

AFFECTED ENVIRONMENT



INTRODUCTION

This chapter describes the existing environment of the Manassas National Battlefield Park and the surrounding region. It focuses on describing the key park resources, uses, facilities and socioeconomic characteristics that provide the necessary background and setting information for the study team to determine the likely effects, described in the Environmental Consequences chapter, of the alternatives. Some features are also discussed because they provide context, and/or must be considered in environmental impact statements.

The affected environment section is general in nature because of the programmatic approach

of general management planning. There are many sources from which more detailed information can be obtained on the natural, cultural, and human environment of Manassas National Battlefield Park. Many of these sources were used in the preparation of this *General Management Plan / Environmental Impact Statement* and are listed in the “Selected Bibliography” near the end of this volume. Additional information on park resources can be found on the Internet at www.battlefieldbypass.com and in the *Manassas National Battlefield Park Bypass Existing Conditions Report* (2003) prepared by the Federal Highway Administration and the National Park Service.

NATURAL ENVIRONMENT

AIR QUALITY

National Ambient Air Quality Standards for certain major air pollutants, including sulfur dioxide, nitrogen oxides, particulate matter, ozone, carbon monoxide, and lead, were established under the 1970 Clean Air Act Amendments. Areas in the United States that meet these standards are known as attainment areas. Areas in which the standards are not met are known as nonattainment areas.

Manassas National Battlefield Park is in Virginia Air Quality Control Region VII, which is in severe nonattainment for ozone. The region is in attainment for the other pollutants.

Section 118 of the Clean Air Act requires federal facilities such as Manassas National Battlefield Park to comply with all federal and state air quality standards and regulations. Section 176 of the act requires federal facilities to conform to state programs designed to attain and maintain those standards.

The 1977 Clean Air Act Amendments established a program to preserve, protect, and enhance the air quality in certain areas of the United States. One hundred and fifty-eight of those areas, including national parks over 6,000 acres and wilderness areas over 5,000 acres, were designated mandatory Class I areas with little additional air pollution permitted over baseline concentrations. Stringent air quality standards, known as increments, were established for those areas for certain air pollutants, including sulfur dioxide, nitrogen oxides, and particulate matter, from new or modified existing major stationary sources. The nation's remaining areas, such as Manassas National Battlefield Park, are Class II areas. The Clean Air Act established less stringent increments for those areas for the three pollutants cited above.

The major source of air pollution within the park is vehicle emissions. However, the major sources of regional air pollution are outside the

park and include stationary sources in the surrounding counties, motor vehicle use in the region, and other sources in the Washington, D.C. metropolitan area. Historically significant views and the visual setting are integral to the visitor experience and can be diminished by air pollution.

SOUNDSCAPE

The NPS' *Management Policies* and *Director's Order #47: Soundscape Preservation and Noise Management* recognize natural soundscapes as a park resource and call for the National Park Service to preserve natural soundscapes. Presently, the soundscape and noise levels at the park are greatly influenced by vehicular and truck traffic on U.S. Route 29, VA Route 234, and I-66.

The National Park Service conducted a traffic noise and vibration assessment for Manassas National Battlefield Park in 1996. The vibration assessment looked at the effects of vibration from the vehicular traffic on the park resources such as the Stone House, and the traffic noise assessment examined the effect of traffic on the visitor experience.

The study found that the risk to the building resulting from damage caused by traffic-induced vibration is small (Peccia 1996).

In contrast, the noise assessment stated that the existing traffic noise levels create noise impacts serious enough to consider noise abatement at several of the key visitor sites at the park (Peccia 1996). When noise levels were compared to land-use compatibility guidelines, many of the park's resources would be discouraged from use as sites for cultural activities because of existing noise levels.

VEGETATION AND WILDLIFE

Vegetation

The park's vegetation is a patchwork of open fields and forest communities representing

different successional stages and ecological conditions. The open fields are maintained through agricultural leases and mowing by park personnel. Many of these grasslands contain native grass communities, particularly Indian grass/little bluestem. Grasslands cover about 35 percent of the park. The forest communities, which cover approximately 50 percent of the park, are primarily deciduous stands of oak-hickory, pine/cedar forest, mixed pine/hardwood stands, and bottomland hardwood stands.

The Virginia Department of Conservation and Recreation, Division of Natural Heritage completed a vascular plant inventory of Manassas National Battlefield Park in March 2001. The species list was added to the Virginia Biological and Conservation Data System. Of over 700 taxa inventoried in the park, 124 are invasive, exotic species.

The coniferous forest (mainly pine/cedar community) is in a successional stage of growth that developed from previously open fields and is characterized by Virginia pine (*Pinus virginiana*), eastern red cedar (*Juniperus virginiana*), and shortleaf pine (*Pinus echinata*). The mixed forest is in a transitional stage that occurs in comparatively small, scattered stands. Oak-hickory dominates the deciduous forest in upland areas and represents the climax growth stage in the park. Stands are often more than 100 years old and commonly consist of white oak (*Quercus alba*), northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), white ash (*Fraxinus americana*), and hickory (*Carya sp.*).

Floodplain bottomland forests, found primarily along Bull Run, represent old, undisturbed forests with many mature floodplain trees. Tree species include pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*). Various bottomland hardwoods also occur along the riparian fringe of tributary streams. Small patches of loblolly pine (*Pinus taeda*) and eastern white pine (*Pinus strobus*) occur on somewhat drier slopes and bluffs (VDCR

DNH 2001). Map 3-1 depicts the historic vegetative communities that existed at the time of the battles of Manassas.

Wildlife

To date, the park staff has documented 168 bird species, 26 mammal species, 23 reptile species, and 19 amphibian species within the park. The National Park Service maintains a current list of species known or likely to use the habitat of the park. More detailed information can be found on the park's website at <http://www.nps.gov/mana/pphtml/managementdocuments.html>. Common species known to occur in the park include white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), and many species of songbirds.

Within Manassas National Battlefield Park, mammals are protected from hunting pressure and surrounding urban development. The fragmented forests interspersed with shrubs and meadows are good habitats for mammals such as eastern fox squirrels, eastern chipmunks, eastern cottontails, short-tailed shrews, and the eastern mole. Some are more specialized in their habitat needs, like the red fox, which prefers open, shrubby, and brushy areas. White-tailed deer are among the most prominent mammals in Manassas National Battlefield Park. Numerous amphibians and reptiles also can be found in the park near vernal pools, small depressions, and other wetlands. Spring peepers, wood frogs, and spotted and marbled salamanders are amphibians commonly found in the park.

White-tailed deer pose a number of resource management challenges in the park because of their impacts on the vegetative community. The large deer population has impacted the ability of the park to reforest historically wooded areas, establish streamside buffers, and created vegetative buffers from development. The foraging activity disrupts natural forest succession processes in the park and removes woody vegetation cover needed for ground-nesting birds. The maintenance

division in the park reports that deer consume between 75 percent and 90 percent of newly installed perennials and annuals.

Distance sampling of deer within the park began in 2000 and has been conducted annually. The current deer density in Manassas National Battlefield Park is estimated at 67 deer per square kilometer. This greatly exceeds the estimated carrying capacity of 15.4 deer per square kilometer for the Virginia Piedmont. The buck-to-doe ratio is 1-to-5.75, indicating overpopulation, and the fawn-to-doe ratio is 0.27-to-1, indicating a stressed population.

All forests in the park have a prominent browse line. In 2000, the park established 30 deer exclosures to determine the impacts the white-tailed deer have on vegetation in the park. In 2004, the effects of deer browsing on three forest types were compared. Results indicated that white-tailed deer are having a substantial adverse impact on the structure and woody seedling composition of forests in the park. In each forest type, the forb cover and vertical plant cover were suppressed, and species richness and seedling survival rates were reduced.

Private property owners and local governments in the area have expressed concern about the deer population. Of particular concern is that resident deer from the park move into and repopulate areas following deer management efforts outside the park.

Manassas National Battlefield Park supports one of the best grassland and shrubland species suites in the region, with healthy populations of several state bird species of conservation concern. These include the eastern meadowlark, grasshopper sparrow, field sparrow, prairie warbler, brown thrasher, and eastern towhee. In 2005, a Henslow's sparrow pair, a state threatened species, was reported on the site. Manassas National Battlefield Park is known to support 168 bird species, including 54 confirmed breeders.

Edge species of birds known to inhabit areas of the park near potential historic landscape modifications include the eastern meadowlark (*Sturnella magna*), prairie warbler (*Dendroica discolor*), indigo bunting (*Paserina cyanea*), grasshopper sparrow (*Ammodramus savannarum*), yellow-breasted chat (*Icteria virens*), American goldfinch (*Carduelis tristis*), barn swallow (*Hirundo rustica*), and eastern bluebird (*Sialis sialis*). Other species typically found in edge or forested areas include the common yellowthroat (*Geothlypis trichas*), American robin (*Turdus migratorius*), cedar waxwing (*Bombycilla cedrorum*), eastern wood pewee (*Contopus virens*), and chimney swift (*Chaetura pelagica*).

Other species are adapted to the forest interior and primarily nest away from edges in the deep forest. Many of these forest interior species require large (greater than 375 acres), contiguous tracts of forest for breeding, and few are found in forest stands of less than 25 acres (USFS 1996, 1992). Only a few forest interior species are known to occur in the areas of potential landscape modification. These include the scarlet tanager (*Piranga olivacea*), Acadian flycatcher (*Empidonax virens*), blue-gray gnatcatcher (*Poleoptila caerulea*), and wood thrush (*Hylocichla mustelina*). These are area-sensitive species that are more common in larger rather than smaller wooded areas and may not successfully breed in small patches of otherwise suitable habitat. Although these birds are considered forest interior species, they occur in less than optimum conditions and can be found in areas other than forest interior habitat.

Threatened, Endangered, and Rare Species and Natural Communities

Manassas National Battlefield Park is classified under the Piedmont Region, Culpeper Basin. This Triassic basin historically supported a number of plants now considered rare by the Commonwealth of Virginia. Since settlement by Europeans, the original grasslands in Prince

Map 3-1 Historic Vegetation Patterns

Map Symbols

— National Battlefield Park Boundary

— Unfinished Railroad Grade

Non-NPS public land within park boundary

Privately owned land within park boundary

Privately owned land within park boundary; NPS owns scenic easement

Privately owned outside park boundary

Vegetation Types

Deciduous Forest

Mixed Forest

Coniferous Forest

Crops - Corn, Wheat, Oats

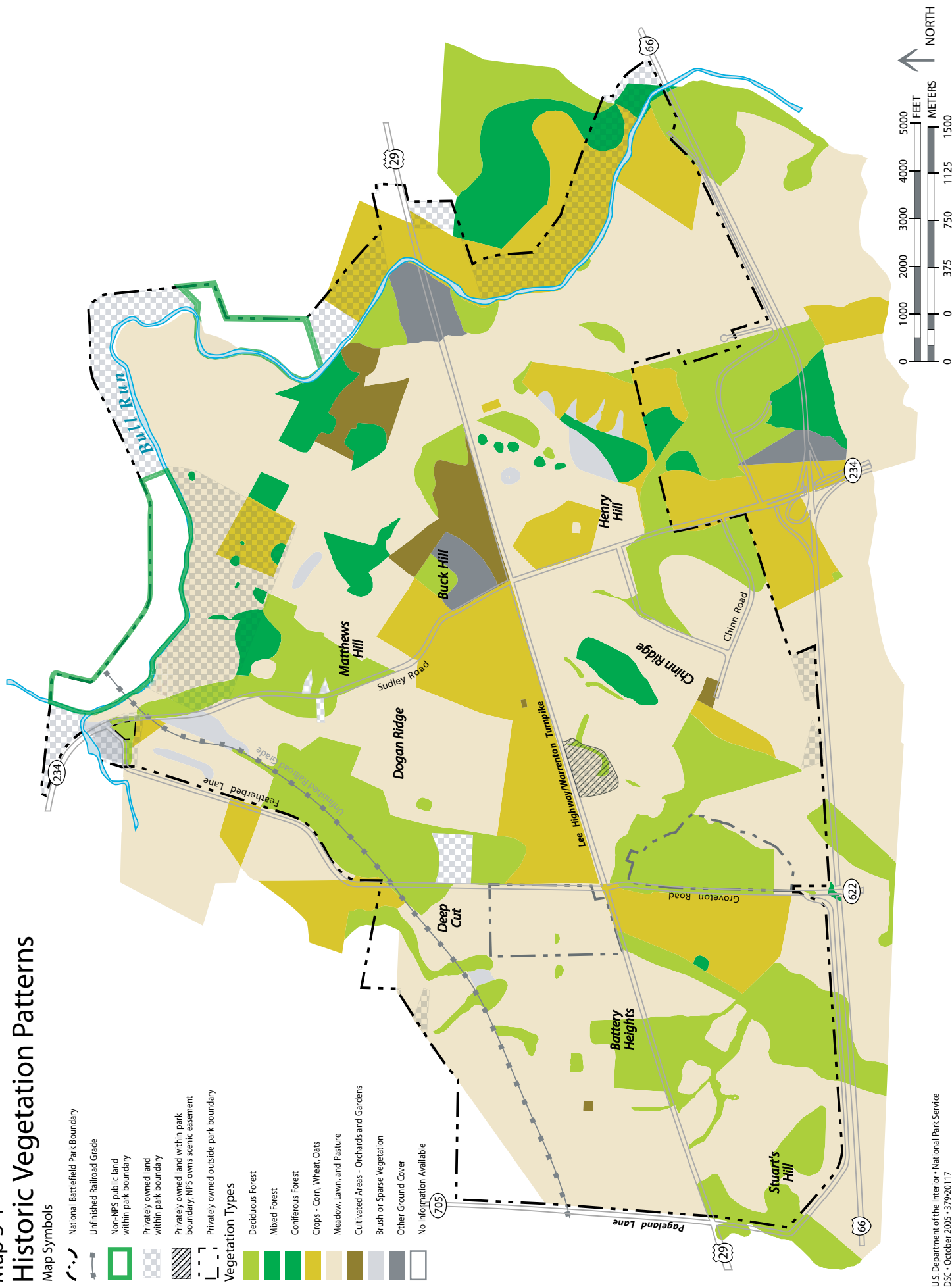
Meadow, Lawn, and Pasture

Cultivated Areas - Orchards and Gardens

Brush or Sparse Vegetation

Other Ground Cover

No Information Available



William County that supported these now scattered populations have been eliminated by agriculture, suppression of natural fires, and construction. In recent years, large portions of the Triassic basin in Prince William and surrounding counties have been subjected to intensive development pressure as the metropolitan Washington, D.C. area has expanded westward. As a result, many of the natural areas in the surrounding region have been destroyed, and the park is increasingly becoming a natural oasis as development in the region increases.

In 1997 and 1998, the Virginia Department of Conservation and Recreation's Division of Natural Heritage inventoried Manassas National Battlefield Park for rare, threatened, and endangered species and significant natural communities. According to that report, Manassas National Battlefield Park is "one of the region's most unspoiled areas" (VDCR DNH 1998). The rare and significant habitats that occur in Manassas National Battlefield Park are the upland depression swamp forest, oak-hickory forest (both threatened elsewhere in Virginia because of development), eastern white pine forest, and piedmont mountain swamp forest.

A Division of Natural Heritage study completed in 1997 inventoried potential habitats within the park for threatened, endangered, and rare species and significant natural communities. This inventory found no federally or state-listed threatened or endangered species. Similarly, the 1997 vascular plant inventory found no federal or state endangered species.

Some rare plants do occur in Manassas National Battlefield Park. The DNH studies identified 13 occurrences of state-listed rare plants associated with diabase or metasilstone substrates, including four each of Appalachian quillwort (*Isoetes appalachiana*) and marsh hedgenettle (*Stachys pilosa* var. *arenicola*), two each of blue hearts (*Buchnera americana*) and hairy beardtongue (*Penstemon hirsutus*), and one of buffalo clover (*Trifolium reflexum*). Other rare species documented include

Mead's sedge (*Carex meadii*), hoary puccoon (*Lithospermum canescens*), and purple milkweed (*Asclepias purpurascens*).

The populations of Appalachian quillwort were in found small, shallow intermittent streams. Hairy beardtongue, blue-hearts, and marsh hedgenettle are associated with open habitats. The park contains the majority of the known Virginia populations of marsh hedgenettle. Buffalo clover is characteristic of prairies and savannas west of the Appalachians and was found in an open canopied Virginia pine stand.

The Division of Natural Heritage also found six occurrences of communities considered rare or significant. Three occurrences of basic oak-hickory forest, covering about 72 acres, were found in the western portion of the park on diabase uplands. These stands are classified as white oak/eastern redbud/bottlebrush grass-cliff muhly. This community type is uncommon to rare in Virginia and is highly threatened because of widespread destruction by development in its primary northern Virginia range.

Also found were one occurrence each of upland depression swamp, eastern white pine forest, and piedmont/mountain swamp forest.

- The upland depression swamp comprises about 3 acres of seasonally flooded wetland south of Battery Heights. This community type is also uncommon to rare in Virginia and is threatened because of widespread destruction by development in its primary northern Virginia range.
- The eastern white pine forest community consists of a 10- to 15- acre stand of mixed eastern white pine, eastern hemlock, and oaks on a steep bluff overlooking Bull Run. This forest type is significant because of the type's rarity in the piedmont.
- The piedmont/mountain swamp forest covers about 40 acres on the alluvial floodplain of Bull Run. The dominant canopy species is pin oak. Pin oak swamps are rare in Virginia, although they are

locally common in the northern Virginia Triassic basin.

While no federally listed, proposed, and candidate threatened or endangered species were known to exist in the park, the U.S. Department of the Interior, Fish and Wildlife Service provided information about threatened and endangered species in Loudoun, Fairfax, and Prince William Counties. The information provided by the Department of the Interior is reproduced in Appendix E: Threatened, Endangered, and Rare Species and Natural Communities.

Bald eagles (*Haliaeetus leucocephalus*) may occasionally be seen, but are transient in the area. A number of rare invertebrate species are known to exist in Prince William County and may potentially occur in the park. Three of these species are state or federal species of concern or are state-listed. They include two mussels, the state-endangered brook floater (*Alasmidonta vericosa*) and the yellow lance (*Elliptio lanceolata*), and a butterfly species of concern, the regal fritillary (*Speyeria idalia*). Other potential rare invertebrates include several aquatic species of amphipods, clubtails, and a stonefly.

WATER RESOURCES (WATER BODIES, WATER QUALITY, WETLANDS, AND FLOODPLAINS)

The park is within the Chesapeake Bay watershed, and its main watercourse is Bull Run, which forms most of the park's eastern boundary. The primary stream within the park is Youngs Branch, which meanders south and east through the park, eventually draining into Bull Run.

The Youngs Branch watershed is approximately 3,000 acres, most of it within the park boundary. The main tributary of Youngs Branch begins near Brawner Farm as an intermittent stream. As it flows eastward, it joins with other tributaries, including Dogan Branch and Chinn Branch, to become a perennial stream.

As stream flow increases, the 100-year floodplain widens as permitted by the adjoining terrain. Bull Run has a primarily wooded, asymmetrical 100-year floodplain bounded by adjacent bluffs.

Wetlands in the park are typically found along the park's bodies of water. Map 3-2 shows the locations of the streams, ponds, and wetlands at Manassas National Battlefield Park.

There are ten farm ponds scattered throughout the park. Most of these ponds were formed from the installation of small earthen dams on small streams. All dams are classified as downstream, low hazard potential, minor size. In the late 1990s, the park took corrective actions to repair many of the dams. Today, the dams are in good condition.

A water quality investigation was conducted for the park in 1995 (Wyatt Group 1995). All streams sampled were reported to be within acceptable levels, although some stream bank erosion was noted and occasional high levels of fecal coliform were noted after rain.

It is the park's practice to plant native species of vegetation in areas where stream bank stability is less than desired. Otherwise, the park maintains bank stability by protecting existing riparian buffer areas. Farm ponds and beaver ponds were noted to have beneficial effects on stream health by removing sediments.

Additional data were collected and presented in the *Baseline Water Quality Data Inventory and Analysis Report (1997)*. The park has recently initiated a basic water quality monitoring program to analyze trends in water quality.

In the summer of 1997, the National Park Service began a cooperative arrangement with the Audubon Naturalist Society. Since that time the National Park Service and Audubon Naturalist Society have collected data on water quality and macro-invertebrate diversity while conducting water quality workshops within the park.

Map 3-2 Existing Water Resources and Wetlands

SYMBOL KEY

- National Battlefield Park Boundary
- National Battlefield Park Land
- Unfinished Railroad Grade
- Non-NPS public land within park boundaries
- Privately held land within park boundaries
- Privately held land within park boundaries; NPS holds scenic easement
- Privately owned land outside park boundary
- Streams
- Ponds
- Wetlands



Preliminary data for Youngs Branch indicate poor diversity within the stream, attributed to high water temperatures caused by poor canopy cover, sediment run-off, and marginal bank stability caused by high storm flows. Lack of a woody buffer along the stream may also have contributed to weak stream banks. Increased flows are probably the result of increased development outside the park.

Water quality monitoring, conducted when possible by the regional water resources division, collects data on water temperature, air temperature, depth of stream, flow rate, specific conductance, dissolved oxygen, pH, salinity, alkalinity, nitrite, phosphorus, ammonia, carbon dioxide, and chloride. This water chemistry data, along with macroinvertebrate information, allows the park to better evaluate stream health.

The National Park Service officially recognizes the wetland definition used by the U.S. Fish and Wildlife Service as outlined in *Classification of Wetlands and Deepwater Habitats of the United States* (USFWS 1979). The National Wetland Inventory map (Manassas Quadrangle dated 1983) was

reviewed to identify known wetlands at the park. The watercourses in the park, including the adjacent riparian and bottomlands as well as ponds, are classified as various types of wetlands. Palustrine forested wetlands at the park include the floodplain bottomland forests, found primarily along Bull Run. They represent old, undisturbed forests with many mature floodplain trees. Species generally include pin oak, swamp white oak, green ash, and American elm.

Two forested wetland systems worthy of special consideration have been identified at the park, including an upland depression swamp and piedmont/mountain swamp forest. The upland depression swamp comprises about 3 acres of seasonally flooded wetland south of Battery Heights. The piedmont/mountain swamp forest covers about 40 acres on the alluvial floodplain of Bull Run (DCR DNH 1993). Various bottomland hardwoods also occur along the riparian fringe of tributary streams. Small palustrine emergent wetlands exist sporadically around the park, and are generally associated with the small ponds or swales at the lower elevations.

CULTURAL ENVIRONMENT

Twice in two years, major armies of the United States and the Confederate States met in combat at Manassas. The Battle of First Manassas (July 21, 1861), the war's first major land battle, ended in a stunning Confederate victory that shattered hopes for a short and easy war. Thirteen months later, the Battle of Second Manassas (August 28-30, 1862), a battle four times larger than the first, brought another Southern triumph and gave Confederate forces their greatest opportunity for strategic success.

Manassas National Battlefield Park, established in 1940, preserves important portions of these two overlapping battlefields and the sites associated with them. The cultural resources related to the Civil War that comprise the park survive today as evocative reminders of the nation's fratricidal struggle. The following is a brief description of the cultural resources. More information on each site can be found in Appendix A: Description of Resources and Appendix B: Description of the Battle Events.

HISTORIC STRUCTURES

Manassas National Battlefield Park was listed in the National Register of Historic Places on October 15, 1966, as part of that year's National Historic Preservation Act. The nomination form to follow up on that designation was submitted in 1981. In 2004, the park superintendent submitted a revised concurrent nomination to the Virginia State Historic Preservation Office, to reflect the new park areas added since the 1981 document, and to add non-park land to the National Register boundaries. The nomination was approved in January 2006.

The revised 2004 form lists 62 structures, monuments, and sites as contributing to the park's significance. These include houses, farms, and Civil War memorials as well as landscape features such as roads, woodlands,

and fields important in shaping the battles' events.

The List of Classified Structures is an inventory of contributing historic structures that gives guidance to the planning process by providing an inventory and list of treatment measures for these structures. At Manassas National Battlefield Park, 40 structures, including monuments, roads, houses, and a bridge, have been included on the List of Classified Structures.

- Thirty-six of these have been designated as structures that must be preserved and maintained.
- Another three structures have been categorized as resources that should be preserved and maintained.
- One structure was classified as a resource that may be preserved or maintained.









Map 3-3 highlights the resources included on the park's List of Classified Structures.

Among the battlefield's historic structures, the Stone House and the Lucinda Dogan House merit special attention as the park's only wartime buildings rehabilitated to their 1860s appearance. Within the park, only one other building, the Thornberry House, dates to the time of the battles, albeit with some alteration. Several other buildings, including the Henry House, John Dogan House (Rosefield), and Brawner Farm House, serve to mark the locations of Civil War period dwellings and function as aids to interpretation.

In addition to the battle-related resources, the park contains an appreciable number of commemorative features that postdate the fighting. The Henry Hill area includes several monuments and markers. These include the remains of a wartime monument to Confederate Colonel Francis Bartow that is perhaps the earliest Civil War monument anywhere, and an equestrian statue honoring Confederate General Thomas J. "Stonewall" Jackson, who

Map 3-3

SYMBOL KEY

- | | |
|---|--|
|  | National Battlefield Park Boundary |
|  | National Battlefield Park Land |
|  | Unfinished Railroad Grade |
|  | Resources included in Manassas NBP's List of Classified Structures (LCS) |
|  | Non-NPS public land within park boundaries |
|  | Privately Held Land Within Park Boundaries |
|  | Privately Held Land Within Park Boundaries; NPS Owns Scenic Easement |
|  | Privately owned land outside park boundary |



received his *nom de guerre* nearby. Other prominent monuments include a pair of sandstone obelisks erected by Union veterans in 1865, one on Henry Hill and one adjacent to the Deep Cut, and three monuments near Groveton commissioned by the State of New York to honor the 5th and 10th New York and the 14th Brooklyn regiments.

Those examples notwithstanding, monuments are not extensive at Manassas National Battlefield Park. The park contains fewer than 20 formal monuments and troop markers scattered across the battlefield. The largest postwar commemorative feature on the battlefield landscape is the Groveton Confederate Cemetery, which contains the remains of more than 260 Confederate dead from the two battles.

CULTURAL LANDSCAPES

In 1996, the National Capital Region of the National Park Service conducted three cultural landscape inventories of different parts of the park. These inventories did not include the Stuart's Hill tract, which had previously been studied by the University Of Georgia, School Of Environmental Design. The 1996 effort produced a cultural landscape rehabilitation report. Each study included a reconnaissance section that identified the scope of the cultural landscape, what is known about the resource, and future research needs. Each study also contained an analysis and evaluation section, which provided a site history of the landscape development, defined the characteristics that contribute to the historic character of the landscape, and identified the individual features associated with those characteristics.

The historic battlefield landscape constitutes the park's most important resource and provides the setting for understanding the events of the Civil War battles fought here. Although the ground cover has changed in some areas, the terrain remains largely unaltered, and key landscape features survive. Within the battlefield landscape are numerous resources that contribute to the park's significance, including historic buildings,

archeological sites and ruins, remnants of historic fence lines, cemeteries and burial sites, traces of wartime roads and farm lanes, the reconstructed Stone Bridge, and the graded bed of the Unfinished Railroad.

ARCHEOLOGICAL RESOURCES

Archeological surveys have been carried out in several sections of the park, but no comprehensive park survey has been undertaken. The surveys that have been completed are, for the most part, related to park development projects or specific park research requirements. Since the early 1980s, surveys of selected areas of the park identified 92 archeological sites. Of these sites, more than two-thirds are in "good" condition. These surveys revealed that the park contains a variety of prehistoric and historic resources.

A park-wide survey of all archeological sites is necessary to identify and evaluate the park's archeological resources and to provide park management with the information necessary to ensure that such resources are protected, conserved, and managed appropriately. Such a survey is also necessary to ensure that park management decisions do not inadvertently impact archeological resources.

Archeological resources dot the historic landscape and provide evidence of the impact of war on the local community. Physical remains of antebellum plantations, modest farmsteads, slave quarters, and outbuildings combine to demonstrate the complexity of the rural, agricultural setting of the battles and help to delineate the historic scene. In addition to the many ruined house sites, traces of earthworks scattered along Bull Run, remnants of soldiers' huts, and depressions from disinterred battlefield burials are among the archeological features that call to mind the convulsive events of the 1860s.

Nearly all the recorded prehistoric sites need further fieldwork, as there is little available information. One potential prehistoric research issue is the development of a context of lithic scatters, which are common

prehistoric resources within the park boundaries (Little 1995). Another issue of historical archeological interest concerns the life of African-Americans before and after the battles and the Civil War (Little 1995).

MUSEUM COLLECTIONS AND ARCHIVES

Original documents and historic artifacts relating to the Battle of First Manassas, the Battle of Second Manassas, and the families and farms impacted by these battles constitute the primary focus of the collection and material for museum exhibits housed in the Henry Hill visitor center and Second Manassas visitor contact station. The collection also includes 40 cannon tubes displayed on reproduction carriages and distributed at battery sites throughout the park. These museum collections are used as part of the visitor center's and visitor contact station's role as orientation points. The museum elements visible to the public are selected to match and enhance the other orientation displays at these facilities, and are also tied to the interpretive elements and cultural landscape of the battlefields themselves.

Less than one percent of the more than 165,000 objects in the park's growing museum collections are ever on exhibit. The remainder of these objects is kept in onsite and offsite

storage facilities. The bulk of the archeological and architectural material and furnishings is maintained at the Museum Resource Center, a regional storage facility in Landover, Maryland. Because of limited onsite storage space at the Henry Hill visitor center, only the less bulky objects that directly support the park's primary interpretive themes and offer the greatest research value can be maintained at the park.

One full-time museum specialist is responsible for managing the park museum collections in accordance with established NPS standards. If needs are beyond the limits of training, experience, and available equipment and facilities, the museum specialist coordinates conservation measures with professional conservators. There is no dedicated space for conservation laboratory work, photography, or exhibit preparation. Additional space is currently maintained at Stuart's Hill for the storage and processing of archival materials in the collection.

The present onsite museum collections and archive facilities are nearing capacity. The anticipated growth of the collection will eventually require more offsite storage for museum objects at the Museum Resources Center, and additional space to accommodate museum records and electronic media.

TRANSPORTATION/TRAFFIC

ROADWAY CHARACTERISTICS

Manassas National Battlefield Park is just north of I-66, surrounding the intersection of U.S. Route 29 and VA Route 234. This location places the park within the heavily populated Washington, D.C. metropolitan area, and along a major transportation corridor that serves increasingly developed northern Virginia. Map 3-4 shows the roads and trails in the Manassas National Battlefield Park.

U.S. Route 29 and VA Route 234 are regional highways that run east-west and north-south, respectively, within the Manassas National Battlefield Park. Both roads are two lanes wide, except that U.S. Route 29 becomes a multilane, divided highway in the western portion of the park. The two highways meet at a signalized intersection in the center of the park. Currently, these highways are used by park visitors, commuters, truckers, and regional travelers.

As part of the Battlefield Bypass study, the Federal Highway Administration completed an existing conditions report that details the transportation conditions of the park and surrounding area. This *General Management Plan / Environmental Impact Statement* is a programmatic study, and is therefore more general in nature. For more detailed information on roadway capacity and levels of service on the roadways and intersections in and adjacent to the park, please refer to the Battlefield Bypass study (FHWA 2005).

TRAFFIC COUNTS AND LEVELS OF SERVICE

Traffic counts collected as part of the Battlefield Bypass study's existing conditions report indicate that U.S. Route 29 carries between 9,000 and 13,200 vehicles per day, and VA Route 234 carries between 9,800 and 14,100 vehicles per day (FHWA 2002). The existing corridor levels of service and average daily traffic counts are shown in Table 3-1.

Table 3-1: Levels of Services for U.S. Route 29 and Virginia Route 234 Corridors

Road Segment	Levels of Service		Average Daily Traffic
	AM	PM	
U.S. Route 29 East of VA Route 234	F	F	13,166
U.S. Route 29 West of VA Route 234	E	E	9,089
VA Route 234 North of U.S. Route 29	E	E	9,815
VA Route 234 South of U.S. Route 29	E	E	14,079

Source: Manassas National Battlefield Park Bypass Study Draft EIS (FHWA 2005).

While definitive data are not available, anecdotal observations indicate that at least 95 percent of this traffic volume is attributable to "through" trips that do not include a stop in the park.

The traffic capacity analyses were performed by the Federal Highway Administration, based on the procedures specified by the *Transportation Research Board Special Report 209: Highway Capacity Manual, 1997*. Level of service is a qualitative rating of the effectiveness of a highway or highway facility in serving traffic, in terms of operating conditions. The *Highway Capacity Manual* identifies operating conditions ranging from A, for best operations (low volume and the unimpeded ability to travel at the speed limit) to F, for worst conditions. The levels of service used for signalized intersections in the Battlefield Bypass study are summarized below.

- LOS A describes operations with an average delay of less than 10.0 seconds.

- LOS B describes operations with an average delay in the range of 10.1 to 20.0 seconds per vehicle.
- LOS C describes operations with delays in the range of 20.1 to 35.0 seconds per vehicle. Individual cycle failures, where all waiting vehicles do not clear the intersection during a single green time, may begin to appear at this level. This is generally considered the lower end of the range of the acceptable level of service in rural areas.
- LOS D describes operation with delays in the range of 35.1 to 55.0 seconds per vehicle. Individual signal cycle failures are noticeable. This is generally considered the lower end of the range of acceptable levels of service in urban areas.
- LOS E describes operations with delays in the range of 55.1 to 80.0 seconds per vehicle. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions (at capacity).
- LOS F describes operations with average delays in excess of 80.0 seconds per vehicle. There are many individual cycle failures. This LOS is considered to be unacceptable to most drivers.

The intersection of U.S. Route 29 and VA Route 234 operates at level of service F during both the morning and evening peak hours. The intersection has a delay in excess of 80 seconds per vehicle, which is considered to be unacceptable to most drivers.

The volume of through-traffic using routes within the park has become a serious detriment to the quality of the visitor experience the park can provide. The mix of pedestrian and vehicle traffic, as well as the mix of slower recreational traffic and higher-speed, through-traffic also poses safety hazards for park visitors.

SAFETY

A transportation study for the park was completed in June 1996. This study found that most vehicular accidents within the park occur on U.S. Route 29 and VA Route 234, while relatively few accidents occur on internal park roads. The accident rates on U.S. Route 29 and VA Route 234 are comparable to those of similar roads in Prince William County.

The study identified the signalized intersection at U.S. Route 29 and VA Route 234 as being problematic and a safety concern because the intersection is operating at capacity during the morning, noon, and evening peak travel periods. Erratic vehicular movement associated with traffic congestion was cited as the primary safety concern (Peccia 1996).

Another safety concern is potential conflicts of pedestrians or bicyclists with the heavy vehicular traffic on U.S. Route 29 and VA Route 234. Presently, a number of the park's trails cross U.S. Route 29 and VA Route 234.

EMERGENCY RESPONSE

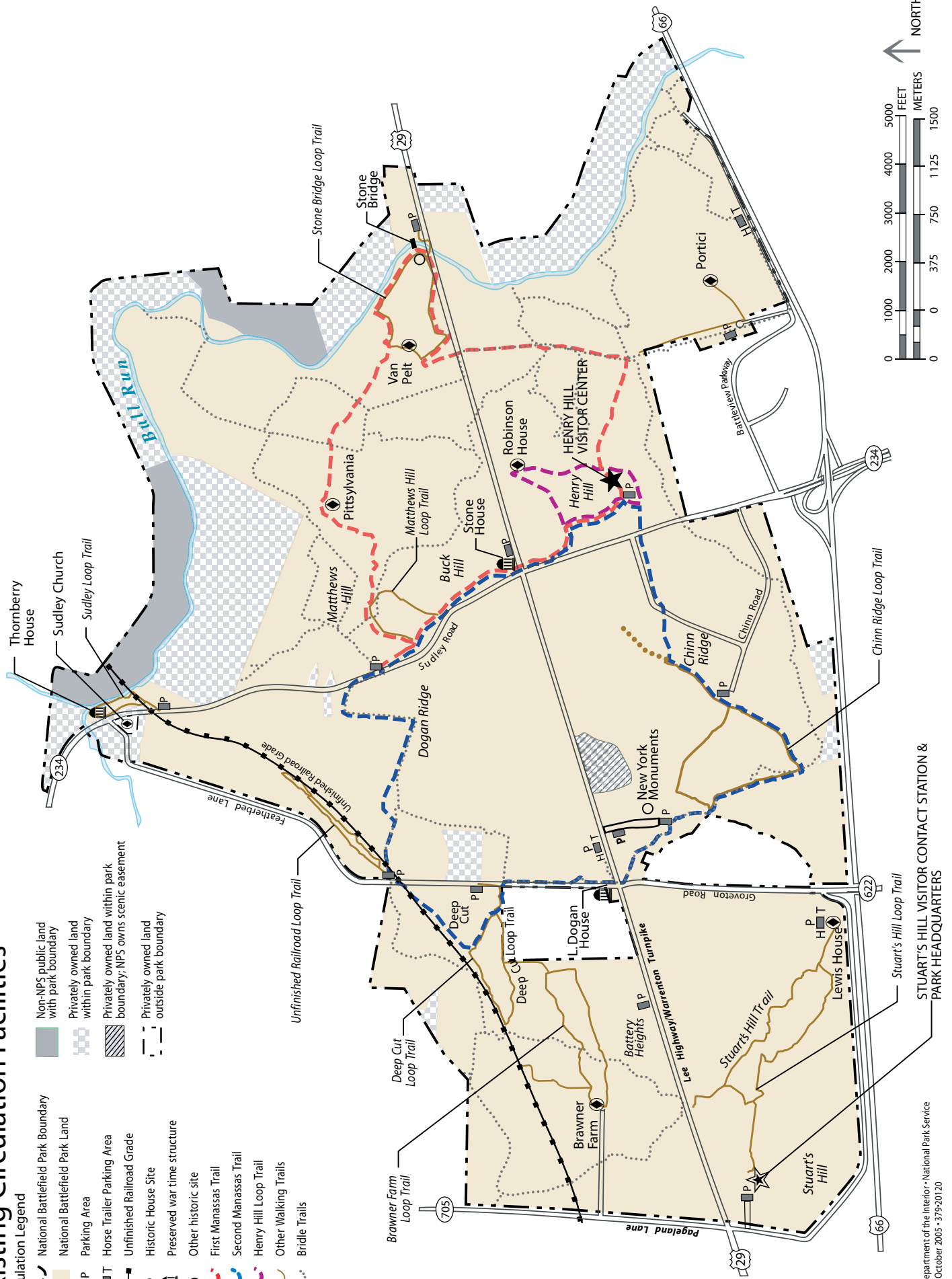
To respond to serious incidents, the National Park Service relies on local emergency services. Emergency response to Manassas National Battlefield Park is provided by local fire departments and emergency response facilities.

The park is served primarily by Stonewall Jackson Volunteer Fire Department, Station 11, at 7814 Garner Drive in Manassas. The station is approximately 1.7 miles from the park's southern entrance on VA Route 234 and approximately 3 miles from the intersection of U.S. Route 29 and VA Route 234 at the center of the park. The response time to this location is approximately 5 minutes, but can be greater, depending on traffic congestion on the roads. The station is equipped with ambulances and fire engines.

Existing Circulation Facilities

Circulation Legend

- National Battlefield Park Boundary
- National Battlefield Park Land
- Parking Area
- Horse Trailer Parking Area
- Unfinished Railroad Grade
- Historic House Site
- Preserved war time structure
- Other historic site
- First Manassas Trail
- Second Manassas Trail
- Henry Hill Loop Trail
- Other Walking Trails
- Bridle Trails
- Non-NPS public land with park boundary
- Privately owned land within park boundary
- Privately owned land within park boundary, NPS owns scenic easement
- Privately owned land outside park boundary



The western end of the park is served by the Prince William County Gainesville District Volunteer Fire Department, Station 4, at 14450 John Marshall Highway (State Highway 55). The station is approximately 3 miles from the western entrance of the park. The response time to the central area of the park is 7 to 12 minutes. The station is equipped with ambulances, fire trucks, and a rescue squad.

Emergency response may also be provided by the West Centreville Volunteer Fire Department Station 38, at 6001 O'Day Drive in Centreville. The station is approximately 3

miles from the eastern entrance on U.S. Route 29. The station is equipped with ambulances and fire trucks.

The park falls within the jurisdiction of the National Capital Region Museum Emergency Response Team (MERT). This group, composed of experts in cultural resource management, is prepared to respond quickly to regional incidents, such as natural disasters or special events, which may threaten or endanger museum collections, both cultural and natural, and associated historic structures and archeological sites.

SOCIOECONOMIC ENVIRONMENT

POPULATION

The park is located in Prince William and Fairfax Counties and is near Loudoun County. The local economic region consists of these counties plus Arlington County and the independent Cities of Alexandria, Fairfax City, Falls Church, Manassas, and Manassas Park.

As of April 2000, Fairfax County's population was 969,749 (Census, 2000). Its population is now believed to have surpassed one million. From 1990 to 2000, Fairfax County's population increased by 18.5 percent. Individuals identifying themselves as "white" made up 69.9 percent of the population, followed by "Asian" at 13 percent, and "African American" at 8.6 percent. American Indians, Native Hawaiians, and Other Pacific Islanders made up the remaining 8.5 percent. Individuals 65 years old and over comprised 7.9 percent of the population.

Loudoun County's population increased by 96.8 percent from 1990 to 2000, and as of the 2000 census, it had a population of 169,599. White individuals made up 82.8 percent of the population, followed by African Americans at 6.9 percent, with Asians, American Indians, Native Hawaiians, and Other Pacific Islanders making up the remaining 10.3 percent. Individuals 65 years old and over comprised 5.6 percent of the population.

Prince William County's April 2000 population was 280,813. From 1990 to 2000, Prince William County's population increased by 30.6 percent. White individuals made up 68.9 percent of the population, followed by African Americans at 18.8 percent. American Indians, Asians, Native Hawaiians, and Other Pacific Islanders made up the remaining 12.3 percent. Individuals 65 years old and over comprised 4.8 percent of the population.

Based on a review of Prince William County Geographic Information Systems information and aerial photography, there are

approximately 70 to 75 residential homes that are within the park boundaries or that require access through the park boundaries to access their property. The Battlefield Bypass study identified 37 private in-holdings in Prince William County and 17 private in-holdings in Fairfax County (FHWA 2002). In addition to the in-holdings, which refer to privately owned properties that are either fully or partially located within the legislative boundaries of the park, there are approximately 20 private landowners that require use of state and U.S. routes in the park to access their properties.

ECONOMY³

In terms of earnings, the service sector of the economy is by far the most important for the local region and the state as a whole. However, the closer a jurisdiction is to Washington, D.C., the more important the federal government sector becomes to earnings.

Between 1999 and 2000, median household income in Virginia increased by 4.3 percent, to \$46,789. In Prince William County, income increased by 6.9 percent, to \$67,466, while Fairfax County income increased 8.1 percent, to \$84,009.

The trade, transportation, and utilities industrial category employed the largest portions of the state's workforce in 2000 at 18.5 percent. Government employed 17.8 percent of the workforce, and professional and business services employed 16.2 percent.

EMPLOYMENT

The Arlington, Fairfax, Loudoun, and Prince William County area of northern Virginia contained nearly 25.6 percent of the state's workforce in 2000. One measure of an area's social and economic well-being is

³ Source for all data: the Virginia Employment Commission website: <http://velma.virtuallmi.com/>

unemployment. This statistic measures the number of people that were available for work and were unable to find suitable work. In 2000, the unemployment rate for Virginia (2.7 percent) was below that of the country as a whole (3.7 percent). The unemployment rates for each of the political units that make up the local region ranged from 1.6 percent to 2.8 percent. For the affected area, the employment situation was better than it was for the country or state.

PER CAPITA INCOME

Personal income is a commonly used measure of the purchasing power available to the residents of a geopolitical unit. Prince William County together with Manassas and Manassas Park (average per capita income of \$29,967 in 2000) were somewhat behind the state average of \$31,120 and slightly higher than the country as a whole (average per capita income of \$29,469). Bureau of Economic Analysis data show that for 2000, except for Prince William

County, Manassas, and Manassas Park, the local area had per capita incomes ranging from \$40,290 to \$51,227, which is substantially higher than the rest of the state and the nation in terms of per capita personal income.

POVERTY

The poverty rate is another measure of the economic and social well-being of an area. In 2000, the percent of persons living below the poverty level within the affected area ranged from 2.8 percent to 7.8 percent. Throughout the affected area, the percentage of persons living below the official poverty level in 2000 was substantially lower than the state (9.6 percent) and national (12.4 percent) averages.

Growing population, growth in industry earnings, relatively high per capita incomes, and relatively low unemployment and poverty rates all indicate that the affected area has a vigorous, robust economy supporting a stable social environment.

RECREATION

The battles, location, historic resources, and historic significance of Manassas National Battlefield Park make it unique among the many parks and recreational areas of the affected region. The Henry Hill walking tour is the primary way that visitors experience the Battle of First Manassas, while the park's driving tour is the primary way for people to experience the Battle of Second Manassas. The park also features walking, hiking, and horseback riding facilities.

Picnicking and hiking are available at the 400-acre Conway Robinson Memorial State Forest,

which is 1/4 mile west of the park. In addition, there are numerous other parks and recreation facilities within the local area that provide a wide variety of public recreational opportunities.

Bull Run Regional Park, operated by the Northern Virginia Regional Park Authority, is approximately 4 miles east of the Henry Hill visitor center. This facility features a broad range of recreational activities, and accommodates large groups' special events.

VISITOR EXPERIENCE

Resources available for visitor use include one visitor center, one visitor contact station, a picnic area, 5,071 acres of battlefield park, 12 miles of tour road, 150 interpretive park signs, 21 miles of hiking trails, and 23 miles of bridle trails.

VISITATION USE AND PATTERNS

The visitor use and patterns of use described in this section provide background for understanding levels of use and impacts of this use on the park's resources. Visitor use data have been collected for many years.

Recreational visits for 2003 depicted in Table 3-2 are indicative of the normal park visitation patterns at Manassas National Battlefield Park.

Table 3-2: Visitor Use for 2003¹	
Month	Recreation Visits
January	20,033
February	24,609
March	82,093
April	146,231
May	93,407
June	50,962
July	54,314
August	118,450
September	64,394
October	36,462
November	36,457
December	32,541
Total	759,953
Source: National Park Service, Public Use Statistics Program Center, PSPC-WASO, available on the Internet at www2.nature.nps.gov/stats/ . ¹ Non-recreation visits were reported as a constant 40 per month for an annual total of 480 non-recreational visits. These numbers, respectively, would be added to the monthly and yearly figures to obtain total visits for a particular month or the year.	

The park is open all year.

Visitation at most parks is seasonal, with the lowest level of use in the winter and the highest in the summer. Spring and autumn are usually seasons of transition, with use going up in the spring and down in the fall. However, visitation patterns at Manassas National Battlefield Park differ from this typical model. Summer visitation is considerably higher than winter visitation. However, pleasant weather, combined with spring blossoms or autumn foliage, create peak visitation during spring and fall weekends.

Annual visitor use figures are presented in Table 3-3. Annual visitor use at the park fluctuates from year to year. While it has increased slightly, visitation has generally been stable. A similar trend is expected in the future.

VISITOR PROFILE

Three general categories of visitors at the Manassas National Battlefield Park are as follows:

- **General visitors**—These people usually have limited specific interests in, or knowledge of, the battles. They visit the park to gain a general understanding of the park's significance. These visitors usually spend less than two hours in the park, mostly at the visitor center and the Henry Hill area.
- **Historical visitors**—These individuals have a good understanding of the overall significance of the battles, and they are looking to examine and understand the actions and details of the two battles. They will spend about five hours in the park touring the battle sites.
- **Recreational visitors**—This people are seeking recreational experiences such as cross-country skiing, fishing, hiking, horseback riding, jogging, nature study, picnicking, and sledding. They usually

come to the park on spring, summer, and fall weekends and holidays.

As described above, the heaviest use of the park occurs during fall and spring weekends. At these times, local use increases dramatically. Seasonal variations are as follows:

- Spring: heaviest use occurs on weekends and is usually concentrated around Stone Bridge, the visitor center, and the surrounding area. Increased use by seniors and school groups occurs, as well as more use by hikers, joggers, and picnickers.
- Summer: family groups on extended vacations dominate the park. Peak daily use occurs between the hours of 11:00 a.m. and 4:00 p.m. The heaviest use is on the weekends.
- Fall: senior citizen and organized tour use increases, especially in October. Use is concentrated on weekends. Area residents make increased use of the park for recreational activities.
- Winter: visitation is the lightest of any season. Area residents and business commuters predominate during this period. Heaviest use occurs during periods of snowfall, when cross-country skiing, sledding, and snow play are the main attractions.

PROJECTION OF FUTURE USE

A variety of factors affects park use. Forecasting visitor use is subject to a high probability of error because the method generally used is simplistic, relatively few data points are available to establish the trend, and there is no cause and effect relationship between past use, future use, and extraneous variables beyond the control of the National Park Service. In addition, the high levels of non-park vehicular traffic on U.S. Route 29 and VA Route 234 preclude accurate counts of park-related traffic. Based on historical data, it is assumed that visitation would probably increase over the long term. This pattern also reflects the general trend for most national park system units.

Table 3-3: Annual Visitor Use, 1983 to 2003

Year	Recreation Visits ¹	Non-Recreation Visits ²	Total Visits
2003	759,953	480	760,433
2002	779,147	480	779,627
2001	822,684	480	823,164
2000	692,006	480	692,486
1999	815,338	480	815,818
1998	972,709	480	973,189
1997	1,025,826	480	1,026,306
1996	725,086	480	725,566
1995	676,087	480	676,567
1994	917,534	480	918,014
1993	614,897	480	615,377
1992	867,606	480	868,086
1991	905,485	480	905,965
1990	799,972	480	800,452
1989	767,138	480	767,619
1988	778,861	420	779,281
1987	667,014	No data collected	667,014
1986	793,274	No data collected	793,274
1985	723,998	No data collected	723,998
1984	703,100	No data collected	703,100
1983	720,754	No data collected	720,754

Source: National Park Service, Public Use Statistics Program Center, PSPC-WASO, available on the Internet at (www2.nature.nps.gov/stats/)

¹ Recreation visits are the entries of persons, for any part of a day, onto lands or waters administered by the National Park Service for recreation purposes.

² Non-recreation visits are entries of persons going to and from in-holdings, trades people with business in the park, non-NPS personnel (such as guides) pursuing a gainful business, and other non-NPS entries for purposes other than recreational pursuits.

PARK OPERATIONS AND MAINTENANCE

Manassas National Battlefield Park had a base operating budget of approximately \$2,526,500 in Fiscal Year 2004 and a work force of 29 permanent positions and 9 seasonal positions. This work force was supplemented in 2004 by approximately 11,900 hours (more than 5.8 full-time-equivalents) of Volunteers-in-Parks service. The park's base budget in Fiscal Year 2004 was supplemented by approximately \$6,000 of donated funds and \$163,300 fee enhancement funds from entrance fees.

Management staff includes the superintendent and cultural and natural resources managers. Staff is organized into four operating divisions: Interpretation, Visitor Protection, Maintenance, and Administration. Staff expertise and specialties include one museum curator, one historian, one natural resource program manager/geographical positioning system specialist, one computer specialist, and two exhibit specialists. This staff is supplemented and/or supported using special project funds, contracts, and/or the assistance or expertise of various NPS entities and other organizations, as available.

Park administration structures include

- one visitor center
- one visitor contact station
- one central maintenance facility
- park headquarters
- one law enforcement office building
- one horse barn
- one hay barn/fire cache building
- one tack building
- one resource management building
- three employee housing units

The park includes 4.65 miles of paved and 7.6 miles of unpaved roadways and two picnic areas. Additional information on the park operations is available from the *Annual Performance Plan for the Manassas National Battlefield Park*, which can be obtained at <http://www.nps.gov/mana/administration/GPRA%202003/gpra2003.htm>.

