National Park Service
U.S. Department of the Interior

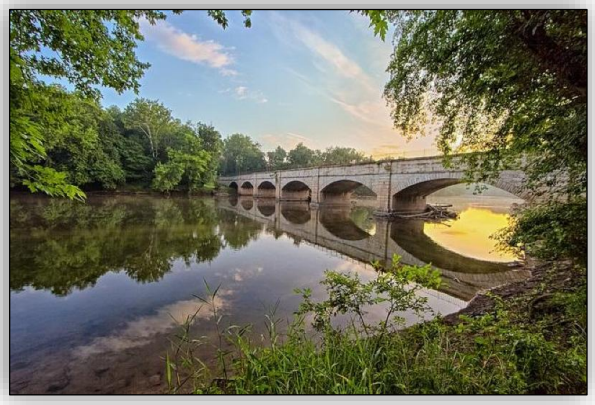
National Capital Region

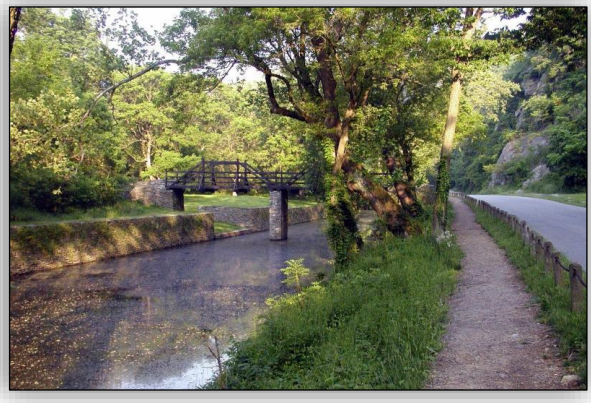
ENVIRONMENTAL ASSESSMENT FOR THE

WETLAND RESTORATION ACTION PLAN

FOR

CATOCTIN MOUNTAIN PARK
CHESAPEAKE & OHIO CANAL NATIONAL HISTORICAL PARK
HARPERS FERRY NATIONAL HISTORICAL PARK
MONOCACY NATIONAL BATTLEFIELD



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PROJECT SUMMARY

The National Park Service's (NPS) National Capital Region (NCR) is preparing this Wetland Restoration Action Plan (WRAP) and Environmental Assessment (EA) for four parks within the NCR: Chesapeake & Ohio Canal National Historical Park (C&O Canal NHP), Monocacy National Battlefield (Monocacy NB), Harpers Ferry National Historical Park (Harpers Ferry NHP), and Catoctin Mountain Park (Catoctin MP).

The purpose of the WRAP is to provide a comprehensive approach to restoring, enhancing, and/or protecting wetlands, waterways, and riparian habitats (collectively referred to as 'wetlands') at the four NCR parks when mitigation opportunities arise in the future. The approach would prioritize areas and provide specific applications to deal with individual wetland resources and deficiencies. The WRAP is needed to provide guidance to park managers so that they may set priorities to restore, enhance, and/or protect existing wetlands; inform project implementation permit requirements and guide where mitigation requirements could occur; identify wetlands areas to implement restoration/enhancement activities; track the "functional gains" on wetlands and floodplains; protect resources from continued degradation; assess wetland baseline conditions; prioritize potential wetland enhancement projects; provide a step-by-step framework for park managers to complete projects; and to minimize or eliminate non-climate induced stressors on wetland systems.

Two alternatives were analyzed in this EA, a no action alternative (alternative A) and an action alternative (alternative B). The no action alternative would be the continuation of the current management of the four parks' wetland/stream resources. Alternative B is the NPS preferred alternative that provides a comprehensive approach to restoring, enhancing, and/or protecting wetlands, waterways, and riparian habitats at the four NCR parks when opportunities or mitigation needs arise. Forty-two potential sites were identified within the four NCR parks for potential restoration under alternative B. Proposed restoration actions under alternative B include invasive species control, native plantings/riparian buffer enhancement, restoration of natural hydrology, increasing fish passage, converting open water to vegetated wetlands, full channel restoration, increasing aesthetics or educational value, and agricultural/disturbance exclusion fencing. When faced with construction projects that may negatively affect park resources, the NPS will be able to refer to the recommendations in alternative B when determining priorities for restoration.

Resources that were analyzed in this EA included wetlands and floodplains, vegetation, wildlife and wildlife habitat, and cultural resources (historic structures and districts, cultural landscapes, and archeological resources). Under the no action alternative, current wetland management in the parks is limited and the parks manage their wetland resources as issues arise. Invasive species removal and native planting is the main action performed at the parks to manage wetlands. These limited management actions would continue at the parks under the no action alternative and in the long term, wetlands, vegetation, and wildlife/wildlife habitat would benefit from these actions but on a limited basis. Restoration techniques included under alternative B such as converting open water to vegetated wetlands, increasing fish passage, full channel restoration, and restoration of natural hydrology would result in short-term adverse impacts on wetlands, vegetation, and wildlife/wildlife habitat due to resource disturbance from the use of heavy equipment. However, in the long term, the restoration techniques would result in beneficial impacts by enhancing existing vegetation, improving the function and health of streams, preventing disturbance of the wetlands thus allowing more native vegetation to establish, and providing for a more diverse wildlife habitat. Adverse impacts are expected on archeological resources from all restoration techniques recommended under alternative B. Adverse impacts on cultural landscapes/historic property would occur from converting open water to vegetated wetlands, increasing fish passage, full channel restoration, placement of educational signs, and exclusion fencing and barriers. However, the parks would consult with NPS Cultural Resource Specialists prior to work being done and the Programmatic Agreement

identifies avoidance, minimization, and mitigation measures for potential adverse effects to any historic properties. The determination of effects under this alternative could result in an *adverse effect*.

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ARPA	Archeological Resources Protection Act
ASMIS	Archeological Sites Management Information System
BMP	Best Management Practice
Catoctin MP	Catoctin Mountain Park
C&O Canal NHP	Chesapeake & Ohio Canal National Historical Park
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLI	Cultural Landscape Inventory
DC	District of Columbia
DEP	Department of Environmental Protection
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
GIS	Geographic Information Systems
Harpers Ferry NHP	Harpers Ferry National Historical Park
LSC	List of Classified Structures
MHT	Maryland Historic Trust
Monocacy NB	Monocacy National Battlefield
NCR	National Capital Region
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
PA	Programmatic Agreement
RDA	Recreational Demonstration Area
SAIP	Systemwide Archeological Inventory Program
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load

USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WIP	Watershed Implementation Plan
WPA	Works Progress Administration
WRAP	Wetland Restoration Action Plan
WSSC	Washington Suburban Sanitary Commission

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PURPOSE OF AND NEED FOR ACTION

PURPOSE AND NEED

The National Park Service's (NPS) National Capital Region (NCR) is preparing this Wetland Restoration Action Plan (WRAP) and Environmental Assessment (EA) for four parks within the NCR:

- Chesapeake & Ohio Canal National Historical Park (C&O Canal NHP)
- Monocacy National Battlefield (Monocacy NB)
- Harpers Ferry National Historical Park (Harpers Ferry NHP)
- Catoctin Mountain Park (Catoctin MP)

This WRAP/EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) and its implementing regulations (40 CFR 1500-1508); the Department of the Interior's NEPA regulations (43 CFR Part 46); and the NPS Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-Making (DO-12 2011) and accompanying NPS NEPA Handbook (2015).

PROJECT PURPOSE

The purpose of this WRAP is to provide a comprehensive approach to restoring, enhancing, and/or protecting wetlands, waterways, and riparian habitats (collectively referred to as 'wetlands') at the four NCR parks when mitigation opportunities arise in the future. The approach would prioritize areas and provide specific applications to deal with individual wetland resources and deficiencies.

NEED FOR THE ACTION

The WRAP is needed to provide guidance to park managers so that they may:

- Set priorities to restore, enhance, and/or protect existing wetlands based on the overall quality of the wetland or riparian area based on their functions and values
- Inform any permit requirements (at the time of project implementation) from NPS resource managers, U.S. Army Corps of Engineers (USACE) and/or other State regulatory agencies (as required) and guide where mitigation requirements could occur when wetlands are either damaged or lost due to construction projects by either NPS or outside agency
- Identify wetlands areas to implement restoration/enhancement activities when other opportunities arise (i.e., available funding, park priorities, volunteer groups)
- Assist the parks to track the "functional gains" on wetlands and floodplains and outlines their overall contribution to the Chesapeake Bay Watershed protection
- Protect the parks' resources from continued degradation from increased stream erosion and other hydraulic influences
- Assess baseline conditions of the parks' wetlands, internal and external influences on wetlands, and potential future threats
- Prioritize potential wetland enhancement projects based on the function and value benefits that can be expected, cost, ease of site access to complete the project, and potential impacts on cultural resources

- Provide a step-by-step framework for park managers to complete projects once funding is secured, including permit requirements, consultations that should occur, and design ideas
- Minimize or eliminate non-climate induced stressors on wetland systems in order to strengthen natural responses or adaptations to climate-change effects; restore degraded wetland conditions that, if left alone, would compound the adverse effects of climate change; and by restoring wetland systems, optimize the opportunities for managers to select the best management strategies (ranging from fighting adverse climate change effects to facilitating the new-normal conditions produced by climate change)

The specific need for a WRAP at each of the four NCR parks is presented below:

Chesapeake & Ohio National Historical Park

- Little information about the park's wetlands exist other than the National Wetlands Inventory data, which is known to significantly under-represent total wetland acreage at the park and misrepresents some types of wetlands.
- Wetlands at the park are degraded by a variety of anthropogenic impacts including adjacent land development, park facility development, invasive exotic species, public infrastructure demands, changes in hydrology and water quality, and recreational uses. Some of these factors are known to have affected several springs and seeps and have likely caused disturbance to other wetlands that have not yet been detected.
- Many historic and culturally sensitive structures, such as culverts and towpath infrastructure, are threatened and impacted from increased stream erosions.
- Increased development throughout the watershed has increased storm flows within stream channels, leading to degraded stream channels and an increased sediment and nutrient supply that are impacting receiving waters such as the Potomac River.
- Wetlands adjacent to agricultural fields have been impacted by agricultural practices by disturbing the wetlands natural vegetation, soils, and hydrology, which typically leads to decreased functions and values of the wetlands.

Monocacy National Battlefield

- Many of the wetlands and waterways observed throughout the park have been impacted by decades of agricultural practices including removal of riparian buffers along the stream channels that have led to increased channel incision and bank erosion. This channel degradation can cause increased sediment loads throughout the watershed decreasing water quality. Channel incision also leads to decreased stream habitat quality and fish passage issues.
- Wetlands within and along the edges of agricultural fields have been cleared of vegetation, replanted with agricultural crop, and repeatedly tilled. These wetlands are typically severely degraded through agricultural practice.
- Agricultural land use, as well as other development within and near the park, has altered the natural hydrology of the wetlands often resulting in the draining of historic wetlands or even increasing the water levels, which flood vegetated wetlands and creates open water ponds.

Harpers Ferry National Historical Park

- The park has a mix of issues similar to the other parks including impacts to wetlands and streams from agricultural practices, impounding of streams and wetlands, increased development of the watershed, introduction of invasive species resulting in decreased diversity and habitat, and under designed culverts.

Catoctin Mountain Park

- Although limited development occurs within the park, some of the parking areas and roadways have altered the hydrology of the streams and increased surface runoff causing some bank erosion and sedimentation within the stream channels.
- Multiple culverts throughout the park appear to be either undersized and/or misaligned resulting in increased bed and bank degradation to the stream channels.
- Invasive species occur within many wetlands at the park resulting in decreased plant diversity and decreased habitat value of the wetlands.
- In some areas of the park, historic land use includes impounding historic vegetated wetlands and streams creating open water ponds.
- A few historic and culturally sensitive structures, such as culverts and a well pump house, are threatened and impacted from increased stream erosion.

CHESAPEAKE BAY WATERSHED

Four parks that are participating in this project lie within the Chesapeake Bay Watershed. They are subject to the U.S. Environmental Protection Agency (USEPA) requirement that federal landowners must help reduce impacts to the Chesapeake Bay. These parks are working with state and county offices on implementation of Bay Watershed Implementation Plans (WIPs), required by Executive Order 13508, to show efforts being made to enhance the larger watershed. As an added benefit to the purpose and need of the WRAP, the WRAP will help the parks understand the steps that can be taken to meet the larger objective which is to track “functional gains” on wetlands and floodplains and will provide a document outlining the parks’ plans to contribute to the Chesapeake Bays protection. In addition, when faced with construction projects the parks, NPS’s Water Resource Division, USACE, and State regulatory agency staff will be able to refer to the recommendations in the WRAP when determining priorities for restoration.

The WIPs are the roadmap for how the Chesapeake Bay jurisdictions, in partnership with federal and local governments, will achieve the Chesapeake Bay Total Maximum Daily Load (TMDL) allocations. Bay jurisdictions including Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia and the District of Columbia (DC). The TMDL is a historic and comprehensive "pollution diet" to restore clean water in the Chesapeake Bay and the region's streams, creeks, and rivers by reducing nitrogen, phosphorus, and sediment.

PROJECT AREA

Figure 1 presents the locations of the four NCR parks participating in this WRAP. The four parks lie within the Chesapeake Bay watershed and all are listed on the National Register of Historic Places (NRHP), the official list of the Nation’s historic places worthy of preservation. Monocacy NB is also listed as a National Historic Landmark (NHL), designated for its national significance.

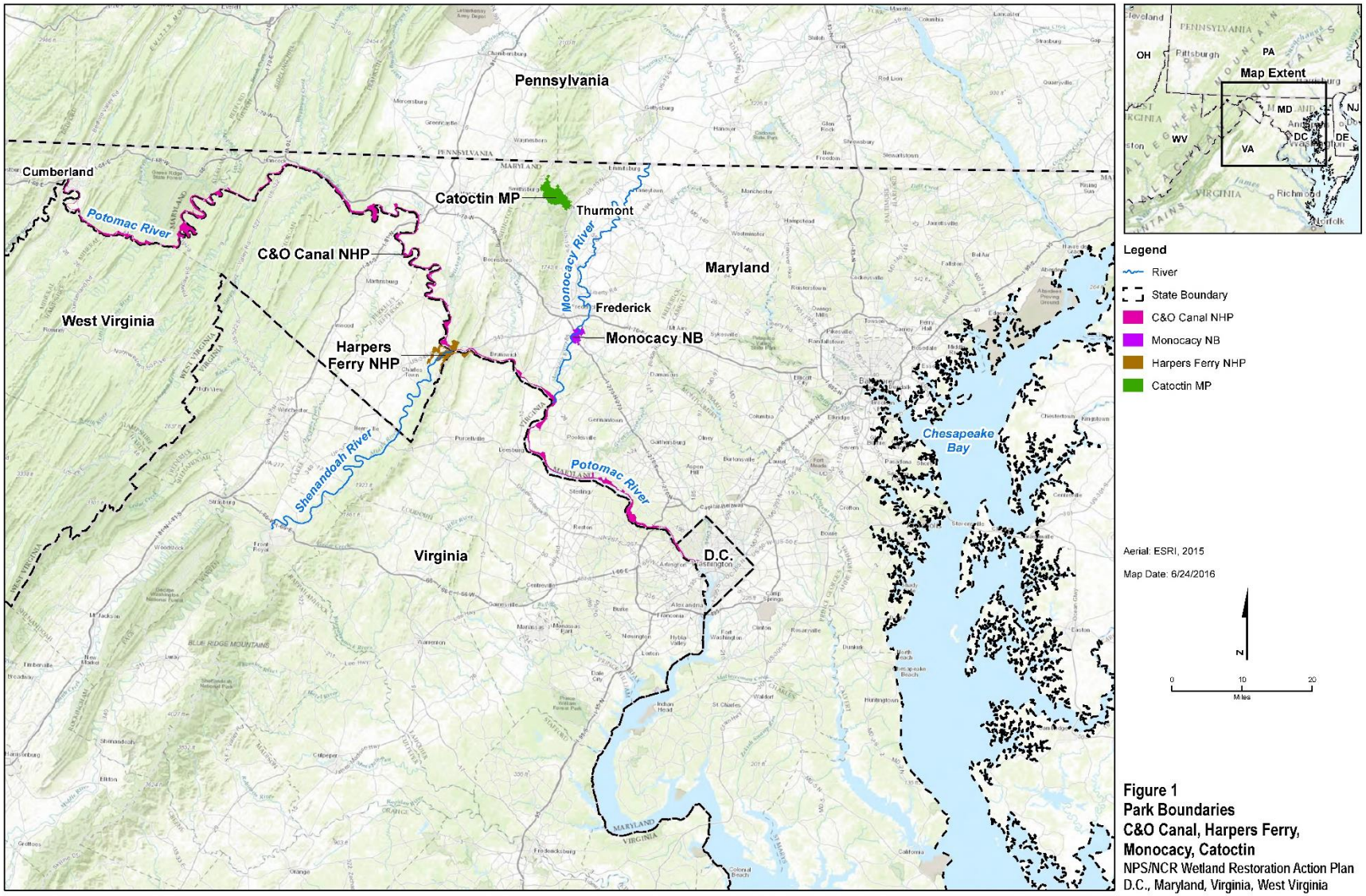

Figure 1
Park Boundaries
C&O Canal, Harpers Ferry, Monocacy, Catoctin
NPS/NCR Wetland Restoration Action Plan
D.C., Maryland, Virginia, West Virginia

CHESAPEAKE & OHIO NATIONAL HISTORICAL PARK

The C&O Canal NHP is located along 184.5 miles of the Potomac River's Maryland shoreline from the mouth of Rock Creek in Georgetown, Maryland to Cumberland, Maryland. The C&O Canal NHP is the last towpath that remains intact from the mule-drawn barge transportation era in the United States. The purpose of the park is to provide visitors the opportunity to understand the canal's reason for being, its construction, its role in transportation, economic development and westward expansion, the way of life that evolved along it, the history of the region through which it passes, and to gain an insight into the era of canal building in the country; and to appreciate the setting in which it lies and the natural and human history that can be studied along its way; and to enjoy the recreational use of the canal, the parklands and the adjacent Potomac River.

The historical significance of the C&O Canal NHP follows:

- The C&O Canal, built between 1828 and 1850, represents a pivotal phase in the first half of America's 19th century transportation revolution in which engineered waterways played a crucial role in the economic development of the young nation.

- The canal is one of the best-preserved of those built in the United States during the great boom of canal construction from 1820 to 1840. It contains more than 1,300 historic structures, including one of the largest collections of 19th century canal features and buildings in the NPS system.

- The canal preserves archeological evidence of 13,000 years of human habitation along the Potomac River.

- The 15-mile -long Potomac Gorge, is one of the most biologically diverse natural areas in the national park system.

- The canal preserves the 19th century canal transportation, civil engineering.

The C&O Canal NHP is situated along the floodplain of the Potomac River and therefore is dominated by a Silver Maple Floodplain Forest. The wetlands throughout the park are primarily depressions and seeps within the forested floodplain and the presence of the canal and towpath have caused some flooding of natural wetland areas, which have created some open water pond areas with emergent fringes. The park also contains commonly occurring invasive plant species and some wetlands areas have been disturbed by mowing and agricultural.

MONOCACY NATIONAL BATTLEFIELD

Monocacy NB is located approximately three miles south of Frederick, the second largest city in Maryland, and near the fast-growing Baltimore-Washington metropolitan area. Roughly, two miles of the Monocacy River run through the national battlefield. The CSX railroad line (historic Baltimore & Ohio Railroad) also extends through the national battlefield, paralleling the Monocacy River and Bush Creek. The historic Urbana Pike (Route 355) runs north-south through the eastern part of the national battlefield. These transportation corridors made Monocacy Junction an important crossroads and strategic location during the Civil War and influenced troop movements during the battle.

Known as the "battle that saved Washington," the Battle of Monocacy was fought on July 9, 1864, as a small Union force delayed Confederate troops at Monocacy Junction in Western Maryland as they advance on the nation's capital. This provided time for Union reinforcement to be moved into

fortifications at Washington and successfully defend the capital. Today, Monocacy NB covers more than 1,600 acres, preserving this historic landscape for future generations.

The purpose of Monocacy NB is to preserve the breastworks, earthworks, walls, and other defenses and shelters used by the Confederate and Union armies on July 9, 1864, as well as the buildings, roads, and outlines of the battlefield; to commemorate the Battle of Monocacy; and to provide opportunities for visitors to understand and appreciate the significance of the Battle of Monocacy within the full context of the Civil War and US history.

Monocacy NB is significant for the following reasons:

- On July 9, 1864, the Battle of Monocacy, where a small Union army successfully delayed a larger Confederate army's advance on Washington, DC, provided sufficient time for General Ulysses S. Grant to send federal reinforcements to the United States capital, preventing its capture and saving Washington.
- This Confederate campaign, its third and final attempt to bring the war to the North, was also designed to divert pressure from General Robert E. Lee's besieged army at Petersburg, Virginia, and to lessen President Abraham Lincoln's chances for reelection.
- Other important events of the Civil War associated with Monocacy include the 1862 Maryland Campaign and finding of General Robert E. Lee's Special Orders 191, which outlined his plan of attack, and the August 1864 meeting of Generals Grant and Sheridan at the Thomas House to plan the Shenandoah Valley Campaign.
- Monocacy NB protects a crossroads where visitors can experience rural landscapes, historic structures, and transportation corridors that have changed little since the Civil War, and provides opportunities for understanding the history of life in Western Maryland within the broader context of US history. Established in 1794 by refugees from the Saint-Domingue (Haitian) slave rebellion, L'Hermitage, also known as the Best Farm, contains the intact archeological record of one of the largest known slave village sites in Maryland, providing unique insights into the lives of enslaved people north of the Potomac River.

A majority of Monocacy NP's consists of agricultural fields, leaving a small portion of deciduous floodplain forest. Many of the wetland areas within the park consist of historically disturbed emergent wetlands that have been impacted by agricultural uses. These emergent wetlands are routinely mowed or brushed to keep shrub and tree species from developing and maturing.

HARPERS FERRY NATIONAL HISTORICAL PARK

Harpers Ferry NHP lies at the confluence of the Potomac and Shenandoah rivers, where the states of West Virginia, Virginia, and Maryland converge. The national historical park was established primarily to preserve historic resources and to commemorate the historic events that occurred at Harpers Ferry for the benefit and enjoyment of all people.

The significance of Harpers Ferry NHP is defined as follows:

- The geography of the Harpers Ferry area has made this a key travel, trade, and communications crossroads from the times of the earliest human habitation by American Indians to the present.
- George Washington designated Harpers Ferry as the second Federal Armory in 1796 because of its geography and natural resources. It became a center for technological innovation, such as

interchangeable parts and a model of the American System of Manufacturing. The Federal Armory provided arms and supplies for the Lewis and Clark expedition.

- Harpers Ferry preserves the site of John Brown's raid of 1859, an epic event occurring in opposition to slavery, which helped precipitate the Civil War.
- Harpers Ferry's location 61 miles northwest of Washington, D.C., made it a strategic target for both the North and South during the American Civil War. The biggest battle in present-day West Virginia occurred here in September 1862, when Stonewall Jackson forced the largest surrender of union troops during the Civil War. Union forces occupied the town during much of the war, establishing extensive fortifications and enforcing martial law on a civilian population. Due to the Baltimore & Ohio Railroad, Harpers Ferry served as the principal supply base for Union military operations in the Shenandoah Valley during campaigns in 1862, 1863, and 1864.
- Harpers Ferry hosted a broad range of African Americans, including slaves, freed blacks, and Civil War refugees. Storer College, which was established in 1867, was one of the first institutions of higher learning for former slaves. It was the site of the second Niagara Movement Convention in 1906, where W. E. B. DuBois devised the first modern philosophy and strategy for civil rights. This led to the formation of the National Association for the Advancement of Colored People.
- The view of the confluence of the Shenandoah and Potomac, which inspired Thomas Jefferson to say it is "worth a voyage across the Atlantic," continues to inspire visitors today.

The majority of Harpers Ferry NHP is covered with eastern deciduous forest. The wetlands within the park are mainly located along the floodplains at forested wetland systems or as emergent wetland seeps typically found along upland slopes. Other wetlands within the park consist of open water ponds where natural wetlands have been impacted by the creation of berms to increase water levels. Due to the disturbance of many of the wetland areas by continuous mowing practices and adjacent agricultural uses, many of the emergent wetlands are dominated by upland grass species.

CATOCTIN MOUNTAIN PARK

Catoctin MP is part of the Blue Ridge Mountains, which are part of the Appalachian Mountains. The Blue Ridge Mountains stretch 500 miles from Georgia to a point just north of Catoctin MP. Along with neighboring Cunningham Falls State Park, Gambrill State Park, and the Frederick and Thurmont watersheds, Catoctin MP is part of the area known as Catoctin Mountain. Catoctin Mountain forms the easternmost section of the Blue Ridge and extends 50 miles from Emmitsburg, Maryland, to Leesburg, Virginia. Catoctin MP is in Frederick and Washington counties west of the town of Thurmont.

Catoctin MP provides outdoor recreation opportunities for the Baltimore-Washington metropolitan areas and visitors from throughout the nation and the world. The park operates under the purpose that has been applied to the area since 1936. Accordingly, Catoctin MP is administered as a public park, for recreational purposes, to conserve all resources, as a buffer to the Presidential Retreat, and to record and protect historically significant resources such as the camp facilities at camps Misty Mount, Greentop, and Round Meadow.

Catoctin MP is significant for the following reasons:

- Catoctin MP was one of 46 Recreational Demonstration Areas (RDA) established in the 1930s. Only 17 remain as part of the NPS.

- Catoctin MP represents an outstanding example of a New Deal era program initiated in the 1930s to recast the landscape for recreation and conservation purposes. Camp Misty Mount and Camp Greentop are listed on the NRHP as historic districts representing a significant legacy of the New Deal era, as developed by the Civilian Conservation Corps and the Works Progress Administration.
- Serving as a natural buffer zone, Catoctin MP protects the presidential retreat, where international leaders have convened to discuss world peace and international diplomacy since the 1940s.
- The diverse cultural resources at Catoctin MP provide examples of industries ranging from small-scale Native American tool production to a large charcoal/iron industry that supported Colonial America and the American Revolution.
- Camp Greentop is home to the oldest operating camp for the disabled in the nation.
- NPS areas played many roles during World War II, and Catoctin MP can be included in that wartime effort as a place providing rest and relaxation opportunities for servicemen, and training facilities for the Office of Strategic Services.
- Catoctin MP hosted the first Job Corps camp in the nation at Camp Round Meadow.
- Catoctin MP is a prime example of a regenerated eastern deciduous forest that reflects the geology and wildlife of habitats in the Appalachian Mountains. Located at the transition of the Blue Ridge and Piedmont provinces, the park offers outstanding scenic beauty within 60 miles of the Baltimore, Maryland, and Washington, D.C., metropolitan areas.
- Catoctin MP's streams and wetlands play an important role as part of the watershed for the Monocacy River, the Potomac River, and the Chesapeake Bay. They serve as indicators of the park's overall ecosystem health.

Most of Catoctin MP is covered with forest and invasive species were found throughout the uplands of the entire park. The majority of the wetlands within the park are headwater forested wetlands. Emergent wetlands where typically observed along the fringes of man mad open water ponds.

ISSUES AND IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS

This section describes project issues or concerns identified during scoping that were determined by the project team to warrant a more detailed analysis. Potential impacts of the alternatives to the resources associated with the issues will be analyzed in detail within the "Affected Environment and Environmental Consequences" chapter of the WRAP/EA.

ISSUE: WETLANDS AND FLOODPLAINS

Section 404 of the Clean Water Act regulates activities in wetlands. Executive Order 11990: *Protection of Wetlands*, directs all federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Director's Order 77-1: *Wetland Protection* states that for new actions where impacts on wetlands cannot be avoided, proposals must include plans for compensatory mitigation that restores wetlands on NPS lands, where possible, at a minimum acreage ratio of 1:1 (NPS 2012). Consistent with Executive Order 11990 and Director's Order 77-1, the NPS has adopted a goal of "no net loss of wetlands" (NPS 2002).

A floodplain is an area of land adjacent to a stream or river that is naturally subject to flooding. Executive Order 11988: *Floodplain Management* directs all federal agencies to avoid both long- and short-term

adverse impacts associated with occupancy, modification, and development in the 1% annual chance floodplain, when possible. This is the flood risk zone regulated through federal, state, and local land use laws. The NPS manages floodplains to preserve floodplain values, minimize potential hazards of flooding, and comply with law (NPS 2006).

Wetlands and streams at the parks are currently degraded by a variety of anthropogenic impacts including adjacent land development, park facility development, invasive exotic species, public infrastructure demands, changes in hydrology and water quality, and recreational uses. This has led to stream erosion and increased storm flows within stream channels, leading to degraded stream channels and an increased sediment and nutrient supply that are impacting streams. Wetlands, streams, and floodplains adjacent to agricultural fields have been impacted by agricultural practices. Agricultural land use, as well as other development within and near the park, has altered the natural hydrology of the wetlands often resulting in the draining of historic wetlands or even increasing the water levels, which flood vegetated wetlands and creates open water ponds. In addition, the parks are subjected to outside sources (e.g., right-of-way permits, special use permits) of impacts on wetlands and floodplains. Therefore, the impact topics wetlands (includes streams) and floodplains will be analyzed further.

ISSUE: VEGETATION

Most of the forested areas throughout the parks are fragmented by agricultural uses or development including homes, roads, and other infrastructure. In addition, the fragmentation of the forest ecosystems at the parks appears to have caused an increased density of invasive or exotic species in the understory. Exotic species have a negative impact on natural resources, native plant communities, and management activities associated with them. Therefore, the impact topics of vegetation will be analyzed further.

ISSUE: WILDLIFE AND WILDLIFE HABITAT

Wildlife and wildlife habitat at the parks is being impacted by park facility development, invasive exotic species, and recreational uses. Most of the forested areas throughout the parks that provide wildlife habitat are fragmented by agricultural uses or development including homes, roads, and other infrastructure. The fragmentation of this ecosystem at the parks appears to have caused an increased density of invasive or exotic species. Exotic species have a negative impact on native plant and wildlife communities. Agricultural land use has resulted in the removal of riparian buffers along stream channels. Amphibians are known to be in decline at C&O Canal NP (Grant et. al. 2013). Therefore, the impact topic of wildlife and wildlife habitat will be analyzed further.

ISSUE: CULTURAL RESOURCES

The potential restoration sites within the parks contain wetlands that fall within historic districts and/or cultural landscapes, and may contain archeological resources. Some restoration activities may result in adverse impacts to these resources, and as a result, the impact topics historic structures and districts, cultural landscapes, and archeological resources will be analyzed further.

Compliance with Section 106 of the National Historic Preservation Act (NHPA) is being handled through ongoing consultation with the Maryland Historical Trust, Virginia Department of Historic Resources, West Virginia Division of Culture and History, and DC Historic Preservation Office. If an undertaking will or may adversely affect historic properties (any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the NHPA), the Section 106 regulations at 36 CFR § 800.6(b)(1)(i-iv) requires the NPS to consult with the State and/or Tribal Historic Preservation Officer (SHPO, THPO) and other parties. A Programmatic Agreement (PA) is appropriate for multiple or complex federal undertakings where effects to historic properties cannot be fully determined in advance,

or prior to decision-making and was prepared for the WRAP. The implementing procedures for Section 106 of the NHPA (36 CFR 800.4(2)) allows for phased identification and evaluation of resources.

RESOURCE TOPICS DISMISSED FROM DETAILED ANALYSIS

The following resource topics were initially considered but were ultimately dismissed from detailed analysis in this WRAP/EA. These topics are described below with the reason(s) that further analysis was not warranted.

SOILS

Most of the types of restoration actions recommended in the WRAP would have very little effect on soils within the parks. Restoration actions such as invasive species removal and native plantings, agricultural exclusion, restoration of the natural hydrology, and channel restoration (e.g., bank armoring, log crossings) would result in a long-term benefit to soils by returning the proposed restoration sites to a more natural condition as well as a benefit from bank armoring to eroded stream banks to reduce soil erosion. More intrusive restoration actions that have been recommended include grade control and relocating or meandering stream channels. Even though these actions would involve grading and movement of soil, the result is again a long-term benefit to soils by returning the proposed sites to a more natural condition. Therefore, soils were dismissed from further analysis.

WATER QUALITY

Some of the restoration actions recommended in the WRAP including restoration of the natural stream hydrology, increasing fish passage, and full channel restoration could result in short-term adverse impacts to water quality. These restoration techniques include the use of heavy equipment and construction activities such as removal of culverts and the placement of structures within the stream channel, which would require grading, excavation, bank armoring, and filling of the existing channel. To minimize impacts to water quality such as turbidity, best management practices (BMPs) including the use of temporary silt fences, interceptor swales, sediment traps/ponds, stockpile covers, or other BMPs to manage stormwater runoff during construction would be used. In addition, in the long term these restoration techniques would result in beneficial impacts on water quality. Restoration of the natural hydrology of a stream would improve the function and health of a streams water quality, and increasing fish passage and full channel restoration would restore a degraded stream ecosystem to a more stable, healthy condition, thus resulting in improved water quality. Therefore, water quality was dismissed from further analysis.

SPECIAL-STATUS SPECIES

The Endangered Species Act (ESA) of 1973, as amended (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), requires impacts on all federally listed threatened or endangered species be considered in planning for federal actions. Section 7 of the Act is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. NPS policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. No species-status species were observed at any of the sites during the March/April 2016 field evaluations. The U.S. Fish and Wildlife Service (USFWS) will be sent a copy of this EA along with an agency consultation letter for review. Further consultation with the USFWS will be done in the future for specific projects as needed. Therefore, special-status species will not be analyzed further in this WRAP/EA.

VISITOR EXPERIENCE

Some sites recommended for restoration are near trailheads and trails, picnic areas, and camping and fishing areas, resulting in potential impacts to the visitor experience. There would be some short-term adverse impacts on visitor experience during implementation (e.g., filling, excavation, and grading) from some of the restoration actions (e.g., restoration of natural hydrology, increasing fish passage, and full channel restoration) due to the use of heavy equipment. Excavation within agricultural fields may result in the loss of some agriculture. In addition, the installation of agricultural/disturbance exclusion fencing could affect crop yield, decisions about which crops are planted, or interest in participation in the parks' agricultural lease programs. However, in the long-term there would be mostly beneficial impacts on visitor experience from the restoration actions. The aesthetic improvements to sites that will be restored or enhanced would result in a long-term benefit on the visitor's experience in the parks and enjoyment of the parks. Increasing fish passage would be beneficial in the long term to visitors who fish at the park. The placement of educational signs and providing access via trails and boardwalks to natural resources would be beneficial to the visitor experience in the long term. Restoring degraded stream ecosystems to a more stable, healthy condition would result in a long-term beneficial impact on visitor experience by providing a more aesthetically pleasing area for the visitor to enjoy. Therefore, the issue of visitor experience was dismissed from further analysis.

MINORITY AND LOW-INCOME POPULATIONS AND COMMUNITIES

The Department of the Interior requires its bureaus to specifically discuss and evaluate the impacts of their actions on minority and low-income populations and communities, as well as the equity of the distribution of the benefits and risk of the decision. NPS EAs and environmental impact statements (EISs) must include either an analysis of impacts to minority and low-income populations and communities or if the issue is dismissed from detailed analysis, the EA or EIS must specifically indicate this. (*See OEPC's Environmental Compliance Memorandum [ECM] 95-3: NEPA Responsibilities under the Departmental Environmental Justice Policy*.) This impact topic was eliminated from further evaluation because none of the alternatives presented in this document would result in disproportionately high adverse environmental effects on minority or low-income communities. There would be no air or water pollution effects that would affect human health. There would be no change in land use in the surrounding area that could affect minority or low-income communities.

INDIAN TRUST RESOURCES

The Department of the Interior requires its bureaus to explicitly consider effects of its actions on Indian trust resources in environmental documents. NPS EAs and EISs must include either an analysis of impacts to Indian sacred sites or a specific dismissal of the issue from detailed analysis (*ECM 97-2: Departmental Responsibilities for Indian Trust Resources and Indian Sacred Sites on Federal Lands, Part 1*). Furthermore, Executive Order 13007 provides that, to the extent practicable, permitted by applicable law, and not clearly inconsistent with essential agency functions, agencies are required to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of sites (NPS 2015). The federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal laws with respect to Native American tribes. There are no known Indian Trust resources located in the project area, and the lands composing the four NCR parks are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the issue of Indian Trust resources was dismissed from further analysis.

CLIMATE CHANGE

Climate change resulting from emissions of greenhouse gases such as carbon dioxide (CO2) and methane (CH4) is a global effect and requires that such emissions be assessed on a global scale. Emissions of greenhouse gases from activities analyzed in this EA would be temporary and would constitute negligible fractions of such gases emitted on a global scale. Implementing the recommended WRAP restoration projects within the parks could have a beneficial impact on climate change by increasing the resiliency of the parks' landscape to the expected impacts of climate change on the parks' resources; however, available information is not adequate to quantify the interaction of climate-change impacts on the consequences of the WRAP restoration projects. Therefore, this topic was dismissed from further analysis.

ALTERNATIVES

This chapter describes the no action alternative and an action alternative for managing the restoration, enhancement, and/or protection of wetlands at the four NCR parks. The action alternative meets the purpose and need for action. This WRAP/EA documents the analysis of environmental consequences of these alternatives. The elements of these alternatives are described in detail in this chapter. Impacts associated with the actions proposed under each alternative are outlined in the "*Affected Environment and Environmental Consequences*" chapter of the EA. In addition, this chapter also addresses alternative concepts that were initially considered but dismissed from detailed analysis.

ALTERNATIVE A: NO-ACTION ALTERANTIVE

Under this alternative, current management of the parks' wetland/stream resources would continue. Overall, the parks manage their wetland/stream resources as issues arise, with the help from volunteers and nonprofit organizations, and to address outside applicants that have projects that would affect park wetlands. Currently, there is not a consistent way the parks are mitigating impacts to wetlands. Invasive species removal is usually the main action to treat wetlands at C&O Canal NHP and they are currently working with an outside applicant on a proposed water treatment project that will be affecting the parks' wetlands. The NCR recently prepared an invasive plant management plan that includes the four parks participating in this WRAP. Nonprofit organizations and volunteers have recently planted native plants in wetlands at Monocacy NB and a nonprofit organization used grant money to plant trees at Catoctin MP. Managing deer browsing issues has been successful under the Catoctin White-tailed Deer Management Plan at Catoctin MP. Monocacy NB has initiated deer management as of December 2016. Harpers Ferry NHP and the C&O Canal NHP is planning to implement deer management sometime in the future. These limited management actions would continue at the four parks under the no action alternative.

ALTERNATIVE B: ACTION ALTERNATIVE (NPS PREFERRED)

The alternative development approach for this alternative explored the scientific and technical feasibility of wetland restoration approaches, and the important elements of the restoration were identified. Alternative B provides a comprehensive approach to restoring, enhancing, and/or protecting wetlands, waterways, and riparian habitats at the four NCR parks when opportunities or mitigation needs arise. When faced with construction projects that may negatively affect park resources, the NPS will be able to refer to the recommendations in this alternative when determining priorities for restoration. The WRAP report includes details on the methods for site selection, a description of the field assessment, opportunities for restoration and enhancement, and a summary of WRAP recommendations. The WRAP report can be found in appendix B. The WRAP report also includes summary tables of this information and figures showing the locations of proposed restoration sites within the four parks. A summary of the methodology for the comprehensive approach to restoring, enhancing, and/or protecting wetlands and riparian habitats is presented below. For more detail on the WRAP, see appendix B.

POTENTIAL SITE IDENTIFICATION

A preliminary desktop data review of available Geographic Information Systems (GIS) layers and online resources was performed in order to locate areas for potential wetland and stream enhancement projects to be proposed for further field evaluations. The GIS data for the data review included National Wetlands Inventory mapped wetlands, previously delineated wetland areas; GIS Hydro layers including mapped stream channels, and known Maryland Historic Trust (MHT) sites. The following information was identified for each potential site during the data review:

- Site coordinates
- Total acreage to be reviewed during the field evaluation
- The potential acreage of wetlands and linear feet of stream channels
- A potential rating for a restoration opportunity (low, medium, high) based on the likely-hood of a restoration or enhancement project being possible onsite
- Rational for selecting the site (e.g., stream channel appears to be ditched, potential prior converted wetland, and existing road crossing of stream channel)
- General enhancement opportunity that may occur at the site

Over fifty potential restoration sites, totaling approximately 1,400 acres were identified within the four parks from the desktop data review screening effort.

FIELD EVALUATION

Following the desktop data review screening effort, a field evaluation of the potential restoration sites within the four parks was performed to confirm the types of wetlands found at each park, quantify the functional value of the wetlands, document specific issues associated with the specific wetland types, and to prioritize the wetlands sites proposed for restoration. Figures 2 – 5 in appendix B show the locations of the proposed restoration sites for each of the four parks including sites that were initially identified during the desktop review but later dropped after the field evaluation. The general types of habitat conditions and wetlands found within the restoration sites at the four parks are described in the "Affected Environment" section of chapter 3.

Wetland Function and Value Assessment

Wetland functions can be defined "as a process or series of processes that take place within a wetland" (Novitzki et al. 2016). These processes include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have value for the wetland itself, for surrounding ecosystems, and for people. Wetland functions are usually grouped as habitat, hydrologic, or water quality. Hydrologic functions are those related to the quantity of water that enters, is stored in, or leaves a wetland and include such factors as the reduction of flow velocity and the role of wetlands as ground-water recharge or discharge areas. Water-quality functions can include the trapping of sediment, pollution control, and the biochemical processes that take place as water enters, is stored in, or leaves a wetland (Novitzki et al. 2016). The functional value of the wetlands present within the proposed restoration sites at the four parks is presented in table 1.

Table 1. Functional Value of Wetlands Present Within the Proposed Restoration Sites at the Four Parks

Functional Value	C&O Canal NHP	Monocacy NB	Harpers Ferry NHP	Catoctin MP
Groundwater recharge/discharge	X	X	X	X
Floodflow alteration	X	X		X
Fish and shellfish habitat				
Sediment and toxicant retention	X	X	X	X
Nutrient removal	X	X	X	X

Functional Value	C&O Canal NHP	Monocacy NB	Harpers Ferry NHP	Catoctin MP
Production export				
Sediment shoreline stabilization				
Wildlife habitat	X	X	X	X
Recreation				X
Educational and scientific value				
Uniqueness / heritage				
Visual quality / aesthetics	X	X	X	X

Site Assessment Results and Ranking

Upon completion of the informal wetlands delineation and the assessment of wetland functions and values, a detailed field assessment of the degraded portions of the wetlands and stream channels was conducted by completing field assessment forms for each site in order to prioritize the sites with a restoration ranking. In general, the wetlands identified for restoration ranked between 59 and 80 out of 100 points, and the stream restoration sites had a larger variation in ranking with scores between 31 and 87 out of 100 points. Restoration site rankings for wetlands and streams are presented in table 2.

Table 2. Wetland and Stream Restoration Site Rankings

Site Number	Wetland Restoration Ranking	Stream Restoration Ranking
CATO-1	80	44
CATO-2	--	39
CATO-3	--	68
CATO-5	73	--
CATO-7	73	--
CATO-9	--	58
CATO-11	64	66
CATO-11	--	66
CATO-13	--	41
CATO-14	--	59
CATO-15	--	61
CATO-16	--	35
CATO -17	--	59
MONO-3	--	86 and 64
MONO-4	65 and 63	67
MONO-5	75	--
MONO-6	69	63
MONO-7	76	--
MONO-8	--	51
MONO-10	--	69

Site Number	Wetland Restoration Ranking	Stream Restoration Ranking
HAFE-2	78	--
HAFE-4	78	--
HAFE-6	62	--
HAFE-7	--	58
HAFE-9	--	42
CHOH-1	61	31
CHOH-5	68	--
CHOH-6	69	--
CHOH-12	--	69
CHOH-13	59	--
CHOH-17	--	47
CHOH-18	66	--
CHOH-19	79	--
CHOH-23	70	--
CHOH-24	62	--
CHOH-25	71 and 73	59
CHOH-27	76	--
CHOH-28	76	--
CHOH-29	--	72
CHOH-30	71	--
CHOH-31	--	87
CHOH-32	--	48
CHOH-33	71	--

Note: CATO = Catoctin MP, MONO = Monocacy NB, HAFE = Harpers Ferry NHP, CHOH = C&O Canal NHP

Detailed information on the results of the wetland delineation, function and value assessment, and assessment of potential restoration sites are provided in the WRAP report (appendix B). The WRAP report provides specific information for each of the 42 proposed restoration sites.

PROPOSED RESTORATION ACTIONS

When developing restoration strategies for the 42 potential sites, a specific set of restoration techniques was established for the wetland and stream sites. Typical techniques proposed for wetland restoration in the WRAP include:

- Invasive Species Control
- Native Plantings
- Restoration of Natural Hydrology
- Increase Plant Diversity

- Converting Open Water to Vegetated Wetlands
- Increasing Aesthetics or Educational Value
- Agricultural/Disturbance Exclusion Fencing

Typical techniques proposed for stream restoration in the WRAP include:

- Invasive Species Control
- Riparian Buffer Enhancement
- Restoration of Natural Hydrology
- Increase Fish Passage
- Full Channel Restoration
- Increasing Aesthetic or Educational Value
- Agricultural/Disturbance Exclusion Fencing

In an effort to streamline the proposed restoration concepts for the 42 selected sites, the techniques listed above were used when developing the restoration strategies. Although additional restoration techniques may be employed at the sites, the restoration concepts proposed for the WRAP are general in nature and additional survey would be required to propose more detailed restoration design.

From the list of techniques considered above, a proposed concept was then generated for each of the 42 potential sites. These concepts were developed to enhance and restore wetlands and streams within the four parks based upon the desktop and field assessments. The proposed concepts are provided in appendix B, figures 6 – 47 and summarized in tables 9 and 10.

Invasive Species Control

This technique includes removal of invasive species of plants along stream banks or within wetlands. This technique can be accomplished in many ways and typically includes manual removal of the plant either by hand or by mowing and other mechanical equipment. Use of herbicide is also typical for treatment of invasive species and the most effective treatment usually includes a combination of manual and chemical control throughout the year. Invasive species control can typically be accomplished without ground disturbance and little to no impact to other resources in the area.

Native Plantings/ Riparian Buffer Enhancement and Increased Plant Diversity

This technique includes planting of vegetation within the wetland or along the streambanks by installing trees, shrubs and other herbaceous material resulting in a small amount of ground disturbance for the placement of the material. Trees and shrubs would typically require a pit to be dug approximately 2-4 feet in diameter and a few feet deep, depending on the size of the plant material used. The dug material would then be used as backfill and the removal of material offsite would not be required. Similarly, the placement of herbaceous material would result in some ground disturbance although pits would only require a few inches to be dug for the insertion of plugs.

Restoration of Natural Hydrology

Many of the wetlands proposed for hydrology restoration have been ditched or drained and would include the removal of these features through filling practices. Additionally, some wetlands along floodplains and

within agricultural fields have been impacted through filling and would require excavation to restore natural hydrology and interaction with the groundwater at the surface of the wetland. Restoration of stream hydrology typically would require the reconnection of the stream to the floodplain by lowering the bank elevations through grading practices.

Converting Open Water to Vegetated Wetlands

Altering water control structures would involve removal of existing berms or culverts that would result in ground disturbance and the use of heavy equipment. Removal or altering the water control structure would lower water elevations in the wetland in order to allow more vegetation to establish and reduce the amount of open water in the area. Once the water levels are altered, the technique would also include the planting of vegetation as described above under native plantings.

Increase Fish Passage

This technique focuses on restoring safe upstream and downstream fish passage to streams and stream reaches that have become isolated by culverts and other artificial obstructions. Man-made in-stream structures (e.g., culverts, dams, levees) can become physical barriers that impede fish passage and reduce connectivity through habitat fragmentation. This technique, which focuses on restoring fish passage longitudinally within the stream, could be accomplished in a few ways. Removal of the obstruction such as culverts and bringing the site back to an open natural channel could be done only if the culvert is no longer needed. However, in most cases the culverts are placed in order for access across the existing stream. If full removal of the culvert is not possible, then the culvert can be replaced with a similar structure but altered in a way to reduce the drop of elevation at the end of the culvert. This can be accomplished two ways—by lowering the culvert and crossing so the bottom of the culvert is partially buried on both ends and alternatively, or instream structures, such as cross vanes of rock or logs, could be placed to create small step-ups along the stream over a longer length rather than one large drop that blocks fish passage.

Full Channel Restoration

This restoration technique involves the placement of structures within the stream channel requiring the grading of stream banks and potential grading along the banks or lowering of the adjacent floodplain areas. Slight reshaping of the stream may also be included in this technique on a case-by-case basis, which would require a larger scale of grading, excavation, and filling of existing channel areas.

Instream structures refer to features intentionally placed in the stream or floodplain for habitat restoration. These features are often referred to as drop structures, vanes, porous weirs, roughened channels/constructed riffles, or boulder placements. Large wood and logjams that are placed for habitat complexity are technically considered instream structures as well. The structures are typically large material that required placement by heavy machinery and require some earth disturbance along the stream banks. The structures are typically buried partially in the existing banks and required some excavation before setting the structure and then backfilling with the existing material. Construction access typically requires a temporary construction access road made of mulch or timber mats for heavy equipment access.

In addition to placement of structures, this technique may also require larger grading of the stream banks or floodplain to lower the elevations of the land to allow the stream channel to overtop banks during high flood events.

Bank armoring is also included in this alternative and it refers to the placement of rock or logs along portions of the stream banks that receive high-energy flows along the bank and area actively eroding. The

placement of this material may also require some grading back of the banks depending on the slope of the bank.

Increasing Aesthetic or Educational Value

Many of the proposed sites are within areas of public access and could include the placement of educational signs near wetlands and or streams to provide information about the habitat and resources sensitive to the area. Placement of signs would typically require minimal ground disturbance for the placement of signposts. Sites with limited access could increase aesthetic and educational value simply by providing easier access to the site such as creation of trails or boardwalks within the vicinity of the project area.

Agricultural/Disturbance Exclusion Fencing

Many of the surrounding land practices such as agricultural or maintenance/mowing activities are continuously impacting the vegetation along the edge of the wetlands or streams and can be reduced by the placement of barriers along the edge of the resources so surrounding land uses practices can no longer impact the resource. Placement of fencing around the resources or even signs to keep a buffer around the resource would result in a minor disturbance to the ground from the placement of fence posts. An alternative to this may be the placement of large natural barriers such as boulders or logs along the edge of the resource to keep equipment away from the resource and would not require land disturbance.

Within the four NCR parks currently participating in this WRAP, 42 potential sites were identified that total almost 50 acres of wetland restoration opportunity, and almost 20,000 linear feet of stream restoration opportunity. A breakdown of restoration area identified by park site is provided in table 3. Site-specific restorations recommendations are summarized in the WRAP report (appendix B, table 12 and figures 6-47).

Table 3. Available Restoration Areas

Park	Number of Sites	Potential Wetland Restoration Acreage	Potential Stream Restoration Length
Catoctin MP	12	3.33 acres	5,073 linear feet
Monocacy NB	7	10.39 acres	9,535 linear feet
Harpers Ferry NHP	5	0.93 acres	826 linear feet
C&O Canal NHP	18	34.73 acres	4,551 linear feet
Total	**42**	**49.38 acres**	**19,985 linear feet**

ADAPTIVE MANAGEMENT

Adaptive management is used when there are clearly defined desirable outcomes to a project, but there is uncertainty or incomplete information to ensure that the outcome will be achieved. According to a Department of the Interior technical guide on adaptive management prepared for its bureaus and agencies (Williams, Szaro, and Shapiro 2009), adaptive management *is a systematic approach for improving resource management by learning from management outcomes…An adaptive approach involves exploring ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management*

actions. Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems… Adaptive management would be useful in this planning effort to make adjustments to vegetation establishment, manage nonnative and invasive species throughout the different restored wetlands, and track the overall restoration approach to ensure restoration is successful. Adaptive management frameworks describe the initial actions being taken, metrics used to ensure objectives are being met, monitoring actions to be taken, and subsequent actions that would be taken if monitoring indicates the objectives are not being met.

An annual monitoring program is proposed that would include maintenance of the restoration sites. Maintenance within restored areas would include the removal of invasive species. If the amount of areal cover of invasive species exceeds 10 percent areal cover as determined during the annual monitoring effort, invasive species will be treated. Additional maintenance may be required depending on annual monitoring results.

Based on the annual monitoring program to measure the progress of the mitigation sites, new maintenance procedures can be implemented through an adaptive management plan. Maintenance measures may include, but are not limited to regrading, replanting, excavation, removal of sediment, substrate amendments, and alteration of hydrology.

In order to meet the potential need for changing mitigation strategies or meeting with unexpected site conditions, an adaptive management plan would be used to ensure that mitigation and restoration goals are met for the site. In the event that monitoring or other information identifies a deficiency in the compensatory mitigation project, at any time during or following construction of the project, appropriate agencies will be notified of the deficiency through the monitoring report and through a letter and formal report documenting the deficiencies to be addressed. The agencies will then assess the deficiencies and determine whether the ecological functions of the project are comparable to the approved performance standards.

If it is found that the deficiencies have significantly impaired the progress of the compensatory mitigation project, then the participating parties will consult to produce appropriate measures in coordination with the permittee. The agencies will have final approval over the measure implemented to address the mitigation project deficiencies.

ALTERNATIVES CONSIDERED BUT DISMISSED

Since the proposed action is straightforward - to restore, enhance, and/or protect wetlands, waterways, and riparian habitats – no other alternative concepts were considered.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the resources that could be affected and the potential environmental consequences of implementing the alternatives being considered. The descriptions of the resources provided in this chapter serve as an account of the baseline conditions against which the potential effects of the proposed actions considered in this WRAP/EA are compared. It provides a comparison among alternatives based on issues and topics discussed in chapter 1. The following resources are included in this chapter: wetlands and floodplains, vegetation, wildlife and wildlife habitat, and cultural resources (historic structures and districts, cultural landscapes, and archeological resources).

METHODOLOGY

In accordance with the Council on Environmental Quality (CEQ) regulations, direct, indirect, and cumulative impacts are described, and the impacts are assessed in terms of context, intensity, and duration (40 CFR 1502.16).

DURATION AND TYPE OF IMPACTS

Several basic assumptions are used for all impact topics (the terms "impact" and "effect" are used interchangeably throughout this document):

- *Short-term impacts*—Impacts associated with construction actions that are temporary and would not have long-lasting effects.
- *Long-term impacts*—Impacts that would last beyond the time when construction is complete, generally longer than three years and possibly lasting through the life of the plan, with potentially permanent effects.
- *Direct impacts*—Impacts that would occur as a direct result of an action.
- *Indirect impacts*—Impacts that would occur from an action and would occur later in time or farther in distance from the action.
- *Beneficial*—A positive change in the condition or appearance of the resource.
- *Adverse*—A change that degrades or detracts the resource from its appearance or condition.

Direct and indirect impacts are addressed in the analysis, although they may not be specifically labeled as such.

CUMULATIVE IMPACTS ANALYSIS

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The CEQ regulations that implement NEPA require assessment of cumulative impacts in the decision-making process for federal projects.

To determine potential cumulative impacts, past, present, and foreseeable future actions and land uses were identified in or near the four NCR parks' project sites. Cumulative impacts are considered for all

alternatives, including the no action alternative, by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions and are presented at the end of each impact topic discussion. Listed below in table 4 are the projects considered in the cumulative impact analysis.

Table 4. Cumulative Impacts Scenario Table

Project	Description	Effected Resource
National Capital Region Invasive Plant Management Plan and Environmental Assessment for Catoctin MP, Monocacy NB, C&O Canal NHP, and Harpers Ferry NHP (future)	An Invasive Plant Management Plan would be implemented at 15 parks in the NCR. The purpose of the plan is to protect and restore natural and cultural resources in the 15 NCR parks by controlling, containing, or substantially minimizing populations of non-native invasive plant species through targeted treatment. The plan would provide guidance to the individual NCR parks on non-native invasive plant management.	• Beneficial long-term impacts on vegetation, wildlife and wildlife habitat. • Beneficial long-term impacts on cultural resources. • While some treatment methods have the potential to affect historic resources, each treatment action would be reviewed in accordance with Section 106 of the NHPA PA, which would ensure any potential adverse effects are avoided, minimized, or mitigated.
White-tailed Deer Management Plan and Environmental Impact Statement for Monocacy NB (ongoing, the plan was initiated in December 2016)	The plan addresses management of deer at Antietam National Battlefield, Monocacy NB, and Manassas National Battlefield Park. The purpose of this action is to develop a deer management strategy that supports preservation of the cultural landscape through the protection and restoration of native vegetation and other natural and cultural resources. Results of vegetation monitoring in recent years have documented the effects of the large herd size on forest regeneration in all three battlefields. Deer browsing has resulted in damage to crops and vegetation that are key components of the cultural landscapes of the battlefields.	• Beneficial to vegetation because the plan would allow the abundance and diversity of vegetation throughout the parks to recover. • Beneficial to wildlife and wildlife habitat since it would allow vegetation to become more abundant. • Beneficial effects to the cultural landscape because of improved agricultural crops, which would lead to increased chances of viability for the parks' farm ventures and forest vegetation that maintain the open and closed patterns of the cultural landscape.
White-tailed Deer Management Plan Environmental Assessment for C&O Canal NHP and Harpers Ferry HP (future)	The plan is being developed for both parks because they face similar issues relating to the high densities of deer within their boundaries and the effects that deer are having on forests and cultural landscapes. The plan analyzed environmental impacts for managing white-tailed deer to reduce impacts on native vegetation, forest regeneration, and the cultural landscapes of the parks.	• Beneficial to vegetation since the plan will promote forest regeneration. • The current overabundance of deer is affecting habitat; therefore, the plan would be beneficial to wildlife and wildlife habitat. • Deer overabundance could affect cultural landscapes by greatly reducing crop yield from over browsing and interest in participation in the parks' agricultural lease programs.

Project	Description	Effected Resource
White-tailed Deer Management Plan / Environmental Impact Statement for Catoctin MP (ongoing)	The plan supports forest regeneration, and provides for long-term protection, conservation, and restoration of native species and cultural landscapes. Excessive deer browsing reduces forest regeneration, resulting in adverse changes to the forest structure, composition, and wildlife habitat. It could adversely affect the natural distribution, abundance, and diversity of native species, including species of special concern, and has impacted native shrubs, trees, and forest systems that comprise the natural vegetation component of cultural landscapes.	• Beneficial impacts on vegetation because vegetation could recover. • Beneficial impacts on wildlife habitat due to reducing deer browsing pressure on natural forest regeneration, allowing increased abundance and diversity of other wildlife that depend on understory vegetation. • Native plant populations would regenerate which would result in beneficial impacts to the park and component cultural landscapes.
Dominion Virginia Power Mount Storm - Doubs Line 551 Electric Power Transmission Line Rebuild and Upgrade at Appalachian National Scenic Trail and Harpers Ferry National Historical Park Environmental Assessment / Assessment of Effect for Harpers Ferry NHP (past/future)	Dominion Virginia Power submitted a permit to upgrade and reconfigure the existing transmission lines. The EA evaluated the potential impacts on the human, natural, and cultural environment of the proposed transmission configuration proposed for the existing transmission line on park property. The total length of the upgraded and reconfigured lines would be approximately 96.4 miles. Upon the approval of the construction permit, approximately 1,995 feet of transmission lines would be rebuilt within the parks.	• Due to vegetation clearing to widen the right-of-way access road and the implementation of the landscape and Integrated Vegetation Management plans, the preferred alternative would have adverse impacts on vegetation. • Implementation of the preferred alternative would result in impacts on historic districts due to impacts from the presence of construction and maintenance equipment and associated activity.
Potomac Submerged Channel Intake Environmental Assessment for C&O Canal NHP (future)	The Washington Suburban Sanitary Commission (WSSC) proposes to construct a new offshore submerged channel intake for water supply at its Potomac Water Filtration Plant (WFP). The C&O Canal NHP is located parallel to the Potomac River and passes between the existing water intake structure and the remaining facilities of the WFP. The project would involve construction activities and the location of permanent WFP structures within the C&O Canal NHP; therefore, an EA was prepared to analyze impacts from the proposed action.	• Adverse impacts on the functions of a wetland and floodplain; however, mitigation for the wetland would be implemented. • Adverse impacts on terrestrial vegetation and wildlife from vegetation clearing. • Adverse impacts on the C&O Canal NHP historic district's landscape and the cultural landscape due to vegetation clearing. • Adverse impact on archeology; however, the impacts would be mitigated.

Project	Description	Effected Resource
Environmental Assessment for Restoration of Canal Operations at Hancock for C&O Canal NHP (future)	The NPS is proposing to enhance the visitor experience at Hancock, Maryland. This action would enable the park to better interpret the canal through interpretive programs and historic preservation of original canal structures. Physical improvements to the canal's historic structures include the restoration and rewatering of the C&O Canal (vegetated wetlands would be converted to open water).	• Long-term moderate adverse impacts on wetlands and vegetation due to rewatering sections of the canal prism; however, compensation would include the restoration of a former forested wetland habitat, and for loss of trees would include the planting of trees within a riparian forest buffer in the park. • Long-term beneficial impacts on historic structures and cultural landscapes from the stabilization of historic structures and from the enhancement of the historic character of the cultural landscape. • Impacts to archeological resources could result but all work would conform to the Section 106 of the NHPA PA, to ensure that disturbance to archeological resources is minimized or avoided.
Monocacy National Battlefield Public Access Plan Environmental Assessment for Monocacy NB (future)	The *Public Access Plan* will look at the battlefield's public access to park areas and resources, and understanding of, park areas and resources in order to enhance the visitor experience and increase opportunities for visitors to connect with the park's resources, history, commemorative aspects, preservation activities, and significance, while minimizing impacts on cultural and natural resources. Strategies will be developed to address the fragmented nature of the battlefield's visitor access and trail system.	• Preliminary impact topics identified for assessment in the EA that are relevant to this WRAP/EA include cultural resources (cultural landscapes, historic buildings and structures, and archeological resources), and natural resources (wetlands, floodplains, vegetation, and wildlife).
MD 355 Bridge Over CSX Environmental Assessment for Monocacy NB (future)	The proposed action includes full replacement of the existing bridge structure on MD 355, raising the profile of the bridge, minor widening of the roadway, providing pedestrian and bicycle facilities, providing improved pedestrian access and connectivity to the Monocacy NB, constructing stormwater management facilities, and relocating utilities. The purpose of the project is to enhance the safety of the traveling public (vehicular and pedestrian) by replacing the structurally deficient bridge while minimizing impacts on the park. The need for the proposed action is because the bridge is structurally deficient.	• Adverse impacts on wildlife, wildlife habitat, and vegetation due to the removal of forest; however, tree replacement and replanting of native vegetation is planned. • Adverse impacts on historic structures and districts due to a temporary easement. • Adverse impacts on cultural landscapes due to temporary visual impacts from construction related activities and from visual impacts from a higher bridge and roadway. • Adverse impacts on archeology.

WETLANDS AND FLOODPLAINS

Wetlands provide important environmental and economic functions and values to their immediate environment and to their adjacent upland areas. For example, wetlands trap sediment and pollutants from stormwater runoff and provide a natural filter before this runoff enters local waterways. Wetlands can store large volumes of water and function as a "sponge," reducing the likelihood of flooding during storm events and protecting the shoreline from erosion. Additionally, wetlands provide excellent habitat for fish, shellfish, and wildlife.

The USACE requires that an area be dominated by hydrophytic vegetation, contain hydric soils, and display indicators of wetland hydrology to be considered a wetland. The NPS definition of wetlands is similar to that of the USEPA and USACE; however, the NPS definition is broader in scope and affords a greater jurisdiction than that of the USACE. The NPS classifies wetlands based on the USFWS *Classification of Wetlands and Deepwater Habitats of the United States*, also known as the Cowardin classification system.

Floodplains are fluvial lands adjacent to freshwater streams and rivers that receive floodwaters once the water has overtopped the bank of the main channel. This is typically the result of a higher than normal influx of upstream water supplies (water moving from higher elevations to lower elevations). Floodplains are important resources in the storage and filtering of these floodwaters. The project area provides several floodplain functions and values, including flood storage and natural moderation of floods, nutrient reduction, wildlife habitat for floodplain species, and scenic open space.

AFFECTED ENVIRONMENT

The following descriptions of the wetlands and floodplains below are from observations made during the March/April 2016 wetland field evaluation that was performed at potential restoration sites within each of the four parks. Streams are also described in this section since many of the proposed restoration actions include riparian habitats along streams as well as within stream tributaries. A complete list of the individual sites at each of the four parks along with the delineated wetland and stream features is provided in appendix B, tables 7 and 8. A brief definition of the general wetland types found throughout the four parks is provided in table 5.

Table 5. General Wetland Types

Wetland Type	Description
Forested Wetland	Forested wetlands are typically found in broad floodplains of the northeast, southeast, and south-central United States and receive floodwater from nearby rivers and streams as well as surficial runoff. These wetlands are dominated by trees over 20 ft. in height and have a closed to semi-closed canopy. They are characterized by saturated soils during the growing season and standing water during certain times of the year.
Emergent Wetland	Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, which are typically present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Generally, emergent wetlands are inundated with surface water for the majority of the growing season allowing the herbaceous vegetation to remain established and limiting the development of woody vegetation.
Open Water Pond	Deeper, normally perennial inundated water features, often man-made that lack terrestrial woody and herbaceous vegetation. These wetlands often contain submerged macrophytes.

Wetland Type	Description
Headwater Seep	Headwater seeps are small wetlands typically found in sloping terrains. These features can be both emergent and forested wetlands. Groundwater reaches the surface through a distinct hole from which shallow, broad flows move outward and create a saturated zone. The groundwater typically flows year round. Seeps are essentially discharge wetlands that convey flow to nearby stream channels.
Riverine Stream Channels	Deepwater habitats contained within a channel except those wetlands dominated by trees, shrubs, persistent emergent vegetation. These Riverine systems include perennial and intermittent stream channels, which contain a defined bed and bank and a clear ordinary high water mark.

Chesapeake & Ohio Canal National Historical Park

The wetlands throughout the C&O Canal NHP are primarily depressions and seeps within the forested floodplain that are dominated by red maple (*Acer rubrum*) and silver maple (*Acer saccharinum*) in the canopy and box elder (*Acer negundo*), spicebush (*Lindera benzoin*), and multiflora rose (*Rosa multiflora*) in the understory. The presence of the canal and towpath have caused some flooding of natural wetland areas which have created some open water pond areas with emergent fringes. These emergent wetland areas along the impoundments are typically dominated by cattails (*Typha latifolia*), common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*) and button bush (*Cephalanthus occidentalis*). In addition to the forested wetlands and impoundments described above the park also contains some wetland areas that have been disturbed by mowing and agricultural uses. These emergent wetlands are dominated by similar upland grasses as well as soft rush (*Juncus effusus*) similarly to those described at Monocacy NB and Harpers Ferry NHP.

Approximately 85 percent of the parklands lie within the 50-year flood plain (the level to which the river can be expected to rise once in every 50 years) of the Potomac River. There are 261 perennial streams documented within park boundaries, three water bodies (Little Pool, Big Pool, and Widewater), an estimated 54 miles of watered canal, and 27 documented springs and seeps.

The wetlands that were specifically assessed for this project and were identified for restoration include 34.73 acres of degraded and previously impacted wetlands and 4,551 linear feet of stream channels throughout the C&O Canal NHP. The dominant impact to the wetlands within the park is the excessive presence of invasive species throughout the floodplain and wetlands. Many of the stream channels identified throughout the park are proposed for full channel restoration and armoring as these channels are typically highly eroded and incised.

Monocacy National Battlefield

Many of the wetland areas within Monocacy NB are emergent wetlands with disturbance to the vegetation due to historic agricultural uses in the park. These emergent wetlands are routinely mowed or brushed to keep shrub and tree species from developing and maturing. The wetlands are dominated by upland plant species [soft rush and woolgrass (*Scirpus cyperinus*)] similar to that of Harpers Ferry NHP emergent wetlands.

Similar to Harpers Ferry NHP and Catoctin MP the lower lying floodplain areas along the stream channels are dominated by maple (*Acer* spp.), American sycamore (*Platanus occidentalis*), hackberry (*Celtis occidentalis*), and ash (*Fraxinus* spp.). Recently disturbed areas are characterized by generalist tree species such as tulip poplar (*Liriodendron tulipifera)*, black cherry (*Prunus serotina*), black locust

(*Robinia pseudoacacia*), boxelder (*Acer negundo*), and the invasive and nonnative tree-of-heaven (*Ailanthus altissima)*.

Due to the Monocacy River, which runs through the park, floodplains are an important landscape feature at the battlefield. At the time of the battle, floodplains were utilized as farmland and there were few areas of native plant-life along the rivers. Today, there are large forested areas along the rivers that act as a buffer between agricultural fields and waterways. These buffer zones reduce the amount of erosion along riverbanks and absorb nutrient and sediment runoff from neighboring fields. Due to the size of the Monocacy River and since much of the park is in the floodplain, the visitor center and surrounding fields are often flooded.

The wetlands that were specifically assessed for this project and were identified for restoration include 10.39 acres of degraded and previously impacted wetlands and 9,535 linear feet of stream channels throughout Monocacy NB. The dominant impact to the wetlands and streams within the park is the presence of agricultural practices within previous wetland areas and along the riparian edge of the stream channels.

Harpers Ferry National Historical Park

The wetlands within Harpers Ferry NHP are mainly located along the floodplains in forested wetland systems or as emergent wetland seeps typically found along upland slopes. Other wetlands within the park consist of open water ponds where natural wetlands have been impacted by the creation of berms to increase water levels.

The forested floodplain wetlands are dominated by skunk cabbage (*Symplocarpus foetidus)* in the understory and red maple and sweetgum in the canopy. The emergent wetlands identified within the park were typically dominated by cattail (*Typha)* and carex spp. However, due to the disturbance of many of the wetland areas by continuous mowing practices and adjacent agricultural uses, many of the emergent wetlands were dominated by upland grass species such as tall fescue (*Festuca arundinacea)*, common dandelion (*Taraxacum officinale)*, and annual rye grass (*Lolium multiflorum*).

The Shenandoah and Potomac rivers flow through the park but are outside the boundary; however, there are several small streams and ponds in the park.

The wetlands that were specifically assessed for this project and were identified for restoration include 0.93 acres of degraded and previously impacted wetlands and 826 linear feet of stream channel throughout Harpers Ferry NHP. The dominant impact to the wetlands within the park is the excessive presence of invasive species along stream channels and wetlands as well as active mowing and agricultural practices through wetlands and along the riparian buffer. Many of the stream channels identified throughout the park are proposed for full channel restoration and armoring as these channels are typically highly eroded and incised.

Catoctin Mountain Park

The majority of the wetlands in Catoctin MP include headwater forested wetland seeps, which are dominated by skunk cabbage in the understory and red maple and sweetgum in the canopy similar to what was found at Harpers Ferry NHP. Highbush blueberry *(Vaccinium corymbosum)* and spicebush are common dominant understory shrubs found in forested wetlands. Emergent wetlands were typically observed along the fringes of man-made open water ponds and were dominated by cattails and soft rush.

Two main permanent streams flow through the park and drain its two principal watersheds — Big Hunting Creek and Owens Creek. Big Hunting Creek consists of four permanent tributaries and numerous intermittent, unnamed tributaries. Blue Blazes Creek, a small tributary of Big Hunting Creek, lies entirely in the park. Very little understory or groundcover occurs in this stream valley, with a fair amount of sediment in the stream. Owens Creek consists of six permanent tributaries and numerous, intermittent, unnamed tributaries. A moderate gradient stream, Owens Creek contains a healthy population of brook trout. This creek begins primarily on the park's west side and flows north, where it leaves the park and flows through an agricultural area before briefly entering the park again for 0.25 mile. The general terrain of Owens Creek is not as rocky as Big Hunting Creek, and the bottom is a combination of silt, gravel, and small rocks. There is a fair amount of bank erosion, and the stream channel is changing. The most prominent tributary of Owens Creek within the park, Ike Smith, has significant erosion problems due to an upstream undersized culvert.

The wetlands that were specifically assessed for this project and were identified for restoration include 3.33 acres of degraded and previously impacted wetlands and 5,073 linear feet of stream channel throughout Catoctin MP. The dominant impact to the wetlands within the park is the creation of open water ponds limiting natural vegetated wetlands, and some altered hydrology from existing road crossings. A few stream channels throughout the park are experiencing localized erosion and potential fish blockages near historic culverts.

IMPACT ANALYSIS

The impact analysis was based on information provided by staff from the four parks, and the results of the on-site wetland/stream evaluations performed for the WRAP (appendix B, section 3.0 Field Assessment). The methodologies used to implement the recommended list of restoration and enhancement activities under the action alternative were analyzed as well as consideration of the restoration action in the long term.

Impacts of Alternative A: No-Action Alternative

Wetlands and streams at the parks are currently degraded by a variety of anthropogenic impacts including adjacent land development, park facility development, invasive exotic species, public infrastructure demands, changes in hydrology and water quality, and recreational uses. This has led to stream erosion and increased storm flows within stream channels, leading to degraded stream channels and an increased sediment and nutrient supply that are impacting streams. Wetlands, streams, and floodplains adjacent to agricultural fields have been impacted by agricultural practices. Agricultural land use, as well as other development within and near the park, has altered the natural hydrology of the wetlands often resulting in the draining of historic wetlands or even increasing the water levels, which flood vegetated wetlands and creates open water ponds. In addition, the parks are subjected to outside sources (e.g., right-of-way permits, special use permits) of impacts on wetlands and floodplains. These impacts are expected to continue under the no action alternative.

Current wetland management in the parks is limited and the parks manage their wetland resources as issues arise. Invasive species removal is the main action to manage wetlands at C&O Canal NHP and native plants have been planted in wetlands at Monocacy NB at Catoctin MP. These limited management actions would continue at the parks under the no action alternative. Wetlands are not expected to be adversely impacted by implementing invasive species removal since native wetland vegetation would be avoided during treatment of invasive plants and the function of the wetland would not change. In the long term, wetlands would benefit from the removal of invasive species since this would allow more native wetland vegetation to establish in areas previously dominated by invasive plants.

Wetlands are not expected to be adversely impacted by implementing native plantings since native wetland plants would be avoided during tree and shrub planting and the function of the wetland would not change. In the long term, wetlands would benefit from the enhancement of native vegetation within wetlands or along streambanks.

Cumulative Impacts. Past, current, and future planning efforts, including the deer management plans have a beneficial impact on wetlands because the reduction of deer allows the abundance and diversity of vegetation including wetland plants throughout the parks to recover from excessive deer browsing. The NCR invasive plant management plan would also benefit the parks by ensuring they have access to a wide range of methods to treat non-native invasive plants. The WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP would result in adverse impacts on wetlands but mitigation for wetlands would be implemented. Therefore, beneficial cumulative impacts are expected on wetlands at the parks when the beneficial impacts from the current management actions are added to the beneficial impacts from the deer plans and invasive plant plan.

Impacts of Alternative B: Action Alternative (NPS Preferred)

The impact analysis from the restoration actions proposed under alternative B for wetlands and streams is presented below. A list of the individual sites within the four parks where the restoration opportunities are proposed can be found in appendix B, tables 9 and 10.

Invasive Species Control. Beneficial impacts on wetlands would result from this technique because the removal of invasive species and the planting of native plants including wetland species would allow native wetland vegetation to establish in areas previously dominated by invasive plants thus resulting in an increase in plant diversity. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where invasive species control should be specifically managed in each of the parks which would help the parks to be ready to implement invasive species control when opportunities arise such as available funding, park priorities, and help from volunteer groups. Invasive species control can typically be accomplished without ground disturbance and little to no impact to other resources in the area; therefore, wetlands and floodplains are not expected to be adversely impacted since the functions of the wetland and floodplain would not change. Invasive species control was recommended at five sites within Catoctin MP, four sites within Monocacy NB, four sites at Harpers Ferry NHP, and 13 sites at C&O Canal NHP. Invasive species control is appropriate for forested and emergent wetlands as well as along stream channels.

Native Plantings/ Riparian Buffer Enhancement and Increased Plant Diversity. Beneficial impacts on wetlands would result from this technique due to the planting of native wetland vegetation within the wetland thus resulting in an increase in plant diversity. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where native plantings should be specifically planted in each of the parks, which would help the parks to be ready to implement native plantings when opportunities arise such as available funding, park priorities, and help from volunteer groups. The planting of vegetation within the wetland/floodplain would result in a small amount of ground disturbance for the placement of the plant material. Trees and shrubs would typically require a pit to be dug approximately 2-4 feet in diameter and a few feet deep, depending on the size of the plant material used. Similarly, the placement of herbaceous material would result in some ground disturbance although pits would only require a few inches to be dug for the insertion of plugs. Therefore, wetlands and floodplains are not expected to be adversely impacted by planting activities. This proposed restoration technique was recommended at seven sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 16 sites at C&O Canal NHP. Native plantings and riparian buffer enhancements would be applicable to all types of wetlands (e.g., forested, emergent, open water)

were plant diversity is low or invasive species control is needed, including along the riparian buffer of stream channels.

Restoration of Natural Hydrology. Implementation of this technique (e.g., filling, excavation, and grading) would adversely impact wetlands, streams, and floodplains in the short term due to disturbance of these resources from restoration construction activities. Many of the wetlands proposed for hydrologic restoration have been ditched or drained and would include the removal of these features through filling practices. Additionally, some wetlands along floodplains and within agricultural fields have been impacted through filling and would require excavation to restore the natural hydrology and interaction with the groundwater at the surface of the wetland. For example, CHOH-5 is a fallow field that has previously been disturbed from farming. It also has gravel sills located perpendicular to flow channels to reduce erosion from stormwater flow. The recommended restoration at CHOH-5 is to excavate the existing depression in the fallow field to lower the base elevation closer to groundwater for the restoration of the historic wetland. The gravel sills placed throughout the wetland area would also be removed (appendix B, table 12 and figure 31). Restoration of stream hydrology typically would require the reconnection of the stream to the floodplain by lowering the bank elevations through grading practices. For example, MONO-6 has a disconnected wetland and stream due to erosion and incision. The proposed restoration is to perform minor grading of the southern stream bank where the erosion is more severe to reconnect the stream channel to the emergent wetland. Channel grade control structures would also be placed in the channel to reconnect to the floodplain and to reduce erosion and incision within the channel (appendix B, table 12 and figure 21). Overall, in the long term restoring the natural hydrology at proposed locations within the parks would be beneficial to wetlands and floodplains. Restoration of natural hydrology was recommended at five sites within Catoctin MP, four sites within Monocacy NB, one site at Harpers Ferry NHP, and 11 sites at C&O Canal NHP. Restoration of natural hydrology is not limited to one specific type of wetland or stream system and can be applied to any system in which hydrology appears to have been altered by past disturbances.

Converting Open Water to Vegetated Wetlands. This technique includes the removal of existing berms or culverts, which would result in ground disturbance from the use of heavy equipment and would adversely impact wetlands in the short-term. However, wetlands would benefit in the long term by removing or altering the water control structure to lower the water elevations in the wetlands, which would allow more wetland vegetation to establish by reducing the amount of open water in the wetland area. Once the water levels are altered, the technique would also include the planting of native wetland vegetation as described above under native plantings to increase the habitat diversity in the wetland. Most of open ponds within the parks were wetlands that were dammed to provide for agricultural and/or recreational purposes, so the goal of the restoration activity is to return the site to its natural state. For example, at HAFE-4 there is an open pond that has invasive species growing along the edge of the pond and the wetland seep above it has been mowed. The pond has no outfall just an overflow area on the side of the pond's berm. The recommendation at this site is to restore an emergent wetland in place of the open water pond and to replant the edge of the pond with native vegetation to increase habitat value and plant diversity (appendix B, table 12, figure 26). Converting open water to vegetated wetlands was recommended at three sites within Catoctin MP, two sites within Monocacy NB, one site (HAFE-4) at Harpers Ferry NHP (described above), and three sites at C&O Canal NHP. This restoration technique is limited to existing open water ponds, which were identified at each of the four parks.

Increase Fish Passage. Implementation of this technique (e.g., removal of culvert, dams, placement of instream structures such as cross vanes of rock or logs) would adversely impact wetlands and streams in the short term due to disturbance from restoration construction activities. Man-made in-stream structures (e.g., culverts, dams, levees) can become physical barriers that impede fish passage and reduce connectivity through habitat fragmentation. This technique focuses on restoring safe upstream and downstream fish passage to streams and stream reaches that have become isolated by culverts and other

artificial obstructions. If full removal of the culvert is not possible, then the culvert can be replaced with a similar structure but altered in a way to reduce the drop of elevation at the end of the culvert. This can be accomplished by lowering of the culvert and crossing so the bottom of the culvert is partially buried on both ends. Alternatively, instream structures such as cross vanes of rock or logs could be placed to create small step-ups along the stream over a longer length rather than one large drop that blocks fish passage. For example, there is a 15-inch drop from the downstream end of an existing historic culvert to the stream at CATO-14 causing a concern for fish passage. Fish passage can be established at the site with grade control just below the culvert, which would gradually raise the stream to the culvert bottom elevation without impacting the historic culvert (appendix B, table 12, figure 14). Overall, in the long term this technique would benefit streams and stream reaches by removing culverts and other artificial obstructions in the stream to return the stream to a more natural condition. Increasing fish passage was recommended at five sites within Catoctin MP, one site within Monocacy NB, one site at Harpers Ferry NHP, and no sites were identified at C&O Canal NHP for this technique. This technique is most appropriate for riverine wetlands (stream channels) and does not apply to forested or emergent wetlands.

Full Channel Restoration. Implementing full channel restoration would result in short-term adverse impacts on streams. This restoration technique includes the placement of large structures (e.g., vanes, porous weirs, boulders, large wood, and logjams) within the stream channel, which would require the grading of stream banks and potential grading along the banks or lowering of the adjacent floodplain areas to allow the stream channel to overtop banks during high flood events. These large structures would require placement by heavy machinery and result in some earth disturbance along the stream banks. The construction for this type of restoration would also require access to the site via a temporary construction access road but the road would be made of mulch or timber mats to protect resources from heavy equipment access. This technique also includes bank armoring which is the placement of rock or logs along portions of the stream banks that receive high-energy flows along the bank and are actively eroding. The placement of this material for armoring may also require some grading back of the banks depending on the slope of the bank. All of these construction activities would contribute to short-term adverse impacts on the stream due to disturbance of the stream banks resulting in potential water quality issues such as turbidity. One of the largest full channel restoration project opportunities is at CHOH-25. This site has a straight mile long ditch with adjacent agricultural fields and forested areas. The channel is recommended to be reshaped within the existing wetland to increase sinuosity and habitat value. The existing wetland is partially drained by this ditch resulting in reduced hydrology, so lifting the ditch elevation to restore the natural wetland hydrology is also recommended at this site (appendix B, table 12 and figure 40). Overall, once construction is complete for this restoration technique, a degraded stream ecosystem would be returned to a more stable, healthy condition resulting in a long-term beneficial impact on the stream. Full channel restoration was recommended at five sites within Catoctin MP, five sites within Monocacy NB, two sites at Harpers Ferry NHP, and seven sites at C&O Canal NHP. This technique is most appropriate for riverine wetlands (stream channels) and does not apply to forested or emergent wetlands.

Increasing Aesthetic or Educational Value. Placement of educational signs near wetlands and or streams is not expected to impact wetlands adversely since minimal ground disturbance would be needed for the placement of signposts. There would be no filling of wetlands associated with the construction of trails since the existing natural terrain would be utilized for new trails and the boardwalk would be elevated or would be located to avoid wetlands. Wetlands would benefit indirectly by providing education to visitors on the importance of wetlands. This proposed restoration technique was recommended at nine sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 11 sites at C&O Canal NHP. This restoration technique is not limited to one specific type of wetland or stream system.

Agricultural/Disturbance Exclusion Fencing. Existing wetlands would be avoided when fencing, signs, or large natural barriers such as boulders or logs are placed along the edge of wetlands to keep equipment

away from the wetlands. In the long term, there would be a beneficial impact on wetlands since the fencing would prevent disturbance of the wetlands thus allowing more native wetland vegetation to establish. No sites were identified for this proposed restoration technique within Catoctin MP since there is no agricultural use at this park, but two sites within Monocacy NB, two sites at Harpers Ferry NHP, and three sites at C&O Canal NHP were recommended for exclusion fencing. This restoration technique is not limited to one specific type of wetland or stream system and can be applied to any system, which was identified as being impacted by agricultural or maintenance practices.

Cumulative Impacts. Cumulative impacts are as described for the no action alternative. The deer management plans and NCR invasive plant plan would have a beneficial impact on wetlands. The WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP would result in adverse impacts on wetlands but mitigation for the wetlands would be implemented. Therefore, cumulative beneficial impacts are expected on wetlands at the parks when the beneficial impacts from the restoration actions under alternative B are added to the beneficial impacts from the plans.

Conclusion. Many of the restoration techniques including invasive species control, native plantings/riparian buffer enhancement, aesthetic/educational value, and agricultural/disturbance exclusion fencing would not adversely impact wetlands during implementation. However, techniques including, converting open water to vegetated wetlands, increasing fish passage, and restoration of natural hydrology, would result in short-term adverse impacts on wetlands. These techniques include the use of heavy equipment and construction activities such as removal of culverts, filling, excavation, and grading. The restoration technique that results in the most adverse impact on wetlands during construction is full channel restoration. This technique includes the placement of large structures within the stream channel, which would require grading, excavation, bank armoring, and filling of existing channel areas by heavy machinery resulting in disturbance along the stream banks. All of these construction activities would contribute to adverse impacts on the stream due to disturbance of the stream banks resulting in potential water quality issues such as turbidity.

In the long term, all of these restoration techniques would result in beneficial impacts on wetlands and streams. Removal of invasive species would allow more native wetland vegetation to establish in areas previously dominated by invasive plants; native plantings would enhance the existing vegetation; restoration of natural hydrology would improve the function and health of streams; converting open water to vegetated wetlands would allow more native wetland vegetation to establish; increasing fish passage restores safe upstream and downstream fish passage; full channel restoration restores a degraded stream ecosystem to a more stable, healthy condition; increasing educational value would help visitors to understand the importance of wetlands; and agricultural exclusion fencing would prevent disturbance of the wetlands thus allowing more native wetland vegetation to establish.

VEGETATION

Generally, the four parks fall within the Eastern Deciduous Forest ecosystem. These forests are dominated by broad-leafed trees that shed their leaves annually, with scattered or infrequent stands of evergreen cone-bearing seed plants such as pines and hemlocks. The Eastern Deciduous Forest canopy is dominated by species of oak (*Quercus spp.*), hickories (*Carya spp.*), tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), and maples (*Acer* spp.).

Most of the forested areas throughout the parks are fragmented by agricultural uses or development including homes, roads and other infrastructure. Common native understory species identified throughout the four parks include spicebush, common greenbriar (*Smilax rotundifolia*), mountain laurel (*Kalmia latifolia*), and lowbush blueberry (*Vaccinium angustifolium*).

The fragmentation of the forest ecosystems at the parks appears to have caused an increased density of invasive or exotic species in the understory, which in general is dominated by multiflora rose and Japanese honeysuckle (*Lonicera japonica*). Exotic species have a negative impact on natural resources, native plant communities, and management activities associated with them. It is important to remove exotic species because they out-compete native vegetation and encroach on the natural areas within the parks. After the exotics have established themselves, they will quickly spread and not allow any other species to grow there. Maintaining biological diversity with the presence of these invasive species is an ongoing struggle that consumes countless resources at the parks and at the national level.

AFFECTED ENVIRONMENT

The following descriptions of the vegetation identified at each of the four parks below is from observations made during the March/April 2016 wetland field evaluation that was performed at potential restoration sites.

Chesapeake & Ohio Canal National Historical Park

The C&O Canal NHP is situated along the floodplain of the Potomac River and therefore is dominated by a Silver Maple Floodplain Forest. This community is most common on low terraces and levees of the floodplain and islands of large tributaries and rivers. The canopy of the Silver Maple Floodplain Forests is strongly dominated by silver maple, red maple, and American sycamore. Along the river edge black willow (*Salix nigra*) and American sycamore dominate. The understory of the forest along the canal is dominated by box-elder (*Acer negundo*), American elm (*Ulmus americana*), and slippery elm (*Ulmus rubra*), gray dogwood (*Cornus racemosa*), poison-ivy (*Toxicodendron radicans*), spicebush, elderberry (*Sambucus canadensis*). Along the upper slopes of the parks forested areas the typical oak-hickory forests dominate and are also found throughout the other parks. Commonly occurring invasive plant species are multiflora rose, bush honeysuckle (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*), Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), and garlic-mustard (*Alliaria petiolata*). Approximately 1,200 acres of the park is used for agricultural practices.

High white-tailed deer (*Odocoileus virginianus*) populations and invasive plants are a concern at the park. Deer pose a problem because, in high concentrations, they can prevent forest regeneration by eating all of the young vegetation and removing the forest understory. The pressure of over browsing, coupled with the competitive pressure of invasive plants is a concern for the parks' forests.

Monocacy National Battlefield

The vegetation composition and patterns at Monocacy NB are indicative of the open natural and agricultural landscape in the Piedmont region of Maryland. The park is approximately 40 percent forested and 60 percent agricultural land and represents a patchwork of upland and riparian forested areas interspersed with agricultural lands and open fields. Portions of the park are undergoing old-field succession; whereas, other portions are second or third growth forests with mature hardwoods. The diverse nature of the landscape offers a number of vegetation and habitat types. Even though the elevation range at Monocacy NB is relatively insignificant, upland areas contain associated dry site species such as oak, hickory, and American beech. At Monocacy NB, the lowland riparian forests in the floodplain of the river and along streams are dominated by maple (*Acer* spp.), American sycamore (*Platanus occidentalis*), hackberry (*Celtis occidentalis*), and ash (*Fraxinus* spp.). Recently disturbed areas are characterized by generalist tree species such as tulip poplar, black cherry (*Prunus serotina*), black locust (*Robinia pseudoacacia*), boxelder (*Acer negundo*), and the invasive and nonnative tree-of-heaven.

The battlefield has an active agricultural lease program (750 acres) and high white-tailed deer populations and invasive plants are a concern at Monocacy NB.

Harpers Ferry National Historical Park

Approximately 70 percent of Harpers Ferry NHP is covered with eastern deciduous forest. Well-drained forest ridges in the park are characterized by chestnut oak (*Quercus prinus*), black oak (*Quercus velutina*), and northern red oak (*Quercus rubra*). Some of the better-drained slopes are covered with bitternut hickory (*Carya cordiformis*), tulip poplar, and sugar maple (*Acer saccharum*). Shrub species common to this area include mountain laurel (*Kalmia latifolia*), mapleleaf viburnum (*Viburnum acerfolium*), and spicebush. Some of the most abundant vine species found in the park include greenbrier (*Smilax rotundifolia*), Virginia creeper (*Parthenocissus quinquefolia*), and wild grape (*Vitis spp*.). Approximately 440 acres of the park is used for agricultural practices.

There are concerns over the effects of white-tailed deer overpopulation and the spread of invasive plants in the park.

Catoctin Mountain Park

Approximately 90 percent of Catoctin MP is covered with forest. Most of the park contains a mixture of oaks, hickories, maple, and tulip poplar. Japanese barberry was by far the most dominant understory species throughout the upland areas and is an invasive species found throughout the uplands of the entire park. Other types of trees that can be found in the park include cherry, ash, sassafras, elm, butternut, locust, walnut, hemlock, and white pine. There is no agricultural land use within the park.

Catoctin MP completed the seventh year of white-tailed deer population reduction as prescribed in the *Catoctin White-tailed Deer Management Plan / Final EIS*. NPS employees that conduct annual plant surveys found that there are nearly 10 times the number of native tree seedlings today than there were before deer management operations began. Before deer management, there were roughly 255 seedlings per acre and there are currently about 2,443 seedlings per acre. Park staff will continue to conduct annual vegetation monitoring, fall deer density surveys, and deer reduction operations as needed.

IMPACT ANALYSIS

General vegetation within the parks was considered for the impact analysis. The methodologies used to implement the recommended list of restoration and enhancement activities for the action alternative were analyzed as well as consideration of the restoration action in the long term.

Impacts of Alternative A: No-Action Alternative

Vegetation within the parks is adversely impacted by park facility development, invasive exotic species, and recreational uses. Most of the forested areas throughout the parks are fragmented by agricultural uses or development including homes, roads, and other infrastructure. The fragmentation of the forest ecosystems at the parks appears to have caused an increased density of invasive or exotic species. Exotic species have a negative impact on natural resources and native plant communities. In addition, the parks are subjected to outside sources (e.g., right-of-way permits, special use permits) of impacts on vegetation. These impacts on vegetation are expected to continue under the no action alternative.

Current wetland management in the parks, including invasive species removal at C&O Canal NHP and planting native plants at Monocacy NB and Catoctin MP, benefit vegetation in these parks. These limited management actions would continue at the parks under the no action alternative. Vegetation would

benefit in the long term due to the removal of invasive species since this would allow more native wetland vegetation to establish in areas previously dominated by invasive plants. Invasive exotic species out-compete native vegetation and encroach on the natural areas within the parks. After the exotics have established themselves, they will quickly spread and not allow any other species to grow there. Planting native plants is an enhancement activity that would benefit vegetation in the long term by increasing biological diversity.

Cumulative Impacts: The deer management plans have a beneficial impact on vegetation because the reduction of deer allows the abundance and diversity of vegetation throughout the parks to recover from excessive deer browsing. The NCR invasive plant management plan would also benefit the vegetation in the parks. The WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP, the transmission line project at Harpers Ferry NHP, and the MD 355 bridge project at Monocacy NB would result in adverse impacts on vegetation due to vegetation clearing. Therefore, there would be both beneficial and adverse cumulative impacts on vegetation at the parks. Cumulative beneficial impacts are expected when the beneficial impacts from the current management actions are added to the beneficial impacts from the deer plans and invasive plant plan. However, cumulative adverse impacts are expected at Harpers Ferry NHP, C&O Canal NHP, and Monocacy NB from vegetation clearing.

Impacts of Alternative B: Action Alternative (NPS Preferred)

The impact analysis from the restoration actions proposed under alternative B for vegetation is presented below. A list of the individual sites within the four parks where these restoration opportunities are proposed can be found in appendix B, tables 9 and 10.

Invasive Species Control. Beneficial impacts on vegetation would result from this technique because the removal of invasive species and the planting of native species would allow native vegetation to establish in areas previously dominated by invasive plants thus resulting in an increase in plant diversity. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where invasive species control should be specifically managed in each of the parks which would help the parks to be ready to implement invasive species control when opportunities arise such as available funding, park priorities, and help from volunteer groups. Invasive species control can typically be accomplished without ground disturbance and little to no impact to other resources in the area; therefore, existing native vegetation is not expected to be adversely impacted. Invasive species control was recommended at five sites within Catoctin MP, four sites within Monocacy NB, four sites at Harpers Ferry NHP, and 13 sites at C&O Canal NHP.

Native Plantings/ Riparian Buffer Enhancement and Increased Plant Diversity. Beneficial impacts on vegetation would result from the planting of native vegetation since it increases plant diversity. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where native plantings should be specifically planted in each of the parks, which would help the parks to be ready to implement native plantings when opportunities arise such as available funding, park priorities, and help from volunteer groups. Native plantings would result in a small amount of ground disturbance for the placement of the plant material. Trees and shrubs would typically require a pit to be dug approximately 2-4 feet in diameter and a few feet deep and herbaceous material would only require a few inches to be dug for the insertion of plugs. Therefore, existing native vegetation is not expected to be adversely impacted by native planting activities. This proposed restoration technique was recommended at seven sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 16 sites at C&O Canal NHP.

Restoration of Natural Hydrology. Implementation of this technique (e.g., filling, excavation, and grading) could adversely impact vegetation in the short term due to disturbance from restoration construction activities. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. Long-term impacts to vegetation could be beneficial if the recommended restoration of the site also includes invasive species control and native plantings, which would increase plant diversity. Additionally, restoring the natural hydrology of wetlands would include impacting current upland areas that were previously wetlands. This would involve the removal of some upland vegetation to be replaced with hydrophytic vegetation. The removal of the upland vegetation would be adverse but short term since the site would be planted immediately following ground disturbance or vegetation removal. Typically, the upland species would be replaced with similar species with a wetter wetland indicator status where the intent is to replace the upland species with native species commonly found throughout the parks' wetlands. Restoration of natural hydrology was recommended at five sites within Catoctin MP, four sites within Monocacy NB, one site at Harpers Ferry NHP, and 11 sites at C&O Canal NHP.

Converting Open Water to Vegetated Wetlands. This technique includes the removal of existing berms or culverts, which would result in ground disturbance from the use of heavy equipment and could adversely impact vegetation in the short-term. However, vegetation would benefit in the long term since this technique includes the planting of native vegetation as described above under native plantings to increase the habitat diversity in the wetland. For example, at HAFE-4 there is an open pond that has invasive species growing along the edge of the pond. The recommendation at this site is to restore an emergent wetland in place of the open water pond and to replant the edge of the pond with native vegetation to increase habitat value and plant diversity (appendix B, table 12, figure 26). Converting open water to vegetated wetlands was recommended at three sites within Catoctin MP, two sites within Monocacy NB, one site (HAFE-4) at Harpers Ferry NHP (described above), and three sites at C&O Canal NHP.

Increase Fish Passage. Implementation of this technique (e.g., removal of culvert, placement of instream structures) could adversely impact vegetation in the short term due to disturbance from restoration construction activities. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. No long-term direct beneficial impacts on vegetation are expected from this technique, but long-term indirect beneficial impacts on vegetation would occur when the recommended restoration of the site also includes invasive species control and native plantings, which would result in increased plant diversity. For example, at CATO-1 invasive species control and riparian buffer enhancement is recommended to increase the streams buffer habitat and plant diversity (appendix B, table 12, figure 6a). Increasing fish passage was recommended at five sites within Catoctin MP, one site within Monocacy NB, one site at Harpers Ferry NHP, and no sites were identified at C&O Canal NHP for this technique.

Full Channel Restoration. Implementing full channel restoration could result in short-term adverse impacts on vegetation due to disturbance from restoration construction activities (e.g., placement of structures, grading, and excavation). Heavy machinery would be needed and earth disturbance may occur along the stream banks. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. Long-term impacts on vegetation would be beneficial when the recommended restoration of the site also includes invasive species control and native plantings. For example, at CHOH-12 invasive species control and riparian buffer enhancement is recommended to increase the streams buffer habitat and plant diversity (appendix B, table 12, figure 33). Full channel restoration was recommended at five sites within Catoctin MP, five sites within Monocacy NB, two sites at Harpers Ferry NHP, and seven sites at C&O Canal NHP.

Increasing Aesthetic or Educational Value. Placement of educational signs is not expected to impact vegetation adversely since minimal ground disturbance would be needed for the placement of signposts.

However, construction of trails and boardwalks could require vegetation clearing thus resulting in an adverse impact on vegetation. However, construction practices would avoid or minimize impacts on existing vegetation. No long-term direct beneficial impacts on vegetation are expected from this technique, but long-term indirect beneficial impacts on vegetation would occur when the recommended restoration of the site also includes invasive species control and native plantings, which would result in increased plant diversity. This proposed restoration technique was recommended at nine sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 11 sites at C&O Canal NHP.

Agricultural/Disturbance Exclusion Fencing. Placement of fencing or large natural barriers could result in short-term adverse impacts on vegetation due to disturbance from installation of these structures. However, there would be limited ground disturbance needed for post installation for fences or signs. Placement of large natural materials such as boulders would disturb existing grasses. In the long term, there would be an adverse impact on small areas of vegetation removed or disturbed by the placement of the barriers or posts, but the overall impact on the vegetation at each site would be beneficial since the fencing would prevent continued disturbance of the wetland vegetation within the exclusion area. There would be a larger area that would benefit then the areas disturbed by the placement of the exclusion device. This restoration technique would limit the ongoing disturbances to vegetation with the exclusion area and would allow for natural plant growth and production as well as natural succession of plant communities. No sites were identified for this proposed restoration technique within Catoctin MP since there is no agricultural use at this park, but two sites within Monocacy NB, two sites at Harpers Ferry NHP, and three sites at C&O Canal NHP were recommended for exclusion fencing.

Cumulative Impacts: Cumulative impacts for projects are as described for the no action alternative. The deer plans and NCR invasive plant plan would have a beneficial impact on vegetation. However, the WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP, transmission line project at Harpers Ferry NHP, and MD 355 bridge project at Monocacy NB result in adverse impacts on vegetation due to vegetation clearing. Therefore, there would be both beneficial and adverse cumulative impacts on vegetation at the parks. Cumulative beneficial impacts are expected when the beneficial impacts from the restoration actions under alternative B are added to the beneficial impacts from the deer plans and invasive plant plan. However, adverse cumulative impacts are expected at Harpers Ferry NHP, C&O Canal NHP, and Monocacy NB from vegetation clearing.

Conclusion. Many of the restoration techniques including restoration of natural hydrology, converting open water to vegetated wetlands, increasing fish passage, full channel restoration, increasing aesthetic/ educational value, and agricultural/disturbance exclusion fencing would result in short term adverse impacts on vegetation during implementation. The most disturbance to vegetation would occur from the restoration of natural hydrology, converting open water to vegetated wetlands, increasing fish passage, and full channel restoration due to use of heavy equipment resulting in land disturbance; however, at the completion of construction for these techniques, the site would be restored to preexisting conditions which includes revegetation with native species.

In the long term, many of the restoration techniques including invasive species control, native plantings/riparian buffer enhancement, converting open water to vegetated wetlands, and agricultural/disturbance exclusion fencing would result in beneficial impacts on vegetation. Removal of invasive species would allow more native wetland vegetation to establish, native plantings would enhance the existing vegetation, converting open water to vegetated wetlands would allow more native wetland vegetation to establish, and agricultural exclusion fencing would prevent disturbance of wetland plants thus allowing more native vegetation to establish.

WILDLIFE AND WILDLIFE HABITAT

One of the most important functions of wetlands is to provide habitat and food web support for wildlife. Wildlife observed throughout the parks during the March/April 2016 wetland field evaluation are similar from park to park and included squirrels, chipmunks, white-tailed deer, box turtles, wood frogs (*Lithobates sylvaticus)*, spring peepers (*Pseudacris crucifer*), groundhogs (*Marmota monax*), bullfrogs, spotted salamander (*Ambystoma maculatum*), redback salamander (*Plethodon cinereus)*, two lined salamander (*Eurycea bislineata*), garter snakes and various song birds.

AFFECTED ENVIRONMENT

The following sections generally describe the wildlife and wildlife habitat in each of the four parks.

Chesapeake & Ohio Canal National Historical Park

The variety in both topography and vegetation lends itself to a rich and equally varied wildlife population at C&O Canal NHP. Most commonly seen at the park are the small mammals such as gray fox (*Urocyon cinereoargenteus)*, squirrel, opossum (*Didelphis virginiana*), and cottontail rabbit (*Sylvilagus floridanus*). Skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), and groundhog are frequently observed and larger mammals like the white-tailed deer and red fox (*Vulpes vulpes*) are also present. The great variety of habitats coupled with the proximity of the eastern flyway makes the park a haven for both permanent and migratory bird populations. Permanent residents include wild turkey (*Meleagris gallopavo*), turkey vulture (*Cathartes aura*), hawk, mourning dove (*Zenaida macroura*), blackbird (*Turdus merula*), woodpecker, robin (*Turdus migratorius)*, cardinal, quail, jay, wren, chickadee, and titmice. Migratory species include mallard (*Anas platyrhynchos*), coot *(Fulica americana*), wood duck (*Aix sponsa*), gull, finch, junco, heron, catbird (*Dumetella carolinensis*), and vireo. The migratory birds such as the puddle ducks and warblers are abundant in Whites Ferry to Great Falls in Montgomery County and in the Brunswick area. The park also has an abundant population of insects, fish, and reptiles; however, amphibians are known to be in decline at the park (Grant et. al. 2013). Wood turtles (*Glyptemys insculpta*) were observed during the March/April 2016 wetland field evaluation.

Monocacy National Battlefield

Monocacy NB provides excellent habitat for many types of wildlife, especially birds. Fencerow corridors, grassland habitat, open meadows, agricultural fields, riparian zones, and forest interiors are all different types of bird habitat that can be found within the park. In an inventory performed in 1999 & 2000 by Frostburg State University, 80 different species of birds were observed within the park. This study found that species richness and bird density was highest in riparian habitats, followed by fencerow habitat, then finally forest interior habitat. Many different types of amphibians can be found at the park including the American toad *(Anaxyrus americanus)* and the northern spring peeper (*Pseudacris crucifer crucifer*). The park is home to a variety of salamanders such as the spotted, marbled, long-tailed, and red-backed salamanders. Reptiles such as snakes, turtles, lizards and skinks can be found in the park. Some reptiles prefer moist floodplains and shaded forests, while others are well suited for open grassland and agricultural fields. A total of 34 different species of mammals have been known to inhabit the park such as shrews, voles, moles, muskrats, lemmings, mice, chipmunks, squirrels, fox, raccoons, skunks, and groundhogs. The larger mammal species found in the park include black bear *(Ursus americanus)*, white-tailed deer, and coyotes (*Canis latrans*). The rising population of deer has an intense effect on the herbaceous and woody plants found within the park.

The battlefield has several freshwater streams and many tributaries within its boundaries. The major water body is the Monocacy River, which runs right through the center of the park. The small, unnamed

tributaries located in the battlefield are intermittent or seasonally inundated. During the summer of 2003, Frostburg State University conducted a fish survey and found 36 species including the greenside darter (*Etheostoma blennioides***)** that prefers the swift moving currents of the Monocacy River and the common carp that prefers the tranquility of a pond.

Harpers Ferry National Historical Park

Harpers Ferry NHP is home to a highly diverse animal community of insects, reptiles, amphibians, birds, and mammals. Habitat types include riparian zones, agricultural fields, upland forests, developed areas, wetlands, geologic exposures, rockslide sites, and rare limestone glades. Wildlife found at the park include frogs, salamanders, turtles, snakes, and lizards. Over 170 bird species and 30 mammal species have been identified in the park. Squirrels, chipmunks, opossums, raccoons, and several bat species are common in the park. White-tailed deer move and feed throughout the park and park resource specialists are concerned that deer have overpopulated the park and are causing impacts on other resources. Historically, 43 species of fish have been encountered in the park in the Potomac and Shenandoah rivers and their tributaries. Freshwater game fish include bass, catfish, and sunfish, and other fish indigenous to the river waters include dace, chub, shiner, darter, minnows, bullhead, and carp.

Catoctin Mountain Park

Catoctin MP's forested ecosystem is habitat for more than 280 species of animals (excluding invertebrates), most of which are resident and migratory birds. Common wildlife that are found in the park include squirrels, chipmunks (*Tamias striatus*), mice (*Peromyscus* spp.), pileated woodpeckers (*Dryocopus pileatus*), wild turkeys, brook trout, bats, wood frogs (*Rana sylvatica*), and eastern box turtles (*Terrapene carolina*). Mammals found in the park, in addition to white-tailed deer, include striped skunks, woodchucks (*Marmota monax*), squirrels, chipmunks, several species of mice, eastern cottontail rabbits, opossums, raccoons, red foxes, gray foxes, coyotes, bobcats, beavers, mink, and black bears. Approximately 170 species of birds occur in the park during some part of the year, including great horned owls (*Bubo virginianus*), wild turkeys, hawks, woodpeckers, and a variety of songbirds such as crows, warblers, sparrows, and finches.

The park provides habitat for about 30 species of reptiles and amphibians. To date, 22 species of amphibians — salamanders, frogs, and toads — have been identified at the park. These species are generally found close to a water source as part of their life cycle is in an aquatic form. Therefore, habitat important to amphibians is generally close to small pools and stream drainages. There are 12 different species of salamanders and 1 species of newt at Catoctin MP. Spotted salamanders spend most of their time underground in animal burrows and natural underground openings. Some salamanders do not have an aquatic life form (e.g., redback salamander), and while these species are less dependent on water pools, they still require moist ground cover.

Small but viable populations of brook trout continue to survive in Ike Smith Creek and Owens Creek. These streams are very small and vulnerable to drought, severe flooding, and sedimentation, all of which threaten the survival of the brook trout. Brook trout were observed during the March/April 2016 wetland field evaluation. Other fish species in Catoctin's streams include American eel (*Anguilla rostrata*), white sucker (*Catostomus commersoni*), mottled sculpin (*Cottus bairdii*), longnose dace (*Rhinichthys cataractae*), rosyside dace (*Clinostomus funduloides*), cutlips minnow (*Exoglossum maxillingua*), blacknose dace (*Rhinichthys atratulus*), creek chub (*Semotilus atromaculatus*), common shiner (*Luxilus cornutus*), and fantail darter (*Etheostoma flabellare*.

IMPACT ANALYSIS

General wildlife and wildlife habitat within the parks was considered for the impact analysis. The methodologies used to implement the recommended list of restoration and enhancement activities for the action alternative were analyzed as well as consideration of the restoration action in the long term.

Impacts of Alternative A: No-Action Alternative

Wildlife and wildlife habitat at the parks is adversely impacted by park facility development, invasive exotic species, and recreational uses. Most of the forested areas throughout the parks that provide wildlife habitat are fragmented by agricultural uses or development including homes, roads, and other infrastructure. The fragmentation of this ecosystem at the parks appears to have caused an increased density of invasive or exotic species. Exotic species have a negative impact on native plant and wildlife communities. In addition, the parks are subjected to outside sources (e.g., right-of-way permits, special use permits) of impacts on wildlife and wildlife habitat. These impacts are expected to continue under the no action alternative.

Current wetland management in the parks including invasive species removal at C&O Canal NHP and planting native plants at Monocacy NB and Catoctin MP would provide a benefit to wildlife and wildlife habitat in these parks. These limited management actions would continue at the parks under the no action alternative. Wildlife habitat would benefit in the long term due to the removal of invasive species since this would allow more native vegetation to establish in areas previously dominated by invasive plants. Planting native plants would benefit wildlife habitat in the long term by increasing biological diversity.

Cumulative Impacts. Cumulative impacts for wildlife and wildlife habitat are similar to impacts analyzed for vegetation. The deer management plans and invasive plant plan have a beneficial impact on wildlife habitat in the parks. The WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP, the transmission line project at Harpers Ferry NHP, and the MD 355 bridge project at Monocacy NB would result in adverse impacts on wildlife habitat due to vegetation clearing. Therefore, there would be both beneficial and adverse cumulative impacts on wildlife and wildlife habitat at the parks. Cumulative beneficial impacts are expected when the beneficial impacts from the current management actions are added to the beneficial impacts from the deer plans and invasive plant plan. However, cumulative adverse impacts are expected at Harpers Ferry NHP, C&O Canal NHP, and Monocacy NB from vegetation clearing.

Impacts of Alternative B: Action Alternative (NPS Preferred)

The impact analysis from the restoration actions proposed under alternative B for wildlife and wildlife habitat is presented below. A list of the individual sites within the four parks where these restoration opportunities are proposed can be found in appendix B, tables 9 and 10.

Invasive Species Control. Beneficial impacts on wildlife habitat would result from this technique because the removal of invasive species and the planting of native species would allow native vegetation to establish in areas previously dominated by invasive plants thus resulting in an increase in plant diversity and an improvement to wildlife habitat. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where invasive species control should be specifically managed in each of the parks which would help the parks to be ready to implement invasive species control when opportunities arise such as available funding, park priorities, and help from volunteer groups. Invasive species control can typically be accomplished without ground disturbance and little to no impact to other resources in the area; therefore, wildlife is not expected to be adversely impacted from

this technique. Invasive species control was recommended at five sites within Catoctin MP, four sites within Monocacy NB, four sites at Harpers Ferry NHP, and 13 sites at C&O Canal NHP.

Native Plantings/ Riparian Buffer Enhancement and Increased Plant Diversity. Beneficial impacts on wildlife habitat would result from the planting of native vegetation since it increases plant diversity, which increases the habitat value for wildlife. In addition, alternative B would provide an additional benefit since the WRAP would provide guidance on where native plantings should be specifically planted in each of the parks, which would help the parks to be ready to implement native plantings when opportunities arise such as available funding, park priorities, and help from volunteer groups. Native plantings would result in a small amount of ground disturbance for the placement of the plant material. Trees and shrubs would typically require a pit to be dug approximately 2-4 feet in diameter and a few feet deep and herbaceous material would only require a few inches to be dug for the insertion of plugs. Therefore, wildlife habitat is not expected to be adversely impacted by native planting activities. This proposed restoration technique was recommended at seven sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 16 sites at C&O Canal NHP.

Restoration of Natural Hydrology. Implementation of this technique (e.g., filling, excavation, and grading) would adversely impact wildlife and wildlife habitat in the short term due to disturbance from restoration construction activities. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. Aquatic wildlife habitat would benefit in the long term due to the streams restoration; the stream would be returned to normal hydrologic conditions thus improving aquatic wildlife habitat. Long-term impacts to wildlife habitat could be beneficial if the recommended restoration of the site also includes invasive species control and native plantings, which would increase plant diversity and improve wildlife habitat. Restoration of natural hydrology was recommended at five sites within Catoctin MP, four sites within Monocacy NB, one site at Harpers Ferry NHP, and 11 sites at C&O Canal NHP.

Converting Open Water to Vegetated Wetlands. This technique includes the removal of existing berms or culverts, which would result in ground disturbance from the use of heavy equipment and would adversely impact wildlife and wildlife habitat in the short-term. There would be a long-term adverse impact to fish and fish habitat if fish are inhabiting any of the open water areas proposed for conversion to wetlands. However, water level elevations would only be lowered so some open water would remain at most of the sites. Other species such as amphibians should be able adjust to the conversion of the habitat since some open water would remain. A long-term benefit from this technique on wildlife would include the addition of wetland habitat, which would provide a more diverse wildlife habitat including additional cover and food for wildlife species to utilize. In addition, this technique includes the planting of native vegetation in the wetland, which would contribute to increasing the wildlife habitat value. Converting open water to vegetated wetlands was recommended at three sites within Catoctin MP, two sites within Monocacy NB, one site (HAFE-4) at Harpers Ferry NHP (described above), and three sites at C&O Canal NHP.

Increase Fish Passage. Implementation of this technique (e.g., removal of culvert, placement of instream structures) would adversely affect wildlife and wildlife habitat in the short term due to disturbance from restoration construction activities. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. In the long term, this technique would benefit fish by improving fish passage in streams from the removal of physical barriers that impedes fish passage. This technique restores safe upstream and downstream fish passage to streams and stream reaches that have become isolated by culverts and other artificial obstructions. Indirect long-term beneficial impacts on wildlife habitat would occur when the recommended restoration of the site also includes invasive species control and native plantings, which would result in increased plant diversity thus increasing the habitat value. Increasing fish passage was recommended at five sites within Catoctin

MP, one site within Monocacy NB, one site at Harpers Ferry NHP, and no sites were identified at C&O Canal NHP for this technique.

Full Channel Restoration. Implementing full channel restoration would result in short-term adverse impacts on wildlife and wildlife habitat due to disturbance from restoration construction activities (e.g., placement of structures, grading, and excavation). Heavy machinery would be needed and earth disturbance may occur along the stream banks. However, at the completion of construction, the site would be restored to preexisting conditions, which includes revegetation with native species. Wildlife would benefit in the long term due to the restoration of a degraded stream ecosystem; the stream would be returned to a more stable, healthy condition. Indirect long-term beneficial impacts on wildlife habitat would occur when the recommended restoration of the site also includes invasive species control and native plantings, which would result in increased plant diversity thus increasing the habitat value. Full channel restoration was recommended at five sites within Catoctin MP, five sites within Monocacy NB, two sites at Harpers Ferry NHP, and seven sites at C&O Canal NHP.

Increasing Aesthetic or Educational Value. Placement of educational signs and construction of trails and boardwalks would adversely affect wildlife and wildlife habitat in the short term due to construction activities. In the long term, wildlife would benefit indirectly by providing education to visitors on the importance of wildlife habitat. Long-term indirect beneficial impacts on wildlife habitat would occur when the recommended restoration of the site also includes invasive species control and native plantings, which would result in increased plant diversity thus increasing habitat value. This proposed restoration technique was recommended at nine sites within Catoctin MP, six sites within Monocacy NB, four sites at Harpers Ferry NHP, and 11 sites at C&O Canal NHP.

Agricultural/Disturbance Exclusion Fencing. Placement of fencing or large natural barriers would result in short-term adverse impacts on wildlife due to disturbance from installation of these structures. In the long term, there would be a beneficial impact on wildlife and wildlife habitat since the fencing would prevent disturbance of wetland habitat thus allowing vegetation to establish providing a more diverse habitat for wildlife. No sites were identified for this proposed restoration technique within Catoctin MP since there is no agricultural use at this park, but two sites within Monocacy NB, two sites at Harpers Ferry NHP, and three sites at C&O Canal NHP were recommended for exclusion fencing.

Cumulative Impacts. Cumulative impacts for projects are as described for the no action alternative. The deer plans and invasive plant plan would have a beneficial impact on wildlife habitat. However, the WSSC submerged channel project and the restoration of canal operations project at C&O Canal NHP, transmission line project at Harpers Ferry NHP, and MD 355 bridge project at Monocacy NB result in adverse impacts on wildlife habitat. Therefore, there would be both beneficial and adverse cumulative impacts on wildlife and wildlife habitat at the parks. Cumulative beneficial impacts are expected when the beneficial impacts from the restoration actions under alternative B are added to the beneficial impacts from the deer plans and invasive plant plan. However, cumulative adverse impacts are expected at Harpers Ferry NHP, C&O Canal NHP, and Monocacy NB from vegetation clearing.

Conclusion: Many of the restoration techniques including restoration of natural hydrology, converting open water to vegetated wetlands, increasing fish passage, full channel restoration, increasing aesthetic/ educational value, and agricultural/disturbance exclusion fencing would result in short- and long-term adverse impacts on wildlife and wildlife habitat during implementation. The most disturbance to wildlife and wildlife habitat would occur from the restoration of natural hydrology, converting open water to vegetated wetlands, increasing fish passage, and full channel restoration due to use of heavy equipment; however, at the completion of construction for these techniques, the site would be restored to preexisting conditions which includes revegetation with native species. In the long term, all of the restoration techniques would result in beneficial impacts on wildlife habitat. Removal of invasive species would

allow more native vegetation habitat to establish, native plantings would enhance the existing vegetation, and converting open water to vegetated wetlands would provide a more diverse wildlife habitat including additional cover and food for wildlife species to utilize. Restoration of the natural hydrology, increasing fish passage, and full channel restoration would benefit aquatic wildlife by restoring the stream to more natural conditions. Wildlife would benefit indirectly by providing education to visitors on the importance of wildlife habitat and agricultural exclusion fencing would prevent disturbance of wetland plants thus allowing native vegetation habitat to establish providing a better quality habitat for wildlife.

CULTURAL RESOURCES

AFFECTED ENVIRONMENT

The potential restoration sites within the parks contain wetlands that fall within historic districts and/or cultural landscapes, and may contain historic properties and archeological resources. Some restoration activities may result in adverse impacts to these resources, and as a result, the known historic structures and districts, cultural landscapes, and archeological resources are described and potential impacts analyzed below.

Chesapeake & Ohio National Historical Park

The C&O Canal began as a dream in the 1820s to access new fortunes in the West, at a time when U.S. prosperity depended on its waterways. Stretching along the Potomac River from Rock Creek at Georgetown in Washington, D.C., to Cumberland, Maryland, for 184.5 miles, the canal served as a major transportation corridor operating as a conduit for coal, lumber, and agricultural products to propel western development and satisfy demands from eastern U.S. markets. Construction on the canal began in 1828, which was intended to connect the Chesapeake Bay to the Ohio River. Falling short of the original vision for the canal, construction ended in Cumberland in 1850 and the canal remained in operation until 1924.

Building the C&O Canal was one of the nation's most ambitious industrial projects of the time. Construction efforts provided thousands of jobs for immigrants and hundreds of families lived along the canal's extensive system of locks, aqueducts, culverts, and flumes. Its 74 lift locks raised canal boats from near sea level to an elevation of 605 feet at Cumberland. The hand-built 3,118-foot-long Paw Paw tunnel and Monocacy aqueduct, for example, are striking testimonies to the skill of canal engineers and craftsmen.

The canal suffered extensive flooding, railroad competition, American Civil War conflicts, and financial ruin. In a little less than 100 years, the C&O Canal was impacted by the competition of large commercial transportation companies in the West, the growth and decline of communities and businesses along the banks of the Potomac River, the fierce battles of the Civil War, and technological improvements that made use of canals obsolete. After the canal closed in 1924, it was neglected for nearly 30 years. The NPS was given jurisdiction of the canal in 1938. However, not until the early 1950s, when Supreme Court Justice William O. Douglas led a march to save the canal and towpath from becoming a modern parkway, was the park fully recognized for its valuable connection with the nation's past.

The C&O Canal became a national monument in 1961, and in 1971, Public Law 91-664 established the C&O Canal NHP "to preserve and interpret the historic and scenic features . . . and develop the potential of the canal for public recreation." Further guidance was included in the introduction section of the 1976 general plan, which stated,

> protecting for public enjoyment a historical park which will, more and more, become an outlet for urban seekers after outdoor recreation will be the difficult task facing the National Park Service in its stewardship of this limited resource.

Today, the remnants of the C&O Canal route, the spirit of its builders and operators, and a legacy of outdoor recreation and educational opportunities endure in this national park unit. Annually, millions of hikers, bicyclists, and runners enjoy the canal's 12-foot-wide towpath, originally built for mule travel, and the park's numerous access points, which provide visitors the opportunity to experience the rich history and natural resources of the Potomac River Valley. Watered sections of the canal provide further recreation for canoeists, boaters, and anglers.

Many of archeological sites were identified during a nine-year archeological overview, assessment, identification, and evaluation study of the park conducted by the Louis Berger Group, Inc. from 2003 to 2011. Berger surveyed 3,391 acres (out of 20,239 total acres) or 16 percent of the park (NPS 2013a). The study was part of the NPS Systemwide Archeological Inventory Program (SAIP), which was developed to address the requirements of the NHPA, Executive Order 11593, and the Archeological Resources Protection Act (ARPA) (NPS 2013a).

Nominated to the NRHP as a historic district, resources that contribute to the significance of the district include cultural landscapes, the canal prism, locks, lockhouses, section houses, aqueducts, culverts, dams, turning basin, masonry walls, weirs, and the Paw Paw tunnel. These resources range from fully functional structures and components to ruins. The historic district includes other cultural landscapes associated with the canal such as the Cushwa Warehouse and adjacent sites such as the Ferry Hill Plantation, Fort Duncan, and the Great Falls Tavern. In addition to the park's cultural landscapes and structures, prehistoric American Indian rock art has been documented at several locations within the park. These petroglyph discoveries represent a significant addition to the understanding of the prehistoric art of North America and its connection to American Indian belief systems. There are estimated to be approximately 550 historic structures and 288 known archeological sites currently listed in the Archeological Sites Management Information System (ASMIS).

Seven of the proposed restoration sites (CHOH-19, CHOH-24, and CHOH-28 to CHOH-32) are located adjacent to the towpath (appendix B, figures 5a-c and 30 - 32).

Monocacy National Battlefield

Known as the "battle that saved Washington," the Battle of Monocacy was fought on July 9, 1864, as a small Union force delayed a Confederate advance on the nation's capital at Monocacy Junction in Western Maryland. This provided time for Union reinforcement to be moved into fortifications at Washington and successfully defend the capital. Today, Monocacy NB covers more than 1,600 acres, preserving this historic landscape for future generations.

Monocacy NB is located approximately three miles south of Frederick, the second largest city in Maryland, and near the fast-growing Baltimore-Washington metropolitan area. Roughly two miles of the Monocacy River run through the national battlefield. The CSX railroad line (historic Baltimore & Ohio Railroad) also extends through the national battlefield, paralleling the Monocacy River and Bush Creek. The historic Urbana Pike (Route 355) runs north-south through the eastern part of the national battlefield. These transportation corridors made Monocacy Junction an important crossroads and strategic location during the Civil War and influenced troop movements during the battle.

The core battlefield consists of six historic properties, the Best Farm (L'Hermitage), the Worthington Farm, the Thomas Farm, the Baker Farm, the Lewis Farm, and the Gambrill Mill. Many of the historic

structures on these farmsteads existed at the time of the battle. The surrounding agricultural fields still retain the look and feel of the Civil War era landscape, with few changes to the field configurations and fence rows. The rural fields and farmsteads retain a high level of historic integrity and provide an evocative backdrop for visitors to understand and reflect on the historic events that unfolded on this tranquil landscape.

Today, Monocacy NB preserves 1,600 acres of this historic landscape. Within Monocacy NB are the breastworks, earthworks, walls, and other defenses and shelters used by the Confederate and Union armies on July 9, 1864, as well as the buildings, roads, and outlines of the battlefield.

Monocacy NB was listed in the NRHP for its military significance and place in national events and place in national events of the period 1850–1874. The buildings, structures, circulation systems, materials, organization, and open space all contribute to the historic agricultural, milling, and early twentieth century commemorative landscape qualities of the battle site. The battlefield's many remaining historic structures combine with the railroad, highways, and farm fields to form a remarkably intact eighteenth and nineteenth century agrarian landscape. Monocacy NB is also a designated NHL, recognized as a site of exceptional importance possessing national significance.

Monocacy NB protects a rich archeological record of human occupation and settlement along the Monocacy River as well as significant archeological sites related to the American Civil War, including troop encampments and earthworks around Monocacy Junction. Currently, the ASMS contains 21 known prehistoric and historic archeological sites. Recent archeological investigation at the Best Farm (L'Hermitage) have revealed new information related to the enslaved people that lived and worked on this farmstead. Additional research and future surveys are likely to identify unknown sites and yield new information about the archeological resources at Monocacy NB.

The five component farmsteads that make up the cultural landscape for Monocacy NB include the Hermitage, the Araby community, Baker Farm, Hill Farm, and Clifton (Worthington). A number of eighteenth and nineteenth century dwelling houses and agricultural outbuildings were clustered on the battlefield's five component farmsteads, along with mills, warehouses, and other structures associated with the Gambrill milling complex. Many of these structures are still extant on the battlefield landscape. The proposed restoration sites for Monocacy NB are located within these components of the cultural landscape (see appendix B, figure 3 for the proposed restoration sites within Monocacy NB).

There are 52 historic structures that can be found at Monocacy NB, many of which stood at the time of the battle. These structures include historic farmhouses, barns, and outbuildings, as well as other structures. The Worthington House, the Best Farm (L'Hermitage), and the Thomas Farm, were important landmarks on the battlefield landscape that still stand today. For a full list of historic structures within the park and their condition, please reference the List of Classified Structures (LCS) database. These historic structures connect visitors to events that took place during the battle and within the broader context of US history.

The five farmsteads are described in table 6.

Table 6. Farmsteads at Monocacy National Battlefield

Name	Description	Restoration Site
Best Farm	748 acres; the farm consists of edges of fields, dimensions of yards, and road traces. In addition to the Main House, other structures, and three Civil War monuments, the trees in the front yard and at drainage along the entrance road,	MONO-5

Name	Description	Restoration Site
	the field and fence lines, yards, and vegetable garden site are defining features.	
Araby Community	1,111-acre property; between 1812 and 1832, John McPherson and his son assembled various portions of adjacent tracts that became known as the Araby Community, which generally encompasses the properties known since the mid-19th century as the Gambrill and Thomas Farms, as well as part of the Worthington Farm.	MONO-4 MONO-6 MONO-8
Worthington Farm	The farm had a very productive agricultural enterprise during the period before the Battle of Antietam. By 1860, the properties that would one day make up the Monocacy were in their present recognizable form.	MONO-7
Baker Farm	Purchased in 1841 and is composed of 500-acres, Baker Farm shared the characteristics of neighboring farms: fertile soil, access to water, woodlands, and links to both the Georgetown and Buckeystown pikes via Baker Valley Road.	MONO-3
The Hill Farm	10 acres of land purchased in 1819; includes that area located south and east of the Baker Valley Road, the southernmost portion of the battlefield.	MONO-10

Harpers Ferry National Historical Park

The town of Harpers Ferry is situated at the confluence of the Shenandoah and Potomac Rivers, and the two rivers cut a gap in the Blue Ridge Mountains before continuing their course to the Chesapeake Bay. This geographic position has made Harpers Ferry a destination for explorers, nature enthusiasts, and entrepreneurs. Lower Town, located on the floodplain between the two rivers, is the heart of Harpers Ferry and the most visited area of the park. Harpers Ferry National Monument was authorized by Congress in 1944 (PL 78-386). In 1963, the name of the park was changed to Harpers Ferry NHP. Harpers Ferry NHP was administratively listed on the NRHP on October 15, 1966. Today, it contains 3,745 acres, primarily in West Virginia. More remote areas of the park include Short Hill and Loudon Heights (in Virginia) and Maryland Heights (in Maryland).

Harpers Ferry is significant for visits during the colonial era by the future first and third Presidents of the United States, George Washington and Thomas Jefferson. Washington saw the commercial potential of the area, while Jefferson marveled at the natural beauty that he observed. During the early nineteenth century (1801–1861), it was the site of the second federal armory. The abolitionist John Brown led a raid on the arsenal in 1859, one of the key events that preceded the Civil War. During that conflict, Harpers Ferry changed hands between Union and Confederate forces eight times, which indicates its strategic importance to both belligerents.

Finally, from 1865 – 1955, Harpers Ferry was nationally significant as a location associated with civil rights, black history, education, and the Niagara Movement. These events were connected to the founding and operation of Storer College in the Camp Hill area of the town. Established through a collaboration between the U.S. Bureau of Refugees, Freedmen, and Abandoned lands ("Freedmen's Bureau"), the Freewill Baptists, and New England philanthropist John Storer, the school was one of the first to provide education for freed slaves. It was chartered as an integrated institution, a symbol of freedom through education, and a symbol of John Brown's vision. Fredrick Douglass served as one of the college's first trustees. It was also the location of the second conference of the Niagara Movement (a predecessor to the

National Association for the Advancement of Colored People, or NAACP) where W.E.B. DuBois demanded equality and civil rights in his keynote *Address to the Country.*

The park's historic properties potentially affected by the WRAP include cultural landscapes, historic structures, and archeological resources. Approximately 35 percent of the park has been surveyed and inventoried for archeological sites. This work began in 1958 and continues to the present, but it has generally been limited to the high-visitation areas of the park in Lower Town, the U.S. Armory Grounds, and Virginius Island. Access to remote areas such as Maryland Heights and Loudon Heights is limited. Work performed in the 1990s discovered the first evidence of Native American habitation at the confluence of the Shenandoah and Potomac Rivers. Inventory and excavation of the extent of archeological deposits covering both the prehistoric and the historic periods of Harpers Ferry have yielded more than 500,000 artifacts and have led to the publication of at least 50 reports. Recent archeological work has focused on the U.S. Armory Grounds, including three new archeological investigations and the publication of several new archeological and historical reports in the past 15 years.

Between the years 1990–1992, NPS staff developed cultural landscape plans for Virginius Island and Lower Town. These plans provided information on the historical context of the two sites including important events, activities, and persons, as well has land use patterns. Six landscapes have been documented with Cultural Landscape Inventories (CLI): Alstadt Farm, Chambers-Murphy Farm, Camp Hill, School House Ridge North, U.S. Armory & Potomac Riverfront, and Virginius Island. Eleven of the 14 (79 percent) of the cultural landscapes at the park have either a CLI, a Cultural Landscape Report, or both.

The national historical park's LCSs provides the primary reference of building types, significance, condition, and recommended treatments. The current LCS listing identifies 152 structures ranging from currently occupied historic and modern structures to Civil War earthworks. All but four structures contribute to the park's NRHP significance. Many of these buildings and structures are part of the fourteen cultural landscapes.

The sites proposed for wetlands restoration within Harpers Ferry NHP can be found in appendix B, figure 4). A springhouse was observed at HAFE-4 during the March/April 2016 field evaluations.

Catoctin Mountain Park

Catoctin MP originated during the Great Depression. The federal government acquired over 10,000 acres in 1935 and established the Catoctin RDA in 1936 with Executive Order 7496. The program created public parks out of marginal farmland near cities—most eventually became state or national parks. In 1936, a New Deal agency named the Works Progress Administration (WPA) (to be renamed the Works Projects Administration in 1939) hired hundreds of local men to create maintenance shops, a visitor center, and cabin camps. Later, in 1939, the Civilian Conservation Corps set up camp in today's Round Meadow, tasked with returning the Catoctin landscape to native eastern hardwood forest. The WPA operated from 1933 to 1942 providing unskilled manual labor jobs related to conservation and the development of natural resources in rural lands owned by federal, state, and local governments.

In 1945, President Harry S. Truman determined the area would "be retained by the National Park Service of the Department of the Interior … in accord with the position expressed by … President Roosevelt." Subsequently, in 1954, the existing 5,748-acre park was carved out of the RDA and designated Catoctin MP by the director of the NPS. The remaining 4,445 acres of the RDA south of Route 77 were transferred to the State of Maryland and became present-day Cunningham Falls State Park.

Archeological resources documented at Catoctin MP include 131 known prehistoric and historic archeological sites (currently listed in the ASMIS), including six archeological sites determined eligible for listing in the NRHP. Prehistoric sites include short-term campsites along stream terraces, special-use sites such as rock shelters and small artifact scatters. The abundance of metarhyolite, a type of stone that was used for making arrowheads and spear points, was a primary resource harvested by ancient peoples who lived near Catoctin Mountain. Historical archeological resources include sites associated with farmsteads established by European settlers in the late 18th and 19th centuries. Industrial related archeological sites associated with the Catoctin Mountain history of logging and the Catoctin Iron Furnace, include numerous collier huts, which were temporary tipi-like dwellings used by colliers who burned the mountain's timber into charcoal to fuel the Iron Furnace. Archeological survey has identified 50 collier hut sites and associated charcoal hearths at the park. Other archeological sites are associated with late-19th and early 20th century tourism on Catoctin Mountain and the federal activities during the park's RDA era and its use by President Roosevelt and the Office of Strategic Services during World War II.

Many of these archeological sites were identified during a four-year archeological overview, assessment, identification, and evaluation study of the park conducted by the Louis Berger Group, Inc. from 2007 to 2010. Berger surveyed 2,603 acres (out of 5,890 total acres) or 44 percent of the park (NPS 2013b). The study was part of the NPS SAIP, which was developed to address the requirements of the NHPA, Executive Order 11593, and the ARPA (NPS 2013b).

The cultural landscapes of the park encompass human history from the region's prehistoric period to the present. The park has three identified CLI Units. The overarching parent landscape consists of the entire acreage of Catoctin MP, Camp Greentop, and Camp Misty Mount.

The Catoctin MP cultural landscape encompasses the entire 5,890 acres of the park. Two periods of significance have been determined for this cultural landscape. The first period (1770–1903) is significant for the early iron industry when the forests of Catoctin Mountain were harvested for timber for the production of charcoal. Iron furnaces were introduced to the region in the 1760s. The Catoctin Iron Furnace (1775) had a significant impact on the area that would become the park. Remnants of charcoal hearths that provided fuel for the iron furnaces dot the landscape as physical reminders of the Catoctin Mountain industrial heritage. Stone walls and historic building foundations remain as vestiges of the area's agricultural history.

The second period of significance (1934–1942) encompasses the mountain's history as a RDA and describes the reforestation activities and the WPA built camps established during this time, including Camp Hi-Catoctin, used by President Franklin D. Roosevelt during World War II.

The component cultural landscapes of Camp Misty Mount and Camp Greentop consist of the buildings, spatial organization patterns, circulation including footpaths, and small scale features such as campfire circles. Both component landscapes are significant for their recreational planning under the RDA, as landscapes for social programs promoting human conservation during the Great Depression, and for campsite design and organization that embodies the development of the rustic revival design in architecture and landscapes.

The vegetation of the park has cultural and historic aspects. It is comprised primarily of various communities of native plants, with a small number of plantings and patches of invasive nonnative plants. Vegetation management by park personnel supports cultural as well as natural landscape objectives.

The park's LCS provides the primary reference of building types, significance, condition, and recommended treatments. The current LCS listing identifies 81 structures ranging from rustic cabin camp structures, blacksmith shop, and pump house to road culverts, stone walls, and water fountains.

Historic structures (e.g., culverts, springhouse, rock wall) were observed at several of the proposed restoration sites (CATO-1, CATO-7, CATO-9, and CATO-16) (appendix B, figure 2).

IMPACT ANALYSIS

Methodology

Section 110 of the NHPA requires that federal land managers establish programs in consultation with the SHPO to identify, evaluate, and nominate properties to the NRHPs. This act applies to all federal undertakings or projects requiring federal funds or permits. Section 106 of the act requires that federal agencies take into account the effect of any proposed undertakings on properties that are listed, or eligible for listing, in the national register.

Potentially eligible NRHP historic properties are present within the parks. Environmental consequences from the two alternatives to these resources were evaluated based on their potential to cause adverse effects to the integrity of the properties as they relate to their potential eligibility to the NRHP.

Physical Destruction/Damage/Disturbance. A number of direct physical impacts could occur to cultural resources ranging from disturbance, to removal or destruction of a contributing feature of an eligible property. For archeological sites, artifacts can be removed from the site through collecting/looting activities, or moved from one place to another. Even if a curious hiker picked up an artifact, examined it, and then dropped back on the ground nearby, its contextual information is lost and it loses its ability to convey certain information about the archeological site.

Changes in the Character of the Property's Use and Visual Features. Changes to a site could alter the use or affect the visual elements of a historic resource that contribute to its eligibility to the NRHP. For example, if the property is eligible as a recreational resource, changes that affect its recreational use could impact the eligibility of the site as a whole or of certain contributing features to the site. Similarly, removal of vegetation where vegetation is considered a contributing feature might visually affect the character of the site.

Viewshed Impacts. Impacts to the viewshed of a historic property, both looking toward a historic property and looking at the view from a historic property, can affect the integrity of setting, feeling, and association of a historic site, cultural landscape, or ethnographic resource.

Section 106 of the NHPA

At this time, the NPS is fulfilling its requirements for cultural resource compliance under Section 106 of the NHPA for the study area and consultation is ongoing with consulting parties. Under Section 106 of the NHPA changes to NRHP-eligible cultural resources resulting from implementation of a project are referred to as "effects," and may be considered as "*no effect*," "*no adverse effect*," or "*adverse effect*." Effects can be beneficial, as well as adverse.

The NPS executed a PA in 2008 with the Advisory Council on Historic Preservation (ACHP) and the National Conference of State Historic Preservation Officers. The purpose of the PA is to establish a program for compliance with Section 106 of the NHPA and set forth a streamlined process when agreed

upon criteria are met and procedures are followed. The PA defines which activities the stream-lined Section 106 process may be used.

Impacts of Alternative A: No-Action Alternative

Current management (e.g., invasive species removal and planting native plants) of wetlands would continue at the four parks under the no action alternative. Invasive species removal could result in the discovery or unintentional dislodging of archeological features. Planting small herbaceous material would result in some ground disturbance although the disturbance would only be a few inches to be dug for the insertion of plugs. This could also result in the discovery and unintentional dislodging of archeological features. Currently, to ensure that invasive plant management activities do not adversely affect cultural resources, the parks consult with NPS cultural resource specialists to determine if cultural resources are present in areas proposed for invasive plant treatment or if the area needs to be surveyed for cultural resources prior to work being done. The NCR recently completed an Invasive Plant Management Plan and Environmental Assessment in 2015 that provides guidance to the individual NCR parks on non-native invasive plant management.

Prior to planting trees and shrubs, which would typically require a pit to be dug approximately 2-4 feet, the parks conduct an archeological survey of the area of disturbance. If archeological resources are discovered, the NPS suspends operations at the site and immediately contacts the appropriate cultural resource specialist, who would arrange for a determination of eligibility in consultation with the SHPO.

Effects to historic landscapes would involve alterations to the alterations to the contributing or character defining features of the cultural landscape, including but not limited to views and vistas, land use, vegetation, and spatial organization. These alterations would be at the site of ground disturbance during the planting; therefore, would be minimal and short-term. Over time, the landscape would naturalize and any impacts would be further minimized or cease. In addition, the new plantings would be native to the area, would be appropriate in height and spread, and be consistent with protecting the cultural landscape.

Cumulative Impacts. Cumulative projects identified would have no to minimal impacts on archeological resources and project activities would conform to Section 106 of the NHPA PAs, to ensure that disturbance to archeological resources is minimized or avoided. The deer plan would reduce browsing pressure, which would allow native plant populations to regenerate which would result in beneficial impacts on the parks cultural landscapes. Also, beneficial effects due to decreased browsing and thus decreased deer depredations of agricultural crops, which would lead to increased chances of viability for the Monocacy NBs farm ventures and forest vegetation that maintain the open and closed patterns of the cultural landscape. The canal restoration project at C&O Canal NHP would result in beneficial impacts on historic structures and cultural landscapes from the stabilization of historic structures and from the enhancement of the historic character of the cultural landscape. Several projects would result in adverse impacts to historic districts and cultural landscapes. Implementation of the Dominion Power transmission line project at Harpers Ferry NHP would result in long-term adverse impacts to historic districts and cultural landscapes, due to the presence of construction and maintenance equipment and associated activity. Adverse impacts are expected on the C&O Canal NHPs historic district's landscape and the cultural landscape due to vegetation clearing and introduction of structures from the WSSC submerged intake project. Although early in the planning process, the Public Access Plan for Monocracy NB could result in adverse impacts to cultural resources by introducing modern trails into the landscape. The MD 355 Bridge would have adverse impacts on the cultural landscapes at Monocacy NB due to temporary visual impacts from construction related activities and from visual impacts from a higher bridge and roadway. Alternative A would not contribute to the cumulative impacts on cultural resources since the current management actions would be short-term and would be mitigated.

Conclusion. Under alternative A, archeological resources may be inadvertently unearthed or viewsheds and vistas, land use, vegetation, and spatial organization within historic landscapes could have short-term minimal alterations until vegetation has re-established. These impacts would not result in destruction, change in use, or loss of integrity to cultural resources.

National Historic Preservation Act, Section 106 Summary. In accordance with the regulations of the ACHP (36 CFR 800.5) that address the criteria of effect and adverse effect, the determination of effects under this alternative would result in *no adverse effect*.

Impacts of Alternative B: Action Alternative (NPS Preferred)

The impact analysis from the restoration actions proposed under alternative B for cultural resources is presented below. A list of the individual sites within the four parks where these restoration opportunities are proposed can be found in appendix B, tables 9 and 10.

Invasive Species Control. Impacts on cultural resources from this technique would be the same as described under alternative A.

Native Plantings/ Riparian Buffer Enhancement and Increased Plant Diversity. Impacts on cultural resources from this technique would be the same as described under alternative A.

Restoration of Natural Hydrology. This technique involves filling, excavation and grading. The removal of fill would not likely result in adverse impacts on archeological resources since the fill was placed there in modern times and not likely contain intact resources. The placement of fill could benefit archeological resources by providing an additional cap over the top of the archeological resource. Excavation and grading of previous undisturbed soils could result in adverse impacts on archeological resources.

Converting Open Water to Vegetated Wetlands. This technique could result in adverse impacts to archeological resources from ground disturbance caused by digging and crushing from the use of heavy equipment. If structures are to be removed, an NPS Cultural Resource Specialist would confirm that the structure does not contribute to the cultural landscape, so that removal would not be an adverse effect to the historic property. Effects to historic landscapes would involve alterations to the alterations to the contributing or character defining features of the cultural landscape, including but not limited to viewsheds and vistas, land use, vegetation, and spatial organization. While developing each project, the NPS would utilize measures (i.e., selecting species with appropriate heights, spread, and nativity) to minimize adverse effects. These alterations would be at the site of ground disturbance during the plantings; therefore, impacts would be minimal and short-term. Over time, the landscape would naturalize and any impacts would be further minimized or cease.

Increase Fish Passage. The removal or alteration of culverts has the potential to adversely impact archeological sites. The NPS would survey for archeological sites within the project area prior to implementation of the restoration technique. If possible, archeological sites would be avoided and protected. If culverts were to be removed, an NPS Cultural Resource Specialist would confirm that the structure does not contribute to the cultural landscape. Effects to historic landscapes would involve alterations to the contributing or character defining features of the cultural landscape, including but not limited to viewsheds and vistas, land use, vegetation, and spatial organization. While developing each project, the NPS would utilize measures (i.e., selecting species with appropriate heights, spread, and nativity) to minimize adverse effects. These alterations would be at the site of ground disturbance during the plantings; therefore, impacts would be minimal and short-term. Over time, the landscape would naturalize and any impacts would be further minimized or cease.

Full Channel Restoration. This technique would include the placement of structures within the stream channel and grading of stream banks with heavy machinery. Ground disturbance and use of heavy equipment could result in the destruction of archeological resources. However, bank armoring prevents erosion, which could benefit archeological resources. Effects to cultural landscapes would involve alterations to the viewshed and introduction of non-historic structures into the landscape. These alterations would be at the site of ground disturbance during construction and structural placement resulting in short-term, adverse effects. Long-term effects would continue to exist as long as the non-historic structures are in place, but would diminish over time as the site naturalizes.

Increasing Aesthetic or Educational Value. The placement of educational signs near wetlands would typically result in minimal ground disturbance for the placement of posts. Ground disturbance could result in damage or destruction to archeological resources. Effects to cultural landscapes would involve introducing non-historic features into the cultural landscape. These alterations would be adverse and short- and long-term. The parks would work with an NPS Cultural Resource Specialist to minimize impacts to the cultural landscape.

Agricultural/Disturbance Exclusion Fencing. Fencing and barriers could involve ground disturbing activities or use of heavy equipment. Ground disturbance and use of heavy equipment could result in the destruction of archeological resources. Effects to cultural landscapes would involve introducing non-historic features into the cultural landscape. These alterations would be adverse and short- and long-term. Wire fencing is a type of less intrusive fencing that could be installed along the edge of the resource to keep equipment out of the resource and would be an alternative to reduce impacts on the cultural landscape. The parks would work with an NPS Cultural Resource Specialist to minimize impacts to the cultural landscape.

Mitigation. For all techniques, the following steps would be taken to ensure that restoration activities do not adversely affect cultural resources:

- The parks would consult with NPS cultural resource specialists to determine if cultural resources are present in areas proposed for restoration or if the area needs to be surveyed for cultural resources prior to work being done.

- If archeological resources are discovered, the NPS would suspend operations at the site and immediately contacts the appropriate cultural resource specialist, who would arrange for a determination of eligibility in consultation with the SHPO.

National Historic Preservation Act. To fulfill requirements for compliance with the NHPA, the NPS is developing a PA, consistent with the provisions of 36 CFR Part 800.14 (b)(3), in consultation with the Maryland Historical Trust, Virginia Department of Historic Resources, West Virginia Division of Culture and History, and the DC Historic Preservation Office. The PA defines the process to comply with Section 106 because the "effects to historic properties cannot be fully determined in advance." The PA includes stipulations for conducting surveys and identifying cultural resources, and establishes steps for meeting its NHPA responsibility prior to subsequent project-specific actions. The stipulations in the PA serve to outline future project reviews and identify avoidance, minimization, and mitigation measures for potential adverse effects to any historic properties. In addition, the PA also addresses minimizing harm to the NHL Monocacy NB as required under Section 110(f) of the NHPA. The NPS has notified the ACHP and the NPS NCR NHL Program of this consultation regarding the NHL property and has invited both parties to consult on the development of the PA. The PA also identifies actions where additional Section 106 compliance and consultation are not required.

Cumulative Impacts. Cumulative projects identified are as described for the no action alternative. Cumulative projects would have no to minimal impacts on archeological resources and project activities would conform to Section 106 of the NHPA PAs, to ensure that disturbance to archeological resources is minimized or avoided. The deer plans would result in beneficial impacts to Catoctin MP and Monocacy NB cultural landscapes, and the canal restoration project would result in beneficial impacts on historic structures and cultural landscapes at C&O Canal NHP. Several projects would result in adverse impacts to historic districts and cultural landscapes: the Dominion Power transmission line project at Harpers Ferry NHP, the WSSC submerged intake project at C&O Canal NHP, and the Public Access Plan for Monocracy NB. The MD 355 Bridge would have adverse impacts on the cultural landscapes at Monocacy NB. Therefore, cumulative adverse impacts are expected on cultural landscapes when the adverse impacts from the restoration actions under alternative B are added to the adverse impacts from the past, present, and future projects.

Conclusion. Most of the restoration techniques could result in adverse impacts on archeological resources; however, the parks would consult with NPS cultural resource specialists to determine if cultural resources are present in areas proposed for restoration or if the area needs to be surveyed for cultural resources prior to work being done. If structures are removed or altered for converting open water to vegetated wetlands and increasing fish passage an NPS Cultural Resource Specialist would confirm that the structure does not contribute to the cultural landscape, so that removal would not be an adverse effect to the historic property. Long-term effects would continue to exist from full channel restoration as long as the non-historic structures are in place, but would diminish over time as the site naturalizes. The placement of educational signs would result in effects to cultural landscapes involving the introduction of non-historic features. These alterations would be adverse and short- and long-term; however, the parks would work with an NPS Cultural Resource Specialist to minimize impacts to the cultural landscape. Exclusion fencing and barriers would result in effects to cultural landscapes by introducing non-historic features into the cultural landscape resulting in short- and long-term adverse effects; however, the parks would work with an NPS Cultural Resource Specialist to minimize impacts to the cultural landscape. Overall, the PA identifies avoidance, minimization, and mitigation measures for potential adverse effects to any historic properties.

National Historic Preservation Act, Section 106 Summary. In accordance with the regulations of the ACHP (36 CFR 800.5) that address the criteria of effect and adverse effect, the determination of effects under this alternative could result in an *adverse effect*, however, measures to avoid and minimize adverse effects would be applied.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

A summary of the environmental consequences of each alternative is presented in table 7.

Table 7. Summary of Environmental Consequences/Impact Comparison Matrix

Impact Topic	Alternative 1 No-action Alternative	Alternative 2 Action Alternative (Preferred Alternative)
Wetlands (includes streams) and Floodplains	Long-term beneficial from invasive species removal and native plantings (these techniques are less beneficial than under alternative 2)	Short-term adverse impacts from construction of three restoration techniques: - converting open water to vegetated wetlands - increasing fish passage - restoration of natural hydrology - full channel restoration (more impact due to scale of technique) All eight techniques result in long-term beneficial impacts
Vegetation	Long-term beneficial from invasive species removal and native plantings (these techniques are less beneficial than under alternative 2)	Short-term adverse impacts from construction of six restoration techniques: - converting open water to vegetated wetlands (more impact) - increasing fish passage (more impact) - restoration of natural hydrology (more impact) - full channel restoration (more impact) - increasing aesthetic/ educational - agricultural/disturbance exclusion fencing Long-term beneficial impacts from four techniques: - invasive species control - native plantings/riparian buffer enhancement - converting open water to vegetated wetlands - agricultural/disturbance exclusion fencing
Wildlife and Wildlife Habitat	Long-term beneficial from invasive species removal and native plantings (these techniques are less beneficial than under alternative 2)	Short-term adverse impacts from construction of six restoration techniques: - converting open water to vegetated wetlands (more impact and long-term impacts to fish) - increasing fish passage (more impact) - restoration of natural hydrology (more impact) - full channel restoration (more impact) - increasing aesthetic/ educational - agricultural/disturbance exclusion fencing All eight techniques result in long-term beneficial impacts

Impact Topic	Alternative 1 No-action Alternative	Alternative 2 Action Alternative (Preferred Alternative)
Cultural Resources	Short-term minimal alterations to archeological resources and viewsheds within historic landscapes. However, the parks would consult with NPS cultural resource specialists to determine if cultural resources are present in areas proposed for restoration or if the area needs to be surveyed for cultural resources prior to work being done. These impacts would not result in destruction, change in use, or loss of integrity to cultural resources.	Adverse impacts from all techniques on archeological resources. Adverse impacts on cultural landscapes/historic property from: - converting open water to vegetated wetlands - increasing fish passage - full channel restoration - placement of educational signs - exclusion fencing and barriers However, the parks would consult with NPS Cultural Resource Specialists prior to work being done. Overall, the PA identifies avoidance, minimization, and mitigation measures for potential adverse effects to any historic properties.
National Historic Preservation Act, Section 106	The determination of effects under this alternative would result in *no adverse effect*	The determination of effects under this alternative could result in *an adverse effect*

MITIGATION MEASURES OF THE ACTION ALTERNATIVES

The NPS places emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. Since the proposed action is to restore, enhance, and/or protect wetlands, waterways, and riparian habitats, traditional mitigation measures are not required for natural resources. However, during implementation of the restoration techniques NPS would avoid or minimize any unnecessary disturbance to existing natural resources.

To ensure that the restoration activities do not adversely affect cultural resources, the parks would employ the following mitigation measures where appropriate:

- NPS cultural resource specialists would be consulted to determine if cultural resources are present in areas proposed for restoration or if the area needs to be surveyed for cultural resources prior to work being done.
- If cultural resources were discovered during sub-surface ground-disturbing activities, the NPS would suspend operations at the site and immediately contact the appropriate cultural resource specialist, who would arrange for a determination of eligibility in consultation with the SHPO and, if necessary, would develop a recovery plan.
- Traditional-use native plants are plants used or held sacred by Native American tribes for medicinal, ceremonial, religious, or other cultural purposes. Where traditional-use plants are known to occur, the parks would identify them in consultation with tribes to avoid or minimize impacts to the maximum extent practicable on such plants.

As stated previously, to mitigate impacts to cultural resources, the NPS prepared a PA, consistent with the provisions of 36 CFR Part 800.4(2), in consultation with the Maryland Historical Trust, Virginia Department of Historic Resources, West Virginia Division of Culture and History, and the DC Historic Preservation Office. The PA includes stipulations for conducting surveys and identifying cultural resources.

CONSULTATION AND COORDINATION

This chapter summarizes the process undertaken by the NPS to contact individuals, agencies, and organizations for information or that assisted in identifying important issues, analyzing impacts, or that will review and comment on the WRAP/EA. Throughout the planning process, the NCR and the four parks encouraged other agencies, park visitors, and private citizens to participate in this planning effort, as summarized below.

THE SCOPING PROCESS

Scoping is an effort to involve the public and agencies in determining the scope of issues to be addressed in an environmental document. It includes consultation with all interested parties and any agency with jurisdiction by law or expertise. Informal internal scoping discussions for the WRAP started in 2015 among NPS staff from the four parks and the National Capital Region.

The public was notified of the plan through a Public Scoping Newsletter that was released on August 10, 2016, which invited the public, agencies, and stakeholders to submit comments and engage in the planning process. The public scoping comment period was open from August 10 through September 16, 2016.

AGENCY SCOPING AND CONSULTATION

Formal scoping and consultation letters were mailed to state and federal agencies on August 9, 2016 requesting consultation and comments regarding the proposed WRAP. Copies of consultation letters and responses can be found in appendix A.

The Endangered Species Act of 1973, as amended (16 USC 1531 et seq.), requires all federal agencies to consult with the USFWS to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The USFWS will be sent a copy of this EA and a consultation letter for review. Further consultation with the USFWS will be done in the future for specific projects as needed.

Section 106 of NHPA requires that federal agencies take into account the effect of any proposed undertakings on properties that are listed or eligible for listing in the National Register. A Section 106 consultation letter was mailed to the SHPO's from the Maryland Historic Trust, the Virginia Department of Historic Resources, the West Virginia Division of Culture and History, and the DC Historic Preservation Office, informing them of the proposed plan, requesting comment on the areas of potential effect, and notifying them of NPS's plan to develop a PA. The PA includes stipulations for conducting surveys and identifying cultural resources, and establishes steps for meeting its NHPA responsibility as it implements restoration prior to subsequent project-specific actions. The stipulations in the PA serve to outline future project reviews and identify avoidance, minimization, and mitigation measures for potential adverse effects to any historic properties. In addition, the PA also addresses minimizing harm to the NHL Monocacy NB as required under Section 110(f) of the NHPA. The NPS has notified the ACHP and the NPS NCR NHL Program of this consultation regarding the NHL property and has invited both parties to consult on the development of the PA. Consultation is ongoing with the SHPO's from Maryland, Virginia, and West Virginia, and DC.

LIST OF RECIPIENTS

A copy of the draft WRAP/EA was provided to the following federal and state agencies.

Federal Agencies

U.S. Fish and Wildlife Service

U.S. Army Corps of Engineers

State Agencies

Maryland Division of Historical and Cultural Programs, Maryland Historical Trust

Virginia Department of Historic Resources

West Virginia Division of Culture and History

District of Columbia Office of Planning, Historic Preservation

Maryland Department of Natural Resources Wildlife and Heritage Service

Virginia Department of Conservation and Recreation, Natural Heritage

West Virginia Department of Natural Resources

District of Columbia Department of Energy and the Environment

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APPENDIX A

AGENCY CORRESPONDENCE

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APPENDIX B

WETLANDS RESTORATION ACTION PLAN FOR CATOCTIN MOUNTAIN PARK, CHESAPEAKE & OHIO CANAL NATIONAL HISTORICAL PARK, HARPERS FERRY NATIONAL HISTORICAL PARK, AND MONOCACY NATIONAL BATTLEFIELD

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