anacostia River.

Water quality would also be improved through a reduced resident Canada goose population. Reducing the population would decrease the number of fecal droppings and decrease the amount of erosion from excessive grazing, thus improving water quality through decreased pathogens and sedimentation. The combination of techniques included as part of alternative B may cause a discernable improvement in water quality in the vicinity of the park. As a result of alternative B, improvements to water quality would be detectable, but these beneficial impacts would be small and localized.

In conclusion, the park would continue to take all necessary actions to maintain or restore the quality of surface waters within the park and to avoid, whenever possible, the pollution of park waters by human activities occurring within and outside of the park. Some impacts to water quality would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values.

FLOODPLAINS

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

Alternative B, the preferred alternative, would not result in impairment of floodplains because actions taken under this alternative improve wetland functions rather than adversely affect them. The majority of beneficial effects would be through improvements to wetlands; additional vegetative buffer plantings along the river; and the removal of impervious surface in the watershed as well as potential flood attenuation through wetland restoration techniques. Flood attenuation and/or alteration enables a wetland to reduce flood damage from prolonged periods of precipitation by storing and desynchronizing (i.e., gradually releasing at lower heights/velocities) floodwaters. A secondary benefit of flood attenuation is the economic value of flood protection through reduced property damage.

In conclusion, the park would continue to take all necessary actions to maintain protect, preserve, and restore the natural resources and functions of floodplains and avoid the long-and short-term environmental effects associated with the occupancy and modification of floodplains. Some impacts to floodplains would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values.

WETLANDS

Anacostia park's tidal wetlands, including Kenilworth Marsh, are a significant park resource. 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. 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.

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 Wetlands Anacostia Park. There are less than 180 acres of tidal emergent wetlands currently existing in the Anacostia between Bladensburg and the confluence with the Potomac River. (AWRP and MWCOG 2009).

There have been and currently are many restoration efforts 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. 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 causing an adverse impact. 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, another issue is incorrect hydrologic regimes (too much inundation to vegetation or too little submersion of vegetation).

Under alternative B the most aggressive wetlands management techniques are combined with intensive goose population reduction techniques (lethal control combined with other techniques) in addition to new wetland restoration techniques. This alternative would not result in impairment of wetland vegetation because the actions under this alternative would improve wetland conditions.

The primary impact to wetland vegetation within the park would result from lethal actions taken to control the resident Canada goose population. It is expected that with rapidly reduced goose browsing pressure, the herbivory previously observed in wetland vegetation would start to reverse, as was found in exclosure studies conducted in the nearby Patuxent River (Haramis et al. 2006). Therefore, a recovery period for wetland vegetation that immediately follows goose removal may allow the vegetation to become more resilient (through increased rootmass and propagules) to goose herbivory the following spring.

Alternative B includes a suite of potential techniques that would enhance existing wetland areas at the park and restore or create new wetland areas resulting in beneficial impacts. Several hydrology techniques are proposed to manage wetlands at the park such as erosion control techniques; removing/modifying structures that negatively affect the marsh; creating tidal guts; potential enforcement of no wake zones along the river; investigating the effects of extreme water level change; and considering altering water elevations. In addition, wetland restoration techniques would also have an overall improvement on the wetlands within the park. These particular techniques would be designed to either create new wetland areas or reconnect the floodplain with the waterbodies (including the Anacostia River, Pope Branch, and Fort Dupont Creek) to potentially create additional or enhanced wetland areas.

In conclusion, the park would continue to take all necessary actions to prevent the destruction, loss, and degradation of wetlands; preserve and enhance the natural and beneficial values of wetlands; and avoid direct and indirect support of new construction in wetlands. Some impacts to wetlands would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values.

AQUATIC RESOURCES – BENTHIC INVERTEBRATES, FINFISH, AND SHELLFISH

Historically, the Anacostia River was a valuable spawning ground and nursery area for anadromous fish and it 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 its approaches zero (DCFWD 2001).

Wetlands provide both aquatic diversity and habitat for finfish and wetland plants serve as a food source (detritus) both directly and indirectly. Recent benthic surveys in wetlands along the Anacostia River demonstrate the presence of extremely large populations of pollution tolerant macroinvertebrates at the Anacostia sites indicating environmental stressors such as the lack of cover in unvegetated areas, disturbance, and likely polluted sediments (USGS 2006a). It has also been concluded that the loss of vegetation and the subsequent erosional substrate at wetlands in Anacostia Park are due to wildlife grazing (primarily resident Canada geese) which has affected the macroinvertebrate community development (USGS 2006a).

The resident Canada goose population would be intensively reduced as part of the preferred alternative which would result in beneficial to wetland vegetation. There would be benefits associated with habitat modification. The habitat modification as part of goose management includes planting 25- to 50-ft buffers along the shorelines of the river throughout the park and increasing the width of existing vegetated buffers. Additional and/or enhancing buffers along the shoreline would benefit finfish species by shading the river and reducing the water temperature in surface waters located immediately adjacent to the buffer zone.

In conclusion, improvements to wetland vegetation through restoration and resident Canada goose management would indirectly benefit benthic macroinvertebrate species. These improvements would not impair aquatic resources, rather improve aquatic resource habitat. The park would continue to preserve and restore the natural abundances, diversities, dynamics, distributions, and habitats of native benthic macroinvertebrate populations, finfish, shellfish, and other fish populations throughout the park. The park would also continue to minimize human impacts on these species and their ecosystems. Some impacts to fish would occur, however, any adverse impacts would not rise to the level of impairment and most impacts would be beneficial.

VEGETATION

Vegetation, wetland and terrestrial, are significant resources to Anacostia Park. Fields and turf provide space for a variety of recreational resources to park visitors. Other vegetation provide habitat for native plants and animals. 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.

Riparian buffers which can sometimes be encompassed in the forested wetlands 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. Several common plant species have been observed along the shoreline of Kingman Marsh in the park.

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. There are several dominant plant species that have been observed within Anacostia Park in this habitat.

Landscaped areas within Anacostia Park include maintained right-of-ways along roads and bridges that span across the park and several maintained recreational fields. There are various types of vegetation in these areas.

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).

Invasive plant species pose a serious threat to the natural environment that create adverse impacts 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. There are several invasive plant species in Anacostia Park.

Alternative B, the preferred alternative, would not result in impairment of vegetation because actions under this alternative are beneficial to vegetation. Any adverse impacts would be small and short-term. The resident Canada goose population would be intensively reduced as part of this alternative benefiting vegetation along the shoreline buffer as well as terrestrial vegetation located further inland such as turf feeding areas. Wetland management techniques under the preferred alternative would establish and benefit terrestrial vegetation.

Habitat modification techniques are also proposed as part of alternative B which include planting 25- to 50-ft buffers along the shorelines of the River throughout the park and increasing the width of existing vegetated buffers. Other vegetation techniques that are part of wetland management are proposed to improve terrestrial vegetation including managing invasive species (reducing areal coverage) and buffering the shoreline. By improving vegetation and increasing and/or enhancing vegetative buffers with native species, there is less likelihood that invasive vegetative species would encroach and persist in these locations. Also, high density plantings using persistent, native species with high root mats and variable height are also included as part of alternative B.

Vegetation may be temporarily adversely affected during land disturbance activities such as re-grading of sites or construction activities associated with hydrology techniques, vegetation techniques, and wetland restoration techniques. However, vegetation disturbance impacts would be minimized as much as possible and the areas would be revegetated immediately following site preparation so as not to create an impairment to the vegetation. Mitigation may include appropriate BMPs such as vegetation buffers, a revegetation plan, or other required documents in the District depending on the total area disturbed.

In conclusion, the park would continue to preserve and restore the natural abundances, diversities, dynamics, distributions, and habitats of native vegetative populations and communities throughout the park. Some impacts to vegetation would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering, park purposes and values. Any adverse impacts would be short term and would not adversely impact the integrity of the vegetation in the park.

WILDLIFE

Anacostia Park's wildlife habitat is a significant park resource. 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 numerous birds, butterflies, fish, reptiles, amphibians, and mammals as either residents within or migrants passing through Anacostia Park as well as numerous other invertebrates (NPS 2003a).

This alternative would not result in impairment of wildlife because wetlands provide necessary habitat, and benefits to wetland habitat under the plan could result in a greater abundance of wildlife species. Under alternative B, the resident Canada goose population would be intensively reduced improving wetland habitat thereby providing benefits to wildlife species. Wetland plants serve as a food source (seeds, roots, leaves) for many wildlife species. Similarly, wildlife species would also indirectly benefit through improved macroinvertebrate and finfish resources, which are also a major food source for aquatic-dependent wildlife species. Specifically, aquatic birds, wading birds, gulls/terns, and other permanent residents that utilize wetlands and their fringe habitat would benefit from improved wetland areas as would mammals, reptiles, amphibians and numerous invertebrates such as butterflies and dragonflies.

Habitat modification techniques, such as vegetated buffers and high density plantings are proposed as part of the preferred alternative. These techniques would provide beneficial impacts to wildlife by providing additional and enhanced habitat along the river. Hydrology techniques that include removing or modifying structures that result in erosion and clogging of marsh and creating tidal guts would also have an overall beneficial impact on wildlife by creating improved and additional habitat. Improved quality and quantity of habitat would indirectly benefit wildlife species as well as support food sources (seeds, roots, leaves, benthic macroinvertebrates, and finfish) for wildlife species Techniques considered as part of goose management are proposed to reduce goose herbivory and improve wetland vegetation, thereby providing benefits to wildlife.

Some wildlife may be temporarily adversely affected during land disturbance activities such as the re-grading of sites or construction activities including hydrology, vegetation and wetland restoration techniques that increase noise. Disturbance impacts would be minimized as much as possible and the disturbed areas would be revegetated immediately following site preparation.

In conclusion, the park would continue to preserve and restore the natural abundances, diversities, dynamics, distributions, and habitats of native wildlife populations and communities throughout the park. Some impacts to wildlife would occur, however, most impacts would be beneficial, thereby fulfilling rather than hindering park purposes and values. Any adverse impacts would be short term and would not adversely impact the integrity of the wildlife in the park

Resident Canada Geese

Canada geese are federally protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703-711). Regulations governing the issuance of permits to take, capture, kill, possess, and transport migratory birds are authorized by the MBTA, promulgated in Title 50 CFR 13.21, and issued by the USFWS. Regulations governing the take, possession, and transportation of migratory birds under sport hunting seasons are authorized by the MBTA and annually promulgated in 50 CFR 20 by the USFWS. The MBTA provides for the protection and conservation of migratory birds (including resident Canada geese), while at the same time providing opportunities for people to use the resource for sport, recreation, and scientific endeavors (USFWS 2005). The MBTA also provides considerable flexibility for dealing with situations where birds may come into conflict with human interests, such as those posed by the increasing numbers of resident Canada geese (USFWS 2005). On August 10, 2006 a final rule was published in 50 CFR 20:21 authorizing state wildlife agencies, private landowners, and airports to conduct indirect and/or direct population control management on resident Canada goose populations. On August 20, 2007, a final

rule was published expanding hunting methods during special September hunting seasons (50 CFR 20:21).

Migratory Canada geese typically arrive in the park in the early fall and migrate north toward Canada by the end of winter (mid-March) to breed in the summer. The 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.

Under alternative B the most aggressive wetlands management techniques are combined with intensive goose population reduction techniques (lethal control combined with other techniques). Current population estimates of resident Canada geese within the park demonstrate that the population of 492 resident geese is well over the recommended size that would allow for successful wetland restoration [and conservation] in Anacostia Park. It is important to note that a beneficial impact to resident Canada geese would not be realized by reducing the population size as proposed in alternative B because the health of the resident Canada goose population at the park is not yet in jeopardy based upon current size numbers and as suggested in USFWS (2005).

Techniques used to reduce the population could include round-up, capture, and euthanasia as well as lethal removal by shooting. The resident Canada goose population beyond park boundaries would not be affected by alternative B. In addition to lethal means of reducing the resident Canada goose population, alternative B would also include an intensive scare/harassment program as well as the following reproductive control techniques: increased egg oiling, egg addling, and egg replacement (if population increases after initial reduction); application of goose hatch material (if population increases greater than 20 percent in one year).

In conclusion, alternative B, the preferred alternative, would not result in impairment of resident Canada geese because a resident Canada goose population would remain at the park. It is the intent of the NPS to maintain a population of resident Canada geese in Anacostia Park. The numbers removed would still be significantly lower than the U.S. Fish and Wildlife Service population recommendations for the area. Finally, while impacts to individual geese would be adverse and long term, these individual deaths do not result in an impairment of the population overall.

CULTURAL RESOURCES

Historic Structures, Districts, and Objects

Anacostia park's tidal wetlands, including Kenilworth Marsh, are a significant park resource. In 1933 the park was transferred to NPS and 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 river banks of the Anacostia.

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.

Alternative B would not result in impairment of historic structures, because no actions under this alternative would change the overall integrity of these structures. Alternative B includes various goose

management and wetland management techniques. A number of the techniques under alternative B would occur adjacent to National Register-listed or eligible historic structures or districts or within the boundaries of historic districts. Some wetland management techniques could somewhat alter the setting in the vicinity of Kenilworth Gardens and in Langston Golf Course and Anacostia Park, but these actions would not diminish the character-defining features or the overall integrity of these historic resources causing impairment to historic structures in the park. Goose management techniques adjacent to Kenilworth Gardens and within the boundaries of Langston Golf Course and Anacostia Park including the potentially-eligible resources within Anacostia Park, would alter aspects of the setting, but they would not diminish the integrity of character-defining features or compromise the overall integrity of these historic resources.

In conclusion, the park would continue to provide for the long-term preservation of, public access to, and appreciation of the features, materials, and qualities contributing to the significance of historic districts and structures. Some impacts to historic districts and structures would occur, however, impacts would not impair the resource to the point that the park's purposes could not be fulfilled. Future NEPA compliance would be necessary to assess possible impacts to the Anacostia River Seawall in the event that NPS implements the seawall breaks and daylighting. Adverse effects under Section 106 would be mitigated by context sensitive design or other measures developed during Section 106 consultation.

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. Archeological sites were identified in what are now park lands as early as the 1880s, but urbanization and landfilling has made it difficult to investigate these sites in modern times.

Archeological testing in the 1980s 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.

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

Alternative B represents the highest level of effort to control the resident Canada goose populations through various goose management and wetland management techniques. The installation of erosion control measures and mechanical seedbank regeneration would occur near Site 51NE17 and the planting of native species/shoreline buffers would occur near Site 51NE30 that could create temporary adverse

impacts, however impairment of the resources would not result. Other activities planned under alternative B that could impact other, as yet undiscovered archeological resources. Additional documentation of archeological resources and NEPA compliance would be necessary to assess possible impacts to archeological resources. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the National Historic Preservation Act.

In conclusion, the park would continue to provide for the long-term preservation of, public access to, and appreciation of the features, materials, and qualities contributing to the significance of archeological resources. Some adverse impacts to archeological resources could occur, however impacts would not impair the resource to the point that the park's purposes could not be fulfilled. Additional documentation of archeological resources, including subsurface archaeological investigations, and NEPA compliance would be necessary to assess possible impacts to archeological resources as a result of different activities. In the event that these studies identify NRHP-eligible resources that would be subject to adverse effects, NPS would develop mitigation measures in accordance with Section 106 of the National Historic Preservation Act.

APPENDIX C: VEGETATIVE MONITORING PLAN

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PRELIMINARY MONITORING PROTOCOL FOR THE TIDAL FRESHWATER WETLAND RESTORATION HERBIVORY STUDY IN NATIONAL CAPITAL PARKS--EAST

ABSTRACT

Four tidal freshwater wetland restoration projects have been undertaken within Anacostia Park on lands managed by the National Park Service since 1993. Monitoring the impacts of Canada goose (*Branta canadensis*) herbivory on the wetland vegetation will play a key role in determining the long-term health of these tidal freshwater wetland restorations. This Implementation Plan lays out monitoring for impacts of herbivory on the vegetation in Kingman Area 1 and inferred to the other wetland areas.

BACKGROUND

In the early to mid-1900's, dredging and filling operations combined with sea wall installation destroyed the extensive tidal freshwater marshes along the Anacostia River in Washington, D.C. In an effort to restore a portion of those once extensive wetlands, the U.S. Army Corps of Engineers (USACE) and the District Department of the Environment (DDOE), working in conjunction with National Park Service National Capital Parks-East (NPS), designed and implemented a series of four tidal freshwater wetland restoration projects along the tidal Anacostia, on lands managed by NPS. The US Geological Survey Patuxent Wildlife Research Center (Cooperator) has taken the lead on monitoring all four wetland restorations, working in conjunction with DDOE, NPS, USACE, and the University of Maryland.

HERBIVORY MONITORING

BASIC APPROACH

Effects of herbivory will be investigated through the use of experimental modules consisting of one unfenced control plot and one sampling plot. The elevated-fence exclosure is designed to exclude only (mature) Canada geese, while allowing access to fish, turtles, and other possible herbivores. This will not exclude goslings, and therefore, impacts from fish/turtle herbivory will include goslings.

The monitoring described here represents a strategic approach to the study of herbivory at the Anacostia Park wetland restorations. It builds on the following advantages of working at Kingman Area 1:

1. Extensive herbivory has already been observed at Kingman Area 1.
2. Kingman Area 1 is fairly large, providing approximately 6.6 ha of potential emergent marsh habitat. It is anticipated that there is sufficient acreage of both unvegetated (unfenced) habitat and vegetated (previously fenced) habitat with the desired elevation range to accommodate modules in both types of habitat. It is useful to know whether the outcome is influenced by the starting habitat or not, since Kingman Area 1 has fairly large areas of each type.
3. Kingman Area 1 has numerous previously fenced areas that have revegetated following the installation of exclosures by Anacostia Wetland Society. Existing herbivory protection will be removed from the areas targeted for vegetated modules fairly quickly and without the need for heavy machinery to provide vegetated habitat of appropriate elevation for experimental purposes.

While the herbivory monitoring described does not attempt to demonstrate impacts of herbivory on vegetation in wetland restorations adjacent to all of the areas where Canada goose management actions

might be implemented, we will be able to infer the effect to the vegetation of these areas. Since Canada geese are mobile and the distances separating these areas are relatively small (approximately 5 kilometers maximum), demonstrating herbivory impacts at Kingman Area 1 supports Canada goose management actions anywhere within Anacostia Park.

Study Modules

The study will use 16 modules, designed to be divided evenly between the two habitat types.

A two-plot module consists of one unfenced control plot and one elevated-fenced exclosure plot. This keeps the design simple and the implementation as cost-effective as possible. Surveillance of elevated-fenced plots, either through motion sensor cameras or periodic on-the-ground surveillance by park staff for goose tracks inside elevated-fence exclosures could be used to help document the nature of any herbivory experienced at these plots. The use of elevated-fenced exclosures should also reduce the possibility that the exclosures themselves will trap sediment and alter elevations and nutrient levels within.

Modules will be placed in unvegetated habitat (unfenced) or vegetated habitat (large, previously fenced areas) in the required elevation range. For the vegetated modules it will be necessary to remove existing fencing in order for the control plots to function properly as controls. Modules will be allocated to random locations within the areas of adequate elevation, maintaining a minimum separation distance among modules of 5 m. Module locations will be recorded using GPS.

Vegetation is sampled within 1 m by 2 m plots (figure C-1), the sampling design used in recent monitoring of the River Fringe and Heritage Island Wetlands Restorations (Krafft et al. 2009). Two corners of the sampling plot are marked with 1.9 cm diameter PVC poles. The taller pole (total length of 3 m, with approximately 2.4 m projecting above-ground) aids in locating the plot visually from a distance. The shorter pole (total length of 1.4 m, with approximately 0.6 m projecting above-ground) provides a second corner for orienting the 1 m by 2 m PVC quadrat frame during sampling events.

Fenced exclosures measure approximately 3 m by 4 m, which should be small enough to deter Canada geese from flying into the exclosures from above, but large enough to provide an approximately 1-m buffer around the sample plot. The inclusion of a buffer protects the sample plot in the elevated-fence exclosure from possible edge effects from Canada geese stretching their necks under the elevated fencing at low tide to graze on plants within their reach. Equipping the exclosures with a gate and a buffer also allows closer examination of the sampling plot, which means that data can be collected at the species level and used to determine species richness in addition to the percent cover.

Exclosures are constructed using vinyl-wrapped wire mesh fence with a recommended mesh size of 5 cm by 10 cm and 1.4 m high. The wire fence is attached to metal t-posts using plastic cable ties. The metal t-posts are 2.4 m tall, allowing for approximately 1 m below ground to provide good stabilization. The taller height limits the possibility of Canada geese swimming over the tops of the exclosures at high tide. A lower elevated height of 0.2 m was chosen rather than the 0.25 m used in the previous studies on the Anacostia and Patuxent to provide additional deterrence to goose entry. This reduction would not be expected to act as a deterrent to most fish or turtles. Horizontal stringing and flagging will be attached to the exclosures on the diagonal to further deter geese from entering the exclosures from above, although the small size of the exclosures should make this method of entry unlikely.

Sampling plots will be arranged in a linear fashion within the modules, as shown in figure C-1. Allocation of the control and fenced-exclosure plot(s) to the available positions within each module will be random.

Elevations

Given the important role elevation plays in determining percent cover, species richness, and species composition in the marsh, comparability of sample plots with respect to elevation will be maintained by limiting the placement of sample plots to an elevation range of 0.25 to 0.37 m NAVD 88. This range was chosen based on previous work in the Anacostia wetland restorations (Krafft et al. 2009, Hammerschlag et al. 2006, Neff 2002) that indicates this range (equivalent to 1.60 to 2.00 ft NGVD 29) is high enough to support native wetland vegetation, but low enough to reduce the probability of invasion by the non-native, common reed (*Phragmites australis*). Sampling plot elevations will be measured periodically to determine change over time. It is recommended that elevations be monitored in 2009 during the plot location process and again in 2011. Elevations should be obtained with a surveyor's level, a laser level, or other appropriate equipment, pegged to local benchmarks.

Field Work Timeline

Exclosures should be installed in April/May, or as soon thereafter as is feasible, so that germinating annuals will not be decimated by herbivory before the exclosures are set up. Exclosures will be examined periodically by Park staff during the growing season to confirm that they are intact, especially following major storm events, and to confirm that goose tracks are not present within elevated-fenced exclosures. Baseline vegetation data will be collected for the study in early June, right after removal of the old protective fencing form the new experimental modules. Annual vegetation monitoring will be conducted in August, prior to the seasonal senescence of a number of the key dominant species (Krafft et al. 2009).

Since the purpose of this monitoring is to measure the general herbivory response rather than tracking individual species that may peak and senesce at different times, an annual August monitoring is sufficient. This plan anticipates, based on past experience that vegetation will volunteer within the exclosures, given appropriate elevation and protection from herbivory. This may take more than one growing season. In the event that Canada goose herbivory is documented by this study and management actions are undertaken, herbivory monitoring should continue after the management actions to provide quantitative statistical documentation of the recovery of vegetation in the unfenced control plots.

Vegetation Sampling Methods

A 1 m by 2 m PVC quadrat frame will be hooked over the two PVC plot markers to delineate the boundaries of the sampling plot. Ocular estimation will be used to record percent cover by cover types consisting of species (or nearest known taxon) and the unvegetated cover type, if present. Percent cover numbers will total at least 100 %. Totals will exceed 100 % in cases where vertical layers of species overlap. Plants do not have to be rooted within the sampling plot to be included in the percent cover data. Cover will be recorded to the nearest percent for values between 1 and 15. Values less than 1 % will be recorded as 0.5 % or 1 %, whichever is closer. Values between 15 and 95 % will be recorded to the nearest 5 %. Values between 95 % and 100 % can be recorded to the nearest percent.

Statistical Analysis

Total vegetative cover, species richness, and elevation data will be analyzed statistically. For data sets where the residuals are normally distributed and the variances are acceptable, analysis of variance (ANOVA) will be used to compare data among plot types (unfenced control plots and elevated-fenced exclosure plots), habitat type (vegetated or unvegetated), and their interaction. 'Module' will be included in the model as well, and we will investigate models that allow correlation between the plots within a module. Data may be transformed prior to analysis (e.g., using a natural log transformation) to improve normality. Post pairwise comparisons will be made using Tukey's Studentized Range Test of Least

Squares Means (family-wise error rate with alpha= 0.05). After the first year, data meeting the necessary normality and variance assumptions will be analyzed using a mixed model repeated measures analysis of variance (SAS, 2003, PROC MIXED). A variety of models will be tested to determine whether an unstructured model (which allows correlation between any two periods to be different) or compound symmetry model (which assumes the same correlation between any two time periods) produce better fit based on a lower value for Akaike's Information Criterion (AIC).

For data sets that do not meet adequate standards of normality and homogeneity of variance, we will consider using alternate statistical analyses such as loglinear models.

CONCLUSIONS

The tidal freshwater wetland restorations located in Anacostia Park have the potential to provide Washington D.C. with environmental benefits through increased habitat for wetland wildlife and plants, increased ability to slow the pace of flood waters and filter pollutants, educational benefits by providing living laboratories in an inner-city setting where that is a rare commodity, and natural aesthetic benefits, also in short supply in the urban environment. Everyone benefits if these wetland restorations located on lands managed by NPS are well-managed and functioning to their optimal capability. Herbivory has limited the ability of these wetland restorations to function at their optimal capability. Data collected through this monitoring plan would provide the quantitative data needed to make sound management decisions regarding these wetlands.

LITERATURE CITED

Brown, M.L. and R.G. Brown

1984 Herbaceous plants of Maryland. Port City Press, Inc., Baltimore, MD. 1127 pp.

Hammerschlag, D., A. Baldwin, C. Krafft, K. Neff, M. Paul, K. Brittingham, K. Rusello, and J. Hatfield

2006 Final Report: Five Years of Monitoring Reconstructed Freshwater Tidal Wetlands in the Urban Anacostia River (2000 – 2004). Patuxent Wildlife Research Center, Laurel, MD. (http://www.pwrc.usgs.gov/resshow/hammerschlag/anacostia.cfm). 101 pp.

Krafft, C. C., R. S. Hammerschlag, and G. R. Guntenspergen

2009 Anacostia River Fringe Wetlands Restoration Project: Final report for the five-year monitoring program (2003 through 2007). Watershed Protection Division, District Department of the Environment, Washington, D.C., DDOE-WPD-1:1.

Neff, K.P.

2002 Plant colonization and vegetation change in a restored tidal freshwater wetland in Washington, D.C. M.S. Thesis. University of Maryland, College Park, MD.

SAS

2003 Statistical Analysis System, Version 9.1. SAS Institute Inc., Cary, NC.

USDA, NRCS

2009 The PLANTS Database (http://plants.usda.gov, 22 February 2009). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

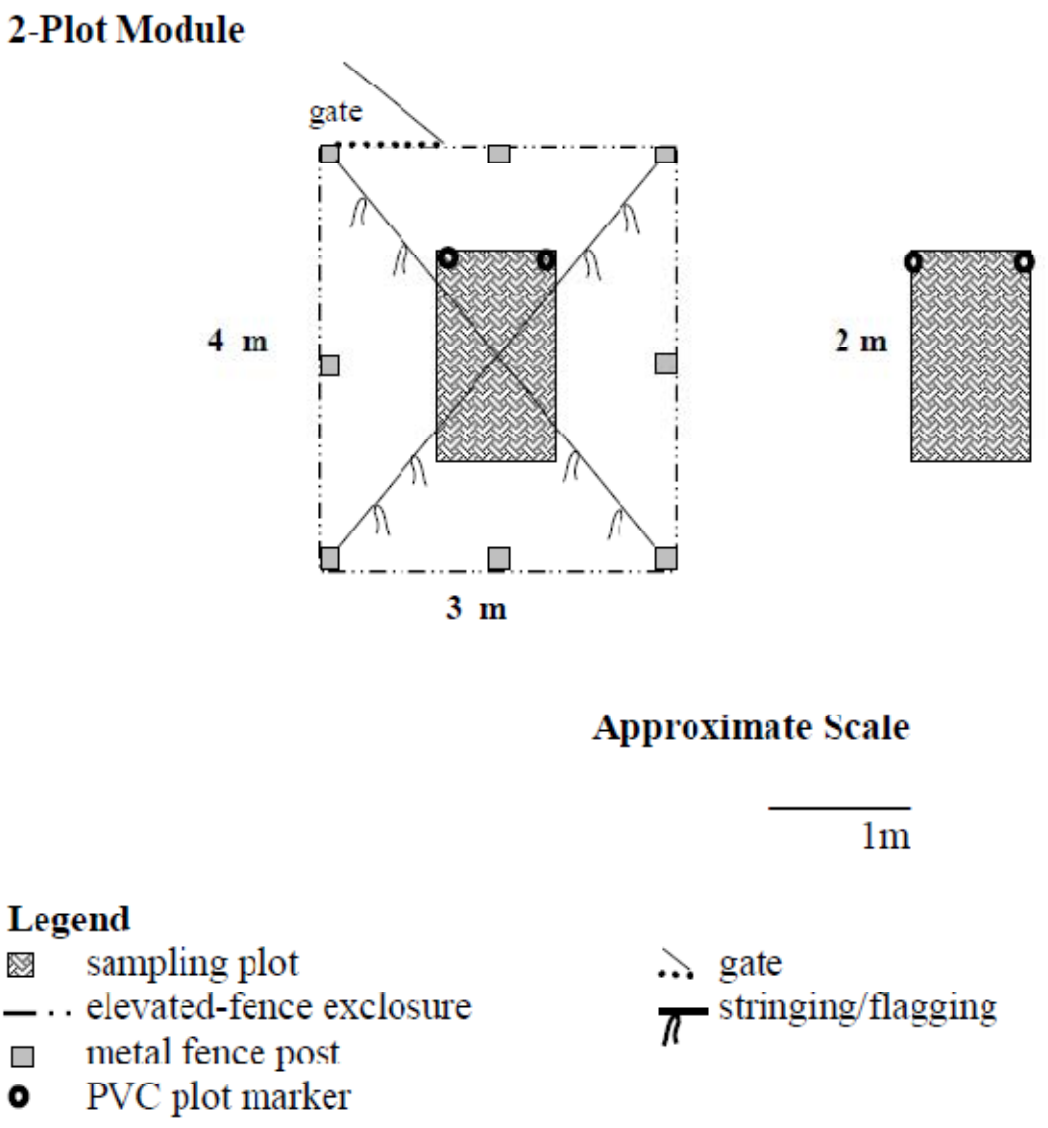

FIGURE C-1: SCHEMATIC DIAGRAM OF AN EXPERIMENTAL MODULE FROM AN AERIAL VIEW. THE MODULE CONSISTS OF ONE ELEVATED-FENCED EXCLOSURE PLOT AND ONE UNFENCED CONTROL PLOT.

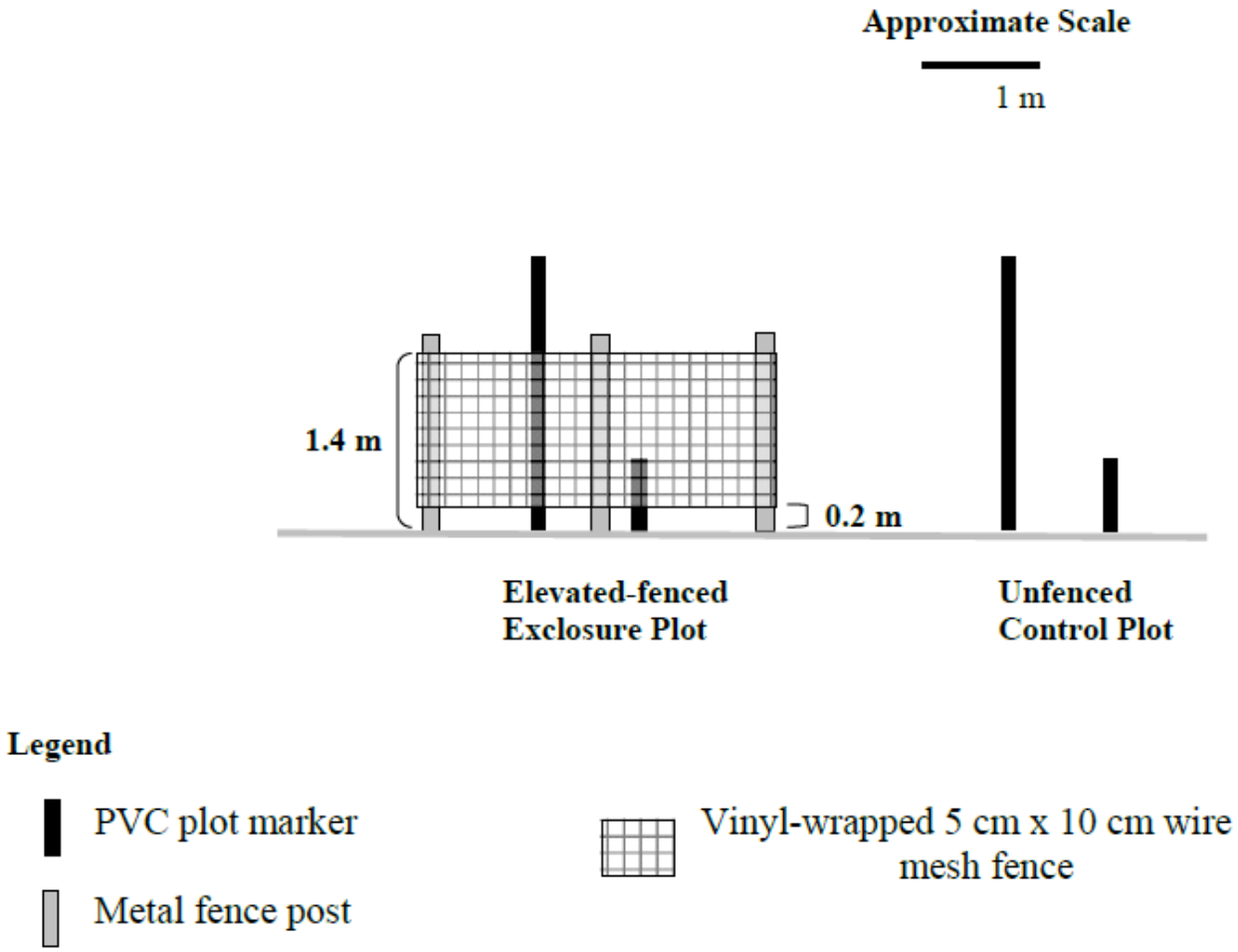

FIGURE C-2: SCHEMATIC DIAGRAM OF AN EXPERIMENTAL MODULE FROM A SIDE VIEW.

APPENDIX D: PLANT SPECIES LIST

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TABLE D-1: LIST OF SPECIES PLANTED FOR ANACOSTIA MARSH RECONSTRUCTION

Common Name	Scientific Name	Notes
High Marsh Plants		
Buttonbush	*Cephalanthus occidentalis*	
Marsh hibiscus	*Hibiscus moscheutos*	
Rice cutgrass	*Leersia oryzoides*	Struggled initially; recovered later
Lizard's tail	*Saururus cernuus*	Did not survive for very long
Mid-Marsh Plants		
Water plantain	*Alisma plantago-aquatic*	Did not survive for very long
Tussock sedge	*Carex stricta*	
Blue flag	*Iris versicolor*	Did not survive for very long
Arrow arum	*Peltandra virginica*	
Smartweed species	*Polygonum* spp.	
Pickerelweed	*Pontedaria cordata*	
Duck potato	*Sagittaria latifolia*	
Common three-square	*Scirpus americanus*	Did not survive for very long
Soft-stem bulrush	*Scirpus validus*	
Lesser bur-reed	*Sparganium americanum*	Did not survive for very long
Giant bur-reed	*Sparganium eurycarpum*	Did not survive for very long
Low Marsh Plants		
Spatterdock	*Nuphar advena*	
Volunteer Plants		
Red maple	*Acer rubrum*	
Beggar-ticks	*Bidens* sp.	
Sedge species	*Carex* spp.	
Spike rush species	*Eleocharis* spp.	
Rice cutgrass	*Leersia oryzoides*	
Purple loosestrife	*Lythrum salicaria*	
Common reed grass	*Phragmites australis*	
Smartweed species	*Polygonum* spp.	
Cottonwood	*Populus deltoides*	
Duck potato	*Sagittaria latifolia*	
Willow species	*Salix* sp.	
Narrow-leaved cattail	*Typha angustifolia*	
Broad-leaved cattail	*Typha latifolia*	
Wild rice	*Zizania aquatica*	

TABLE D-2: PLANT SPECIES USED FOR WETLAND AND GOOSE MANAGEMENT TECHNIQUES THAT ARE LESS PALATABLE TO CANADA GEESE

Common Name	Scientific Name	Type of Plant
Yellow pond lily	*Nuphar advena*	Herbaceous
Arrow arum	*Peltandra virginica*	Herbaceous
Soft-stem bulrush	*Schoenoplectus tabermontanae*	Herbaceous
Soft rush	*Juncus effusus*	Herbaceous
Broad-leaved cattail	*Typha latifolia*	Herbaceous
Rice cutgrass	*Leersia oryzoides*	Herbaceous
Water purslane	*Ludwigia palustris*	Herbaceous
Swamp milkweed	*Asclepias incarnata*	Herbaceous
Common button bush	*Cephalanthus occidentalis*	Woody
Swamp rose	*Rosa palustris*	Woody
Crimsoneyed rosemallow	*Hibiscus moscheutos*	Woody
Southern arrowood	*Viburnum spp.*	Woody
Shrub dogwood	*Cornus spp.*	Woody
Willow species	*Salix spp.*	Woody

APPENDIX E: SPECIES LISTS

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TABLE E-1: PLANT AND ANIMAL LISTS

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
PLANTS				
Acalypha rhomboidea	Rhombic cooperleaf or three-seeded	--	--	--
Acer negundo	Box elder	--	--	--
Acer rubrum	Red maple	--	--	--
Agrostis gigantean	Redtop bentgrass	--	--	--
Ailanthus altissima	Tree-of-heaven	--	--	--
Alisma platago	Water plantain	--	--	--
Allium canadense	Wild garlic	--	--	--
Allium vineale	Field garlic	--	--	--
Alnus serrulata	Smooth alder	--	--	--
Alopecurus carolinianus	Carolina foxtail	--	--	--
Amaranthus hydrides	smooth pigweed	--	--	--
Amaranthus retroflexus	rough pigweed	--	--	--
Amaranthus sp.	Water hemp	--	--	--
Amorpha fruticosa	False indigo	--	--	--
Ampelamus albidus	Sandvine or honeyvine	--	--	--
Ampelopsis brevipedunculata	Porcelain berry	--	--	--
Anagallis arvensis	Scarlet pimpernel	--	--	--
Asclepias incarnata	Swamp milkweed	--	--	--
Asclepias syriaca	Common milkweed	--	--	--
Arabidopsis thaliana	Mouse-ear cress	--	--	--
Artemisia annua	Annual wormwood	--	--	--
Artemisia vulgaris	Mugwort or wormwood	--	--	--
Aster lanceolatus	Eastern lined aster	--	--	--
Betula nigra	River birch	--	--	--
Bidens frondosa	Beggar-ticks	--	--	--
Bidens spp.	Stick-tight	--	--	--
Boehmeria cylindrica	False nettle	--	--	--
Bromus japonicus	Japanese chess	--	--	--
Bromus wildenowii	Rescue grass	--	--	--
Calystegia sepium	Hedge bindweed	--	--	--
Carex shortiana	Short's sedge	G5	S2	E
Carex stipata	Crowded sedge	--	--	--
Carex stricta	Tussock sedge	--	--	--
Carex vulpinoidea	Foxtail sedge	--	--	--
Cedrus atlantica	Atlas cedar	--	--	--
Cephalanthus occidentalis	Buttonbush	--	--	--
Chaenorrhinum minus	Lesser toadflax	--	--	--
Chaerophyllum procumbens	Spreading chervil	--	--	--
Chenopodium album	Lamb's quarters	--	--	--
Chenopodium ambrosioides	Mexican tea	--	--	--
Cicuta maculata	Common water hemlock	--	--	--
Clematis terniflora	Yarn-leaved clematis	--	--	--
Cuscuta gronovii	Common dodder	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Cuscuta pentagona	Field-dodder or five-angled dodder	--	--	--
Cynodon dactylon	Bermuda grass	--	--	--
Cyperus erythrorhizos	Red-rooted galingale	--	--	--
Cyperus esculentus	Yellow nutsedge	--	--	--
Cyperus iria	Yellow cyperus	--	--	--
Datura stramonium	Jimson weed	--	--	--
Daucus carota	Queen anne's lace	--	--	--
Desmanthus illinoensis	Bundleflower or prairie mimosa	--	--	--
Echinochloa crusgalli	A barnyard grass	--	--	--
Eclipta prostrate	Yerba-de-tajo	--	--	--
Eleocharis engelmannii	Engelmann's spikerush	G4?	S3	--
Eleocharis sp.	Spike rush	--	--	--
Elymus virginicus	Virginia wild-rye	--	--	--
Elytrigia repens	Quackgrass	--	--	--
Erianthus ravennae	Ravenna plume grass	--	--	--
Erigeron annus	Annual or daisy fleabane	--	--	--
Eupatorium altissimum	Tall eupatorium	G5	S3	--
Euphorbia maculata	Milk or spotted purslane	--	--	--
Galium aparine	Cleavers bedstraw	--	--	--
Galium pedmontanum	A bedstraw	--	--	--
Geum canadense	White avens	--	--	--
Hemerocallis fulva	Common day lily	--	--	--
Helenium autumnale	Yellow sneezeweed	--	--	--
Hibiscus laevis	Halberd-leaved rose mallow	G5	S3	--
Hibiscus moscheutos	Rose mallow	--	--	--
Hibiscus syriacus	Rose of Sharon	--	--	--
Hordeum pusillum	Little barley	--	--	--
Humulus japonicus	Japanese hop	--	--	--
Impatiens capensis	Jewelweed or orange touch-me-not	--	--	--
Ipomoea coccinea	Red morning glory	--	--	--
Ipomoea hederacea	Ivy-leaved morning-glory	--	--	--
Ipomoea lacunosa	Small-flowered morning-glory	--	--	--
Ipomoea purpurea	Common morning-glory	--	--	--
Iris pseudacorus	Yellow iris	--	--	--
Iris versicolor	Blue flag	--	--	--
Juncus acuminatus	Narrow-flowered rush	--	--	--
Juncus effuses	Soft rush	--	--	--
Justica americana	American water-willow	--	--	--
Leersia oryzoides	Rice cutgrass	--	--	--
Lepidium campestre	Field cress	--	--	--
Lepidium virginicum	Poor-man's pepper	--	--	--
Lespedeza cuneata	Chinese lespedeza	--	--	--
Lespedeza stipulacea	Korean bushclover	--	--	--
Lonicera japonica	Japanese honeysuckle	--	--	--
Lycium barbarum	Chinese matrimonyvine	--	--	--
Lysimachia ciliata	Fringed loosestrife	--	--	--
Lythrum salicaria	Purple loosestrife	--	--	--
Malva neglecta	Common mallow or chesses	--	--	--
Matricicaria recutita	Wild chamomile	--	--	--
Mazus pumilus	Japanese mazus	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Medicago lupulina	Black medick	--	--	--
Melilotus alba	White sweet clover	--	--	--
Melilotus officinalis	Yellow sweet clover	--	--	--
Monarda fistulosa	Wild bergamot	--	--	--
Muhlenbergia schreberi	Nimbleweed	--	--	--
Nelumbo lutea	American lotus	--	--	--
Nuphar advena	Spatterdock	--	--	--
Oenothera biennis	Common evening primrose	--	--	--
Peltandra virginica	Arrow arum	--	--	--
Phleum pratense	Timothy grass	--	--	--
Phragmites australus	Phragmites	--	--	--
Phytolacca americana	Pokeweed	--	--	--
Pilea pumila	Clearweed	--	--	--
Plantago lanceolata	English plantain	--	--	--
Poa compressa	Canada bluegrass	--	--	--
Poa pratensis	Kentucky bluegrass	--	--	--
Polygonum aviculare	Prostrate knotweed	--	--	--
Polygonum convolvulus	Black bindweed	--	--	--
Polygonum hydropiper	Water pepper	--	--	--
Polygonum lapathifolium	Dock-leaved smartweed	--	--	--
Polygonum perfoliatum	Mile-a-minute tearthumb	--	--	--
Polygonum persicaria	Lady's thumb smartweed	--	--	--
Polygonum punctatum	Dotted smartweed	--	--	--
Pontederia cordata	Pickeral-weed	--	--	--
Populus deltoides	Cottonwood	--	--	--
Potentilla norvegica	Rough cinquefoil or strawberry weed	--	--	--
Pueraria lobata	Kudzu	--	--	--
Ranunculus sceleratus	Cursed crowfoot	--	--	--
Rorippa palustris	Common yellow water-cress	--	--	--
Rudbeckia laciniata	Cutleaf or tall coneflower	--	--	--
Rumex altissimus	Tall dock	G5	S1	E
Rumex crispus	Curly dock	--	--	--
Sagittaria latifolia	Common or broad-leaved arrowhead	--	--	--
Salix nigra	Black willow	--	--	--
Saururus cernuus	Lizard tail	--	--	--
Scirpus americanus	Olney three-square	--	--	--
Scirpus atrovirens	Black bulrush	--	--	--
Scleranthus annuus	Annual knawel	--	--	--
Scripus validus	Soft stem bulrush	--	--	--
Scutellaria lateriflora	Mad dog skullcap	--	--	--
Setaria glauca	Yellow foxtail	--	--	--
Setaria viridis	Green foxtail	--	--	--
Sibara virginica	Virginia cress	--	--	--
Sicyos angulatus	Bur cucumber	--	--	--
Silene latifolia	White champion	--	--	--
Sisymbrium officinale	Hedge mustard	--	--	--
Solanum carolinense	Horse-nettle	--	--	--
Solanum nigrum	American or black nightshade	--	--	--
Sophora japonica	Japanese pagoda tree	--	--	--
Sparganium americanum	Lesser bur-reed	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Sparganium eurycarpum	Giant bur-reed	--	--	--
Torilis arvensis	Field hedge-parsley	--	--	--
Tragopogon dublus	Fistulous goat's beard	--	--	--
Trifolium arvense	Rabbitfoot clover	--	--	--
Trifolium pratense	Red clover	--	--	--
Trifolium repens	White clover	--	--	--
Tripsacum dactyloides	Gama grass	--	--	--
Typha angustifolia	Narrow-leaved cattail	--	--	--
Typha latifolia	Broad-leaved cattail	--	--	--
Ulmus americana	American elm	--	--	--
Ulmus pumila	Siberian elm	--	--	--
Valerianella locusta	Blue corn-salad	--	--	--
Veronica peregrina	Purslane speedwell	--	--	--
Vicia angustifolia	Common vetch	--	--	--
Vitis vulpina	Winter grape	--	--	--
Wisteria frutescens	Atlantic wisteria	--	--	--
Zizania aquatica	Wild rice	--	--	--
AMPHIBIANS				
Acris crepitans	Northern cricket frog	--	--	--
Ambystoma maculaturm	Spotted salamander	--	--	--
Ambystoma opacum	Marbled salamander	--	--	--
Bufo americanus	American toad	--	--	--
Bufo woodhousii fowleri	Fowler's toad	--	--	--
Desmognathus fuscus	Northern dusky salamander	--	--	--
Eurycea bislineata bislineata	Northern two-lined salamander	--	--	--
Hemidactylium scutatum	Four-toed salamander	--	--	--
Notothalmus viridescens	Red spotted newt	--	--	--
Plethodon cinereus	Red-backed salamander	--	--	--
Pseudacris crucifer	Spring peeper	--	--	--
Pseudacris triseriata	Upland chorus frog	--	--	--
Pseudotriton ruber	Northern red salamander	--	--	--
Rana catesbeiana	Bullfrog	--	--	--
Rana clamitans melanota	Green frog	--	--	--
Rana palustris	Pickerel frog	--	--	--
Rana sylvatica	Wood frog	--	--	--
Rana utricularia	Southern leopard frog	--	--	--
	Gray treefrog	--	--	--
BRYOZOA				
Pectinella magnifica	Jelly-ball freshwater bryozoan	--	--	--
FISH				
Anguilla rostrata	American eel	--	--	--
Dorosoma cepedianum	Gizzard shad	--	--	--
Fundulus diaphanus	Banded killifish	--	--	--
Ictalurus nebulosus	Brown bullhead	--	--	--
Ictalurus punctatus	Channel catfish	--	--	--
Lepomis gibbosus	Pumpkinseed	--	--	--
Lepomis macrochirus	Bluegill	--	--	--
Lepomis megalotis	Longear sunfish	--	--	--
Micropterus salmoides	Largemouth bass	--	--	--
Morone americanus	White perch	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Notropis hudsoninus	Spottail shiner	--	--	--
	Mummichog	--	--	--
	Mosquito fish	--	--	--
	Carp	--	--	--
	Striped bass	--	--	--
LEPIDOTERA				
Ancyloxypha numitor	Least skipper	--	--	--
Atalopedes campestris	Sachem skipper	--	--	--
Boloria bellona	Meadow fritillary	--	--	--
Calycopis cecrops	Red-banded hairstreak	--	--	--
Celastrina ladon pseudargi	Spring azure	--	--	--
Celastrina ladon	Summer azure	--	--	--
Cercyonis p. pegala	Common wood nymph	--	--	--
Colias eurytheme	Orange sulphur	--	--	--
Colias philodice	Clouded sulphur	--	--	--
Danaus p. plexippus	Monarch	--	--	--
Epargyeus clarus	Silver-spotted skipper	--	--	--
Euptoieta claudia	Variegated fritillary	--	--	--
Everes comyntas	Eastern blue tailed	--	--	--
Junonia coenia	Common buckeye	--	--	--
Limenitis archippus	Viceroy	--	--	--
Nymphalis a. antiopa	Mourning cloak	--	--	--
Papilio g. glaucus	Eastern tiger swallowtail	--	--	--
Papilio polyxenes	Black swallowtail	--	--	--
Papilio troilus	Spicebush swallowtail	--	--	--
Pholisora catullus	Common sootywing	--	--	--
Pieris rapae	Cabbage white	--	--	--
Poanes zabulon	Zabulon skipper	--	--	--
Polygonia interrogationis	Question mark	--	--	--
Pontia protodice	Checkered white	--	--	--
Psyciodes tharos	Pearl crescent	--	--	--
Satyrodes appalachia	Appalachian brown	--	--	--
Vanessa atalanta	Red admiral	--	--	--
Vanessa cardui	Painted lady	--	--	--
	Silvery checkerspot	--	--	--
	Eastern comma	--	--	--
	Horace's duskywing	--	--	--
	Juvenal's duskywing	--	--	--
	Wildindigo duskywing	--	--	--
	Hackberry emperor	--	--	--
	Great spangled fritillary	--	--	--
	Variegated fritillary	--	--	--
	Little glassywing	--	--	--
	Gray hairstreak	--	--	--
	Red-spotted purple	--	--	--
	Queen	--	--	--
	Little wood satyr	--	--	--
	Hayhurst's scallopwing	--	--	--
	Broadwinged skipper	--	--	--
	Common-checkered skipper	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Crossline skipper	--	--	--
	Dun skipper	--	--	--
	Fiery skipper	--	--	--
	Ocola skipper	--	--	--
	Peck's skipper	--	--	--
	Cloudless sulphur	--	--	--
	Zebra swallowtail	--	--	--
	Checkered white	--	--	--
BIRDS				
	Bittern, American	G4	S1S2B	I
	Bittern, least	G5	S1S3B	I
	Blackbird, red-winged	--	--	--
	Blackbird, rusty	--	--	--
	Bluebird, eastern	--	--	--
	Bobolink	--	--	--
	Bunting, indigo	--	--	--
	Cardinal, northern	--	--	--
	Catbird, gray	--	--	--
	Chat, yellow-breasted	--	--	--
	Chickadee, Carolina	--	--	--
	Coot, American	--	--	--
	Cormorant, double-crested	G5	S1B	--
	Cowbird, brown-headed	--	--	--
	Creeper, brown	--	--	--
	Crow, American	--	--	--
	Crow, fish	--	--	--
	Cuckoo, black-billed	--	--	--
	Cuckoo, yellow-billed	--	--	--
	Dickcissel	G5	S2B	--
	Dove, mourning	--	--	--
	Dove, rock	--	--	--
	Dowitcher, long-billed	--	--	--
	Dowitcher, short-billed	--	--	--
	Duck, black	--	--	--
	Duck, bufflehead	--	--	--
	Duck, canvasback	--	--	--
	Duck, gadwall	--	--	--
	Duck, common goldeneye	--	--	--
	Duck, hybrid domestic	--	--	--
	Duck, long-tailed	--	--	--
	Duck, mallard	--	--	--
	Duck, oldsquaw	--	--	--
	Duck, hybrid peking	--	--	--
	Duck, northern pintail	--	--	--
	Duck, ring-necked	--	--	--
	Duck, ruddy	--	--	--
	Duck, northern shoveler	--	--	--
	Duck, blue-winged teal	--	--	--
	Duck, green-winged teal	--	--	--
	Duck, American wigeon	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Duck, wood	--	--	--
	Dunlin	--	--	--
	Eagle, American bald	G4	S2S3	T
	Egret, cattle	--	--	--
	Egret, great	--	--	--
	Egret, snowy	--	--	--
	Falcon, peregrine	G4	S1B	I
	Finch, house	--	--	--
	Finch, purple	G5	S3B	--
	Finch, yellow shafted	--	--	--
	Flicker, northern	--	--	--
	Flycatcher, acadian	--	--	--
	Flycatcher, great crested	--	--	--
	Flycatcher, least	G5	S3S4B	--
	Flycatcher, willow	--	--	--
	Flycatcher, yellow-bellied	--	--	--
	Gallinule, common	--	--	--
	Gnatcatcher, blue-gray	--	--	--
	Goldfinch, American	--	--	--
	Goose, Canada	--	--	--
	Goose, hybrid domestic	--	--	--
	Goose, greater white-fronted	--	--	--
	Goose, snow	--	--	--
	Grackle, common	--	--	--
	Grebe, eared	--	--	--
	Grebe, horned	--	--	--
	Grebe, pied-billed	G5	S2B	--
	Grebe, red-necked	--	--	--
	Grosbeak, blue	--	--	--
	Grosbeak, evening	--	--	--
	Grosbeak, rose-breasted	--	--	--
	Gull, bonaparte's	--	--	--
	Gull, franklin's	--	--	--
	Gull, greater black-backed	--	--	--
	Gull, herring	--	--	--
	Gull, laughing	G5	S1B	--
	Gull, lesser black-backed	--	--	--
	Gull, ring-billed	--	--	--
	Harrier, northern	G5	S2B	--
	Hawk, broad-winged	--	--	--
	Hawk, cooper's	--	--	--
	Hawk, red-shouldered	--	--	--
	Hawk, red-tailed	--	--	--
	Hawk, sharp-shinned	--	--	--
	Heron, back-crowned night	--	--	--
	Heron, great blue	--	--	--
	Heron, green	--	--	--
	Heron, little blue	--	--	--
	Heron, yellow-crowned night	G5	S3B	--
	Hummingbird, ruby-throated	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Ibis, glossy	--	--	--
	Jay, blue	--	--	--
	Junco, dark-eyed	G5	S2B	--
	Kestrel, American	--	--	--
	Killdeer	--	--	--
	Kingbird, eastern	--	--	--
	Kingbird, western	--	--	--
	Kingfisher, belted	--	--	--
	Kinglet, golden-crowned	G5	S2B	--
	Kinglet, ruby-crowned	--	--	--
	Lark, horned	--	--	--
	Loon, common	--	--	--
	Loon, red-throated	--	--	--
	Martin, purple	--	--	--
	Meadowlark, eastern	--	--	--
	Merganser, common	--	--	--
	Merganser, hooded	G5	S1B	
	Merganser, red-breasted	--	--	--
	Merlin	--	--	--
	Mockingbird, northern	--	--	--
	Nighthawk, common	G5	S3S4B	--
	Nuthatch, red-breasted	G5	S1B	--
	Nuthatch, white-breasted	--	--	--
	Oriole, northern Baltimore	--	--	--
	Oriole, orchard	--	--	--
	Osprey	--	--	--
	Owl, barred	--	--	--
	Owl, great horned	--	--	--
	Phalarope, northern	--	--	--
	Phalarope, red-necked	--	--	--
	Phoebe, eastern	--	--	--
	Pine siskin	--	--	--
	Pipit, american	--	--	--
	Pipit, water	--	--	--
	Plover, american golden	--	--	--
	Plover, semipalmated	--	--	--
	Quail, bobwhite common	--	--	--
	Rail, common moorhen	--	--	--
	Rail, sora	--	--	--
	Rail Virginia	--	--	--
	Robin, American	--	--	--
	Sanderling	--	--	--
	Sandpiper, least	--	--	--
	Sandpiper, pectoral	--	--	--
	Sandpiper, semipalmated	--	--	--
	Sandpiper, solitary	--	--	--
	Sandpiper, spotted	--	--	--
	Sandpiper, stilt	--	--	--
	Sandpiper, western	--	--	--
	Sandpiper, white-rumped	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Sapsucker, yellow-bellied	G5	SHB	--
	Scaup, lesser	--	--	--
	Shoveler, northern	--	--	--
	Snipe, common	--	--	--
	Sparrow, American tree	--	--	--
	Sparrow, chipping	--	--	--
	Sparrow, field	--	--	--
	Sparrow, fox	--	--	--
	Sparrow, grasshopper	--	--	--
	Sparrow, house	--	--	--
	Sparrow, lincoln's	--	--	--
	Sparrow, savannah	G5	S3S4B	--
	Sparrow, song	--	--	--
	Sparrow, swamp	--	--	--
	Sparrow, vesper	G5	S3S4B	--
	Sparrow, white-crowned	--	--	--
	Sparrow, white-throated	--	--	--
	Starling, European	--	--	--
	Stilt, black-necked	--	--	--
	Swallow, bank	G5	S3S4B	--
	Swallow, barn	--	--	--
	Swallow, cliff	--	--	--
	Swallow, rough-winged	--	--	--
	Swallow, tree	--	--	--
	Swan, tundra	--	--	--
	Swift, chimney	--	--	--
	Tanager, scarlet	--	--	--
	Teal, green-winged	--	--	--
	Teal, blue-winged	--	--	--
	Tern, Caspian	--	--	--
	Tern forester's	--	--	--
	Tern, least	G4	S2B	--
	Thrasher, brown	--	--	--
	Thrush, gray-cheeked	--	--	--
	Thrush, hermit	--	--	--
	Thrush, swainson's	--	--	--
	Thrush, veery	--	--	--
	Thrush, wood	--	--	--
	Titmouse, tufted	--	--	--
	Towhee, eastern	--	--	--
	Towhee, rufous-sided	--	--	--
	Vireo, blue-headed	--	--	--
	Vireo, red-eyed	--	--	--
	Vireo, solitary	--	--	--
	Vireo, warbling	--	--	--
	Vireo, white-eyed	--	--	--
	Vireo, yellow-throated	--	--	--
	Vulture, black	--	--	--
	Vulture, turkey	--	--	--
	Warbler, american redstart	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
	Warbler, bay-breasted	--	--	--
	Warbler, black-and-white	--	--	--
	Warbler, black-throated blue	G5	S3S4B	--
	Warbler, black-throated green	--	--	--
	Warbler, blackburnian	G5	S1S2B	--
	Warbler, blackpoll	--	--	--
	Warbler, blue-winged	--	--	--
	Warbler, canada	G5	S3B	--
	Warbler, cape may	--	--	--
	Warbler, cerulean	G4	S3S4B	--
	Warbler, chestnut-sided	--	--	--
	Warbler, common yellowthroat	--	--	--
	Warbler, connecticut	--	--	--
	Warbler, hooded	--	--	--
	Warbler, kentucky	--	--	--
	Warbler, magnolia	G5	S3S4B	--
	Warbler, nashville	G5	S1S2B	I
	Warbler, orange-crowned	--	--	--
	Warbler, ovenbird	--	--	--
	Warbler, palm	--	--	--
	Warbler, parula northern	--	--	--
	Warbler, prairie	--	--	--
	Warbler, prothonotary	--	--	--
	Warbler, wilson's	--	--	--
	Warbler, yellow	--	--	--
	Warbler, yellow-rumped	--	--	--
	Waterthrush, Louisiana	--	--	--
	Waterthrush, northern	G5	S2S3B	--
	Waxwing, cedar	--	--	--
	Wigeon, American	--	--	--
	Woodcock, American	--	--	--
	Woodpecker, downy	--	--	--
	Woodpecker, hairy	--	--	--
	Woodpecker, pileated	--	--	--
	Woodpecker, red-bellied	--	--	--
	Woodpecker, red-headed	--	--	--
	Wood-pewee, eastern	--	--	--
	Wren, carolina	--	--	--
	Wren, house	--	--	--
	Wren, marsh	--	--	--
	Wren, winter	G5	S2B	--
	Yellowlegs, greater	--	--	--
	Yellowlegs, lesser	--	--	--
MAMMALS				
Blarina brevicauda	Short-tail shrew	--	--	--
Castor canadensis	Beaver	--	--	--
Condylura cristata	Starnose mole	--	--	--
Diadelphis marsupialis	Opossum	--	--	--
Eptesicus fuscus	Big brown bat	--	--	--
Lassiurus borealis	Red bat	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Lutra canadensis lataxina	River otter	--	--	--
Marmota monax	Woodchuck	--	--	--
Microtus pennsylvanicus	Meadow vole	--	--	--
Mustela vision	Mink	--	--	--
Odocoileus virginiana	White-tailed deer	--	--	--
Ondatra zibethica	Muskrat	--	--	--
Peromyscus leucopus	White-footed mouse	--	--	--
Procyon lotor	Raccoon	--	--	--
Scalopus aquaticus	Eastern mole	--	--	--
Sciurus carolinesis	Eastern gray squirrel	--	--	--
Sylvilagus floridanus	Eastern cottontail	--	--	--
Tamias striatus	Eastern chipmunk	--	--	--
Urocyon cinereoargenteus	Gray fox	--	--	--
Vulpes vulpes	Red fox	--	--	--
MANTODEA				
Mantis religiosa	Preying mantis	--	--	--
MOLLUSKS				
Pyganodon cataracta	Eastern floater mussel	--	--	--
ODONATA				
Anax junius	Common green darner dragonfly	--	--	--
Perithemis tenera	Eastern amberwing dragonfly	--	--	--
Tramea lacerata hagen	Black saddlebag dragonfly	--	--	--
	Blue dasher	--	--	--
	Spangled skimmer	--	--	--
	Common whitetail	--	--	--
	Lilypad forktail	--	--	--
	Eastern pondhawk	--	--	--
	Slaty skimmer	--	--	--
	Widow skimmer	--	--	--
	Swamp darner	--	--	--
	Familiar bluet	--	--	--
REPTILES				
Carphophis amoenus	Eastern worn snake	--	--	--
Chelydra serpentina	Snapping turtle	--	--	--
Chrysemys p. picta	Eastern painted turtle	--	--	--
Clemmys guttata	Spotted turtle	--	--	--
Columber c. constrictor	Northern black racer snake	--	--	--
Chrysemys p. picta	Eastern painted turtle	--	--	--
Diadophis punctatus edwardsi	Northern ringneck snake	--	--	--
Elaphe o. obsoleta	Black rat snake	--	--	--
Eumeces fasciatus	Five-lined skink	--	--	--
Heterodon platyrhinos	Eastern hognose snake	--	--	--
Kinosternon s. subrubrum	Eastern mud turtle	--	--	--
Nerodia s. sipedon	Northern water snake	--	--	--
Ophedodrys aestivus	Rough green snake	--	--	--
Pseudemys rubriventris	Red-bellied turtle	--	--	--
Regina septemvittata	Queen snake	--	--	--
Sceloporus undulatus hyacinthinus	Fence lizard	--	--	--
Sternotherus odoratus	Eastern mud turtle	--	--	--
Sternotherus odoratus	Common musk turtle	--	--	--

Scientific Name	Common Name	Federal Rank	Maryland Rank[1]	Maryland Status[1,2]
Storeria d. dekayi	Northern brown snake	--	--	--
Terrapene c. carolina	Eastern box turtle	--	--	--
Thamnophis sauritis	Ribbon snake	--	--	--
Thamnophis sirtalis	Eastern garter snake	--	--	--
Trachemys scripta elegans	Red-eared slider turtle	--	--	--

[1] *The District of Columbia utilizes the species rankings adopted by the Maryland Wildlife and Heritage Service Natural Heritage Program.*

[2] *This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions as shown below have been taken from Code of Maryland Regulations (COMAR) 08.03.08.*

Global Rank	*G2*	*Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.*
	G5	*Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.*
	G?	*The species has not yet been ranked.*
State Rank	*S1*	*Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation. Species with this rank are actively tracked by the Wildlife and Heritage Service.*
	S2	*State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Wildlife and Heritage Service.*
	S3	*Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Wildlife and Heritage Service.*
	S4	*Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.*
	SH	*Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.*
	_B	*A qualifier at the end of a rank. This species is a migrant and the subrank refers only to the breeding statusof the species in Maryland. This species may have a different subrank for non-breeding populations.*
State Status	*E*	*Endangered. A species whose continued existence as a viable component of the State's flora and fauna is determined to be in jeopardy.*
	I	*In Need of Conservation. An species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.*
	T	*Threatened. A species of flora or fauna that appears likely, within the foreseeable future, to become endangered in the State.*

Source: Draft Anacostia Park GMP

TABLE E-2: INVASIVE PLANT SPECIES PREVIOUSLY TREATED AT ANACOSTIA PARK

Scientific Name	Common Name	Treatment Location
Ailanthus altissima	Tree-of-heavan	KAG, AC
Alliaria petiolata	Garlic mustard	KAG
Ampelopsis brevipedunculata	Amur peppervine	KAG, AP, AC
Arctium minus	Lesser burdock	AP
Artemisia annua	Sweet sagewort	AC
Artemisia vulgaris	Common wormwood	AP
Celastrus orbiculatus	Asian bittersweet	KAG
Chenopodium album	Lambsquarters	AP
Cichorium intybus	Chickory	AC
Clematis terniflora	Sweet autumn virginsbower	KAG, AP
Glechoma hederacea	Ground ivy	KAG, AC
Hedera helix	English ivy	KAG
Lamium amplexicaule	Henbit deadnettle	AP
Lespedeza cuneata	Sericea lespedeza	KAG
Ligustrum vulgare	European privet	KAG
Lonicera japonica	Japanese honeysuckle	KAG, AP, AC
Lonicera spp.	Honeysuckle species	KAG, AP, AC
Lythrum salicaria	Purple looestrife	KAG, AP, AC
Microstegium vimineum	Nepalese browntop	KAG, AC
Morus alba	White mulberry	AP, AC
Phragmites australis	Common reed	KAG, AP
Polygonum cuspidatum	Japanese knotweed	AP, AC
Polygonum perfoliatum	Asiatic tearthumb	KAG, AC
Pueraria lobata	Kudzu	AP, AC
Rosa multiflora	Multiflora rose	KAG, AC
Rumex crispus	Curly dock	AP
Setaria faberi	Japanese bristlegrass	KAG
Wisteria sinensis	Chinese wisteria	KAG

Note: KAG = Kenilworth Aquatic Gardens, AP = Anacostia Park, AC = Arboretum Corridor, as defined in NPS 2006

TABLE E-3: AQUATIC BIRDS OCCURRING AT ANACOSTIA PARK

Common Name	Scientific Name	Feeding Habit
Resident Over-winter Breeding Duck-Like Birds		
Bufflehead	*Bucephala albeola*	Omnivore
Canvasback	*Aythya valisineria*	Grazer
Gadwall	*Anas strepera*	Omnivore
Goldeneye	*Bucephala clangula*	Invertebrates
Mallard	*Anas platyrhynchos*	Omnivore
Oldsquaw	*Clangula hyemalis*	Invertebrates
Pintail	*Anas acuta*	Omnivore
Ringneck duck	*Aythya collaris*	Grazer
Northern shoveler	*Anas clypeata*	Omnivore
Ruddy duck	*Oxyjura jamaicensis*	Grazer
Blue-winged teal	*Anas discors*	Omnivore
Green-winged teal	*Anas crecca*	Omnivore
American widgeon	*Anas Americana*	Grazer
Wood duck	*Aix sponsa*	Grazer
Canada goose	*Branta Canadensis*	Grazer
Snow goose	*Chen caerulescens*	Grazer
Common merganser	*Mergus merganser*	Piscivore
Hooded merganser	*Lophodytes cucullatus*	Invertebrates
Red-breasted merganser	*Mergus serrator*	Piscivore
American coot	*Fulica Americana*	Grazer
Eared grebe	*Podiceps nigricollis*	Piscivore
Horned grebe	*Podiceps auritus*	Piscivore
Pied-billed grebe	*Podilymbus podiceps*	Piscivore
Red-necked grebe	*Podiceps grisegena*	Piscivore
Common loon	*Gavia immer*	Piscivore
Red-throated loon	*Gavia stellata*	Piscivore
Sora rail	*Porzana Carolina*	Omnivore
Virginia rail	*Rallus limicola*	Omnivore
Common gallinule	*Gallinula chloropus*	Omnivore

Common Name	Scientific Name	Feeding Habit
Wading Birds		
American bittern	*Botaurus lentiginosus*	Piscivore/ Invertebrates
Least bittern	*Ixobrychus exilis*	Piscivore/ Invertebrates
Cattle egret	*Bubulcus ibis*	Invertebrates
Great egret	*Casmerodius albus*	Invertebrates
Snowy egret	*Egretta thula*	Invertebrates
Black-crowned night heron	*Nycticorax nyticorax*	Piscivore/ Invertebrates
Great blue heron	*Ardea herodias*	Piscivore
Green heron	*Butorides virescens*	Piscivore/ Invertebrates
Little blue heron	*Egretta caerulea*	Piscivore/ Invertebrates
Gulls and Terns		
Herring gull	*Larus argentatus*	Omnivore
Laughing gull	*Larus atricilla*	Piscivore
Ring-billed gull	*Larus delawarensis*	Omnivore
Caspian tern	*Sterna caspia*	Piscivore
Forsters tern	*Sterna forsteri*	Piscivore
Least tern	*Sterna antillarum*	Piscivore
Sandpipers		
Dunlin	*Calidris alpina*	Invertebrates
Sanderling	*Calidris alba*	Invertebrates
Least sandpiper	*Calidris minutilla*	Invertebrates
Pectoral sandpiper	*Calidris melanotos*	Invertebrates
Semipalmated		
sandpiper	*Calidris pusilla*	Invertebrates
Solitary sandpiper	*Tringa solitaria*	Invertebrates
Spotted sandpiper	*Acitis macularia*	Invertebrates
Stilt sandpiper	*Calidris himantopus*	Invertebrates
Blackbirds		
Red-ringed blackbird	*Agelaius phoeniceus*	Omnivore
Rusty blackbird	*Euphagus carolinus*	Omnivore
Other Species		
Double-crested cormorant	*Phalacrocorax auritus*	Piscivore
Belted kingfisher	*Ceryle alcyon*	Piscivore
Osprey	*Pandion haliaetus*	Piscivore

TABLE E-4: LIST OF SPECIES OF GREATEST CONSERVATION NEED THROUGH THE DISTRICT WILDLIFE ACTION PLAN IN THE DISTRICT OF COLUMBIA

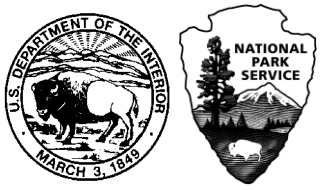
Common Name	Scientific Name
Birds	
Acadian Flycatcher	*Empidonax virescens*
American Bittern	*Botaurus lentiginosus*
American Black Duck	*Anas rubripes*
American Woodcock	*Scolopax minor*
Bald Eagle	*Haliaeetus leucocephalus*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Bobolink	*Dolichonyx oryzivorus*
Broad-winged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*
Cerulean Warbler	*Dendroica cerulean*
Chimney Swift	*Chaetura pelagica*
Eastern Meadowlark	*Sturnella magna*
Eastern Towhee	*Pipilo erythrophthalmus*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Great Horned Owl	*Bubo virginianus*
Hooded Warbler	*Wilsonia citrine*
Kentucky Warbler	*Oporornis formosus*
Least Bittern	*Ixobrychus exilis*
Louisiana Waterthrush	*Seiurus motacilla*
Marsh Wren	*Cistothorus palustris*
Northern Bobwhite	*Colinus virginianus*
Ovenbird	*Seiurus aurocapilla*
Prothonotary Warbler	*Protonotaria citrea*
Red-shouldered Hawk	*Buteo lineatus*
Scarlet Tanager	*Piranga olivacea*
Sora	*Porzana carolina*
Virginia Rail	*Rallus limicola*
White-eyed Vireo	*Vireo griseus*
Wilson's Snipe	*Gallinago delicata*
Wood Duck	*Aix sponsa*
Wood Thrush	*Hylocichla mustelina*

Common Name	Scientific Name
Worm-eating Warbler	*Helmitheros vermivorus*
Yellow-throated Vireo	*Vireo flavifrons*
Mammals	
Allegheny Woodrat	*Neotoma magister*
American Mink	*Mustela vison*
Eastern Chipmunk	*Tamias striatus*
Eastern Cottontail	*Sylvilagus floridanus*
Eastern Red Bat	*Lasiurus borealis*
Eastern Small-footed Myotis	*Myotis lebii*
Gray Fox	*Urocyon cinereoargenteus*
Northern River Otter	*Lutra canadensis*
Southern Bog Lemming	*Synaptomys cooperi*
Southern Flying Squirrel	*Glaucomys volans*
Virginia Opossum	*Didelphis virginiana*
Reptiles	
Bog Turtle	*Clemmys muhlenbergii*
Common Musk Turtle	*Sternotherus odoratus*
Corn Snake	*Elaphe guttata guttata*
Eastern Box Turtle	*Terrapene carolina*
Eastern Fence Lizard	*Sceloporus undulates*
Eastern Garter Snake	*Thamnophis sirtalis*
Eastern Hognose Snake	*Heterodon platirhinos*
Eastern Mud Turtle	*Kinosternon subrubrum*
Eastern Painted Turtle	*Chrysemys picta picta*
Eastern Ribbon Snake	*Thamnophis sauritus*
Eastern Worm Snake	*Carphophis amoenus amoenus*
Five-lined Skink	*Eumeces fasciatus*
Northern Black Racer	*Coluber constrictor*
Northern Brown Snake	*Storeria dekayi*
Northern Copperhead	*Agkistsrodon contortrix*
Northern Ringneck Snake	*Diadophis punctatus edwardsii*
Queen Snake	*Regina septemvittata*
Redbelly Turtle	*Pseudemys rubriventris*
Rough Green Snake	*Opheodrys aestivus*
Scarlet Snake	*Cemophora coccinea copei*
Spotted Turtle	*Chrysemys guttata*

Common Name	Scientific Name
Timber Rattlesnake	*Crotalus horridus*
Wood Turtle	*Clemmys inscuplta*
Amphibians	
American Toad	*Bufo americanus*
Bullfrog	*Rana catesbeiana*
Fowler's Toad	*Bufo fowleri*
Marbled Salamander	*Ambystoma opacum*
Eastern Mud Salamander	*Pseudotriton m. montanus*
Northern Cricket Frog	*Acris crepitans*
Northern Dusky Salamander	*Desmognathus fuscus*
Northern Spring Peeper	*Pseudacris crucifer*
Northern Two-lined Salamander	*Eurycea bislineata*
Pickerel Frog	*Rana palustris*
Northern Red Salamander	*Pseudotriton rubber ruber*
Redback Salamander	*Plethodon cinereus*
Red Spotted Newt	*Notophthalmus viridescens*
Spotted Salamander	*Ambystoma maculatum*
Upland Chorus Frog	*Pseudacris feriarum feriarum*
Wood Frog	*Rana sylvatica*
Fish	
Alewife	*Alosa pseudoharengus*
American Eel	*Anguilla rostrata*
American Shad	*Alosa sapidissima*
Atlantic Sturgeon	*Acipenser oxyrhynchus*
Blueback Herring	*Alosa aestivalis*
Bowfin	*Amia calva*
Central Stoneroller	*Campostoma anomalum*
Greenside Darter	*Etheostoma blennioides*
Hickory Shad	*Alosa mediocris*
Shortnosed Sturgeon	*Acipenser brevirostrum*
Silverjaw Minnow	*Ericymba buccata*
Warmouth	*Lepomis gulosus*
Invertebrates	
A Copepod	*Acanthocyclops columbiensis*
A Copepod	*Acanthocyclops villosipes*
A Copepod	*Attheyella (Canthocamptus) illiniosensis*

Common Name	Scientific Name
A Copepod	*Attheyella (Mrazekiella) illiniosensis*
A Copepod	*Attheyella (Mrazekiella) obatogamensis*
A Copepod	*Bryocamptus hutchinsoni*
A Copepod	*Bryocamptus minutus*
A Copepod	*Bryocamptus nivalis*
A Copepod	*Bryocamptus zschokkei*
A Copepod	*Diacyclops harryi*
A Copepod	*Diacyclops nearcticus*
A Copepod	*Eucyclops agilis*
A Copepod	*Macrocyclops albidus*
A Copepod	*Paracyclops fFimbriatus chiltoni*
Alewife Floater	*Anodonta implicata*
Appalachian Grizzled Skipper	*Pyrgus wyandot*
Appalachian Spring Snail	*Fontigens bottimeri*
Brook Floater	*Alasmidonta varicosa*
Crossline Skipper Butterfly	*Polites origenes*
Dwarf Wedgemussel	*Alasmidonta heterodon*
Eastern Comma Butterfly	*Polygonia comma*
Eastern Pondmussel	*Ligumia nasuta*
Edward's Hairstreak	*Satyrium edwardsii fontigens bottimeri*
Emerald Spreadwing	*Lestes dryas*
Fine-lined Emerald	*Somatochlora filosa*
Frosted Elfin	*Callophrys irus*
Great Spangled Fritillary Butterfly	*Speyeria cybele*
Green Floater	*Lasmigona subviridis*
Grey Petaltail	*Tachopteryx thoreyi*
Hay's Spring Amphipod	*Sygobromus hayi*
Kenk's Amphipod	*Stygobromus kenki*
Lilypad Forktail Damselfly	*Ischnura kellicotti williamsoni*
Little Glassywing Butterfly	*Pompeius verna*
Mocha Emerald Dragonfly	*Somatochlora linearis*
Monarch Butterfly	*Danaus p. plexippus*
Mottled Duskywing	*Erynnis martialis*
Pizzini's Cave Amphipod	*Stygobromus pizzinii*
Potomac Groundwater Amphipod	*Stygobromus tenuis potomacus*
Question Mark Butterfly	*Polygonia interrogationis*

Common Name	Scientific Name
Red Admiral Butterfly	*Vanessa atalanta rubria*
Regal Fritillary Butterfly	*Speyeria idalia*
Sedge Sprite	*Nehalennia irene*
Sphagnum Sprite	*Nehalennia gracilis*
Spiny-foot Copepod	*Attheyella villosipes*
Tidewater Mucket	*Leptodea ochracea*
Tiger Spiketail Dragonfly	*Cordulegster errones*
Triangle Floater	*Alasmidonta undulata*
Unicorn Clubtail Dragonfly	*Arigomphus villosipes*
Variegated Fritillary Butterfly	*Euptoieta claudia*
Yellow Lampmussel	*Lampsilis cariosa*



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

(2011)