

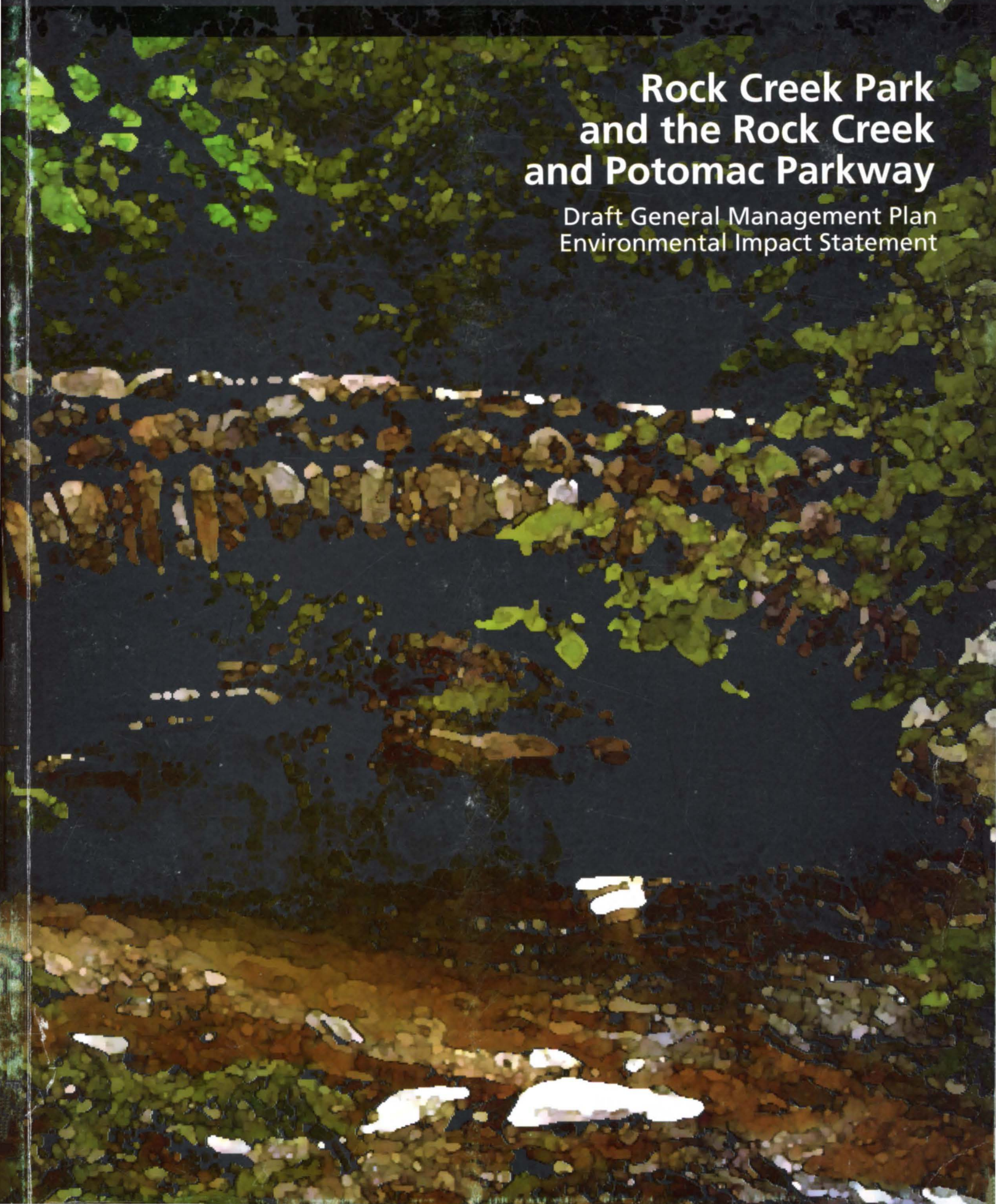
Rock Creek Park
and the Rock Creek and Potomac Parkway
Washington, D.C.

National Park Service
U.S. Department of the Interior



Rock Creek Park and the Rock Creek and Potomac Parkway

Draft General Management Plan
Environmental Impact Statement



How to Comment on This Plan :

Comments on the *Draft General Management Plan / Environmental Impact Statement, Rock Creek Park and the Rock Creek and Potomac Parkway* are welcome and will be accepted for 90 days following publication of notification in the *Federal Register*. You can submit your comments via mail or electronically.

Send written comments to:

National Park Service, Rock Creek Park
Superintendent
3545 Williamsburg Lane NW
Washington, D.C. 20008-1207

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Draft
General Management Plan
Environmental Impact Statement

**Rock Creek Park and the
Rock Creek and Potomac Parkway**

Washington, D.C.

Four alternatives were identified for the management of Rock Creek Park and the Rock Creek and Potomac Parkway. Alternative D was identified as the preferred alternative.

Alternative A, Improved Management of Established Park Uses, would improve visitor safety, better control traffic volumes and speeds through the park, enhance interpretation and education opportunities, and improve the use of park resources, especially cultural resources. It generally would retain the current scope of visitor uses.

Alternative B, Continue Current Management/No Action, would continue the current management pattern into the future.

Alternative C, Nonmotorized Recreation Emphasis, would eliminate automobile traffic along much of the northern portion of Beach Drive, and better control traffic volumes and speeds elsewhere. Management of resources other than traffic would be the same as in Alternative A.

Alternative D, Mid-Weekday Recreation Enhancement, would eliminate automobile traffic along much of the northern part of Beach Drive from 9:30 A.M. to 3:30 P.M. each weekday. Management of resources other than traffic would be the same as in Alternative A.

Alternatives A, C, and D would all improve management of the resources of the park and parkway relative to Alternative B. Impact topics that would experience major improvements would include native wildlife, historic structures and cultural landscapes, and visitor safety. Major adverse effects on the traditional visitor experience of automobile touring along the length of the park would occur with Alternative C.

For more information concerning this plan, contact:

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EXECUTIVE SUMMARY

OVERVIEW

This general management plan and environmental impact statement is the basic guidance document for managing Rock Creek Park and the Rock Creek and Potomac Parkway. The purposes of this plan are to specify resource conditions and visitor experiences to be achieved in the park and parkway, and to provide the foundation for decision-making and preparation of more specific resource plans regarding the management of the park and parkway.

The final general management plan will be the first comprehensive plan prepared for Rock Creek Park and the Rock Creek and Potomac Parkway by the National Park Service (NPS). When completed, it will represent an agreement by the National Park Service with the public on how the park and parkway will be used and managed during the plan period. This plan represents the results of a multi-year-long planning process that began in 1996. This plan complies with applicable NPS planning guidance, including *Director's Order #2: Park Planning* (NPS 1998a), and *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a).

The area covered by this plan includes the 1,754 acres administered by the National Park Service in the Rock Creek valley from the Maryland state line south to the National Zoo, the 2-mile-long Rock Creek and Potomac Parkway from the National Zoo to Virginia Avenue, lands along selected tributaries of Rock Creek, and roadways that are associated with these areas.

A pivotal management issue to be resolved by this plan involves the use of park roads by commuters on weekdays. This issue includes determining the appropriate level of commuter traffic in Rock Creek Park and the degree to which park values would be affected by such use. The other two key management issues include the currently limited ability to provide orientation, interpretation, and education services to visitors in the park, and the problems that park administrative and operation activities encounter at their present locations in historic structures.

These key management issues are summarized in three questions, called decision points. The decision points helped define the management alternatives that are described and evaluated in this draft general management plan. The decision points ask:

- how should traffic be managed in Rock Creek Park and on the Rock Creek and Potomac Parkway?

- what are the most appropriate levels of service and locations for visitor interpretation and education in the park?

- what are the most appropriate locations to support administration and operations functions with respect to minimizing resource disturbance?

Current management practices include closing portions of Beach Drive and other park roads to motorized vehicles on weekends and holidays. These closures provide recreation opportunities that are unmatched elsewhere in the Washington, D.C. metropolitan area, and are very popular with park visitors. Therefore, all of the alternatives for future management of the park will continue the practice of weekend and holiday road closures.

As with all NPS units, management of the park and parkway is guided by numerous congressional acts, executive orders, and NPS policies. In addition to the approaches contained in the alternatives in this draft general management plan, the National Park Service strives to implement all of these legislative, executive, and policy requirements in the park and parkway. The section “Servicewide Policies and Mandates” identifies the desired conditions that the National Park Service will work to attain regardless of the alternative that is selected, and the types of actions the National Park Service will take to achieve those desired conditions.

Specific resources and values, called impact topics, were used to focus the planning process and the assessment of the alternatives’ consequences. Four criteria were used to determine the impact topics. They included resources cited in the establishing legislation for the park or the parkway, resources critical to maintaining the significance and character of the park, resources recognized as important by laws or regulations, and resources of concern to the public, as expressed during scoping. Impact topics were organized into three categories:

- natural resources, including air quality, Rock Creek and its tributaries, wetlands and floodplains, deciduous forests, protected and rare species, and other native wildlife

- cultural resources, including archeological resources, historic structures, and cultural landscapes

- visitor and community values, including traditional park character and visitor experience, regional and local transportation, and community character

Four alternatives were developed to provide different approaches for addressing the decision points. To design the four alternatives, the National Park Service first conducted public scoping, and then screened a larger number of alternatives, refining them based on public input. Following the general definition of the alternatives, the National Park Service identified management prescriptions that could be applicable to implementing the alternatives.

The management prescriptions identify how various parts of the park and parkway would be managed. Each prescription is defined in this general management plan based on desired visitor experiences and resource conditions, and the kinds of activities or facilities within the prescription that would achieve the targeted conditions. The management prescriptions were then mapped to specific areas of the park to define the details of the four alternatives.

Twelve management prescriptions define all of the target visitor experiences and resource conditions that could occur under the four alternatives for Rock Creek Park and the Rock Creek and Potomac Parkway. Each alternative is a combination of several management prescriptions. None of the alternatives would use all of the prescriptions, and the locations where some of the prescriptions would be applied vary among alternatives.

Consistent with the high level of concern expressed in scoping about the use of roadways, seven of the prescriptions apply to roads. The others emphasize desired conditions and visitor experiences for forests, cultural resources, recreation areas, visitor facilities, and administration and operations areas.

DESCRIPTIONS OF ALTERNATIVES

Guidelines for preparing environmental impact statements require that the preferred alternative be identified in the draft environmental impact statement unless the decision-maker has no prefer-

ence. The National Park Service has identified Alternative D: Mid-Weekday Recreation Enhancement, as the preferred approach for future management of the park and parkway. This alternative would provide for the broadest use of the park and would represent the best balance of improving resource protection, enhancing recreational opportunities, and continuing the traditional visitor experience of automobile touring along the length of the park.

The key features of the alternatives include the following.

Alternative A: Improved Management of Established Park Uses. Alternative A would improve visitor safety, better control traffic volumes and speeds through the park, enhance interpretation and education opportunities, and improve the use of park resources, especially cultural resources. It generally would retain the current scope of visitor uses.

Alternative A would improve traffic management within the park and parkway. The existing park roadway system would be retained and nonrecreational through-traffic would be accommodated. However, to improve visitor safety and the quality of the visitor's experience, traffic would be managed to reduce speeds and volumes compared to those that would occur if current management were continued (Alternative B). This would include high-occupancy vehicle (HOV) restrictions during rush-hours on segments of Beach Drive. Alternative A also would:

- upgrade some trails and rehabilitate deteriorating segments
- rehabilitate the Peirce Mill complex to focus on the history of milling and land use in the area, and rehabilitate the Peirce Mill Barn for use in interpretation and education
- move the park administrative offices out of the Peirce-Klingbein Mansion at Linnaean Hill to commercial office space outside the park, or to a new office facility that would be constructed at the park maintenance yard
- rehabilitate the Linnaean Hill complex for adaptive use compatible with park values
- move the U.S. Park Police substation out of the Lodge House on Beach Drive at Joyce Road to commercial space outside the park, or to a new park police substation that would be constructed near the existing U.S. Park Police H-3 stables
- convert the Lodge House to a visitor contact station to provide park orientation, information, and interpretation
- rehabilitate and expand the nature center and upgrade the planetarium to improve effectiveness of public programs

Alternative B: Continue Current Management/No Action. Alternative B would continue the current management pattern into the future. It represents the "no action alternative" required by the Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act and *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a).

Under Alternative B, Rock Creek Park and the Rock Creek and Potomac Parkway would be maintained as they have evolved thus far. There would not be any major changes in resources management, visitor programs, or facilities beyond regular maintenance. The current park road system would be retained and existing traffic management would continue.

Alternative C: Nonmotorized Recreation Emphasis. Alternative C would address comments by members of the public who want to promote nonmotorized recreation. Alternative C would eliminate traffic in much of the northern part of the park by closing three sections of Beach Drive to automobiles. These would be the same three segments that currently are closed on weekends. It also would implement traffic-reducing and traffic-calming measures on roads in the southern portion of the park and on the parkway. The Alternative C management proposals for resources other than traffic would be the same as those listed above for Alternative A.

The intent of closing the road along portions of the Rock Creek valley floor would be to manage this area as a quiet refuge from urban automobile traffic and to promote nonmotorized recreation throughout the week. This section of the park would become a destination for nonmotorized activities, rather than a through drive, in keeping with the park's natural and historic character. Alternative C also would convert the road into a paved trail through the Rock Creek valley and connecting to the Potomac River, as envisioned in regional bicycle plans.

Alternative D: Mid-Weekday Recreation Enhancement. Alternative D was developed in response to a letter sent to the National Park Service by the mayor of Washington, D.C. The mayor suggested "implementing weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush hour periods."

On weekdays, Alternative D would close three segments of Beach Drive in the northern portion of the park to motorized vehicles for a 6-hour period, from 9:30 A.M. to 3:30 P.M. These would be the same segments that currently are closed on weekends. For the other 18 hours of each weekday, including both rush-hour periods, traffic management would be similar to Alternative B, although traffic-calming measures like those in Alternative A would be used to reduce speeds. Alternative D would manage resources other than traffic in the same manner as presented above for Alternative A.

Alternative D was intended as a compromise between traffic and nonmotorized recreation. During rush-hour periods, the alternative would attempt to facilitate traffic flows and minimize the diversion of rush-hour traffic from the park into nearby neighborhoods. Between rush-hour periods on weekdays, it would promote nonmotorized recreation and provide a quiet refuge from the surrounding urban area.

ENVIRONMENTAL CONSEQUENCES

The environmental impact statement portion of this plan describes the affected environment of the park and parkway in terms of 11 impact topics. The environmental consequences section describes the effects of each alternative on each impact topic.

Determining environmental consequences first included identifying the regulations and policies that were applicable to the impact topic, and then defining the methods that were used to conduct the analysis. This included defining relative terms such as "minor" or "major" effects for the impact topic and establishing timeframes for long-term and short-term effects. The analysis was then performed both for the park and parkway and in a more regional context to determine cumulative impacts. Most analyses involved comparing conditions that would occur with changes in management (Alternatives A, C, and D, commonly called the "action alternatives") to conditions that would occur if current management practices continued (Alternative B, the "no action alternative").

The analysis of environmental consequences found that all four alternatives would have fairly similar effects on air quality, the water quality and hydrology of Rock Creek and its tributaries, wetlands and floodplains, deciduous forests, and protected and rare species. These findings would be expected, based both on the NPS' mandate to protect these resource and the development of the alternatives from decision points that focus on traffic management, visitor interpretation and education, and effective administration and operations.

Some differences to natural resources would occur. However, except for roadkill reductions that would occur with all of the action alternatives, none of the differences to natural resources among the alternatives would be major.

In the area of traditional park character and visitor experience, the improved education and interpretation facilities included in Alternatives A, C, and D would provide greater opportunities for the public to learn about and experience the park's natural and cultural resources, compared to Alternative B. The action alternatives would also enhance the efficiency of park administration and improve police services.

The traffic management measures of all three action alternatives would produce major improvements in visitor safety. Most of the improvements would be associated with the implementation of engineered traffic-calming devices, which would reduce vehicle speeds and the associated frequency and severity of accidents.

The greatest benefits to nonmotorized recreation would be associated with Alternative C. However, Alternative C would eliminate the traditional visitor experience of automobile touring along the length of the park, including the gorge area, which would be a major adverse effect on traditional park character and visitor experience.

Park roads designed as historic also are considered a cultural resource. By closing them to motorized traffic, Alternative C would modify the design features that define their significance.

Cultural resources would be the only impact topic where one or more of the alternatives could cause irreversible and irretrievable losses of resources. Under the three action alternatives, the disturbance of sites in association with new construction could result in some irreversible and irretrievable loss of archeological or historic resources.

For Alternatives A, C, and D, the effects on traditional park character and visitor experience, regional and local transportation during rush hours, and community characteristics that are associated with traffic levels were evaluated based on improvements or declines in levels of service (LOS) relative to Alternative B in the year 2020.

Alternative D would produce 2020 conditions similar (no differences in LOS) to those in Alternative B. This result was expected, since Alternative D was designed to minimize effects both on rush-hour traffic and neighborhoods.

Within the park, for the other two action alternatives, improvements in LOS would be noticeable to major. Effects would include a 40 percent reduction in average daily traffic through the gorge area with Alternative A, and the elimination of automobile traffic on most of Beach Drive north of Broad Branch Road with Alternative C.

Noticeable (change of one LOS) improvements in traffic would occur along most of the Rock Creek and Potomac Parkway with Alternatives A and C.

Outside of the park, Alternative A would provide noticeable to major LOS improvements on four road segments. Two road segments would have noticeably degraded LOSs, with associated adverse effects on community character. There would not be a disproportionate routing of traffic to disadvantaged areas or ethnic neighborhoods.

With Alternative C, eight road segments outside of the park would have the benefits to traffic and community character of improved LOSs, while nine road segments would have decreased LOSs with associated adverse effects on traffic and community character. There would not be a disproportionate routing of traffic to disadvantaged areas or ethnic neighborhoods.

During the middle part of workdays, Alternatives C and D would have similar effects, diverting traffic that would use park roads under Alternative B onto nearby city streets. However, nearby streets and intersections would be operating well below their capacities during the mid-day period, even in the year 2020. While the diverted mid-day traffic would be perceptible on some city streets, it would not cause any changes in LOSs or in traffic-related community character.

With regard to the first decision point, Alternatives A, C, and D would substantially reduce automobile traffic in the park compared to Alternative B.

Alternative A would accomplish this by implementing traffic-reducing and traffic-calming measures, including HOV requirements during rush hours, while maintaining the roads as part of the city's transportation system throughout weekdays.

Alternative C would permanently remove some segments of Beach Drive from the city's motorized vehicle grid, and would implement traffic-reducing and traffic-calming measures in other areas.

Alternative D would implement traffic-calming measures, and would also close sections of Beach Drive to motorized traffic during the middle part of each weekday.

Regarding the second decision point, the levels of service for visitor interpretation and education would be equally improved under the identical measures of Alternatives A, C, and D. This would be accomplished by moving administrative and operations functions out of historic buildings and by rehabilitating these and other historic and educational structures. For the third decision point, Alternatives A, C, and D would provide the same level of improvements compared to Alternative B by moving administration and operations functions into modern facilities.

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PURPOSE OF AND NEED FOR ACTION

This section defines the purposes of the general management plan for Rock Creek Park and the Rock Creek and Potomac Parkway, and why the general management plan is needed. It includes planning direction and guidance, and identifies the issues (decision points and impact topics) that were considered.

PURPOSE OF THE GENERAL MANAGEMENT PLAN

Rock Creek Park and the Rock Creek and Potomac Parkway are heavily used by the public. This use places demands on park personnel and facilities to protect resources and maintain a suitable visitor experience. Use and associated demands are expected to increase in the future. A coordinated, integrated plan is required to guide park management in a direction that best meets the multiple demands being placed on the area.

This plan is the basic document for managing Rock Creek Park and the Rock Creek and Potomac Parkway. The purposes of this general management plan are to

- specify resource conditions and visitor experiences to be achieved in Rock Creek Park and the Rock Creek and Potomac Parkway

- provide the basic foundation for decision-making regarding the management of the park and parkway

The final general management plan will be the first comprehensive plan prepared for Rock Creek Park and the Rock Creek and Potomac Parkway by the National Park Service (NPS). When completed, it will represent an agreement by the National Park Service with the public on how the park and parkway will be used and managed. As such, it is intended to

- confirm the significance of the park and parkway

- establish the direction and values that should be considered in planning to achieve the purposes defined in the establishing legislation of the park and parkway

- define management prescriptions that establish the goals of the National Park Service and the public with regard to visitor experience, natural resources, and cultural resources, including the types and locations of resource management activities, visitor activities, and development that are appropriate within each management prescription

- determine areas where management prescriptions should be applied to achieve the overall management goals of the park and parkway

- assist NPS staff in determining whether actions proposed by the National Park Service or others are consistent with the goals embodied in the management prescription where the action would occur

- serve as the basis for shorter-term management documents such as 5-year strategic plans, annual performance plans, and implementation plans

PURPOSE AND NEED FOR ACTION

Some of the future visitor experience, natural resource, and cultural resource conditions of Rock Creek Park and the Rock Creek and Potomac Parkway are specified in law and policy. Others must be determined through planning. The alternatives in this draft general management plan address the resource and experience conditions that are not mandated by law and policy.

The National Park Service views public comment as an integral part in establishing the desired resource and experience conditions that will guide the management of the park and parkway. Measures taken by the National Park Service to include the public as a partner in general management planning for the park and parkway include:

- soliciting public participation in the planning process and incorporating suggestions from the public into the park management alternatives

- performing public scoping to identify important impact topics and evaluating the effects of the alternatives to those impact topics in the draft environmental impact statement

- inviting the public to comment on this draft general management plan and environmental impact statement and using that input in the preparation of the final general management plan and environmental impact statement

The general management plan does not propose specific actions or describe how particular programs or projects should be ranked or implemented. Those decisions will be addressed during the more detailed planning associated with strategic plans, annual performance plans, and implementation plans. All of those plans will derive from the goals, future conditions, and appropriate types of activities established in the general management plan. As part of that decision-making process, project-specific National Environmental Policy Act (NEPA) documents would be prepared prior to the implementation of any of the actions included in this general management plan.

NEED FOR THE GENERAL MANAGEMENT PLAN

A general management plan is needed for Rock Creek Park and the Rock Creek and Potomac Parkway because there is no modern document to guide their management. The only previous broad management plan for Rock Creek Park was written in 1918 (Olmsted Brothers 1918). This plan was prepared prior to the park coming under NPS jurisdiction in 1933 and before lands around the park were heavily developed. The Rock Creek and Potomac Parkway, which opened in 1936, has never had a plan to guide management.

Without an overall plan, decisions for both the park and parkway have been made over the years in a piecemeal fashion. This general management plan, which provides broad direction for the future of the park and parkway, is needed to assist park managers in making purposeful decisions based on a deliberate vision of the park and parkway.

General management planning is needed to

- clarify the minimum levels of resource protection and public use that must be achieved for the park and parkway, based on the park- and parkway-specific purpose and significance, plus the body of laws and policies directing park management

- determine the best mix of resource protection and visitor experiences beyond what is prescribed by law and policy based on the

 - mission of the park and parkway

 - range of public expectations and concerns

 - resources occurring within the park

 - long-term economic costs

- establish the degree to which the park should be managed to

 - preserve and enhance its natural and cultural resources

 - provide recreation

 - control nonrecreational traffic

A general management plan also is needed to meet the requirements of the National Parks and Recreation Act of 1978 and NPS policy, which mandate an up-to-date general management plan for each unit of the national park system.

PARK HISTORY AND USE RELATIVE TO MANAGEMENT PLANNING

Rock Creek Park is located in the northern portion of Washington, D.C. (Region map). It consists primarily of an undeveloped, wooded valley, with some associated tributaries and uplands. The major landscape feature is Rock Creek, a perennially flowing stream that bisects the length of the park before joining the Potomac River south of the park. The park is completely surrounded by the heavily urbanized metropolitan Washington, D.C. area (Vicinity map).

The central issue for general management planning in Rock Creek Park is how to meet the often conflicting purposes of protecting the scenic, natural, and cultural resources of the park, while concurrently providing for appropriate public use of these resources. This issue is complicated by the location of Rock Creek Park within a major metropolitan area. As a result of its location, the park has many users, some of whom hold widely varying opinions about its optimal use. Another challenge of this urban location involves encouraging use by all segments of the public.

Rock Creek Park was founded in 1890 as one of the first federal parks. Its establishing legislation, provided in appendix A, cites the area's natural beauty and high public value. When the park was established, it was on the edge of the growing city and was already a favorite area for rural retreat. In the establishing legislation, Rock Creek Park was "dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States." The park would "provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible."

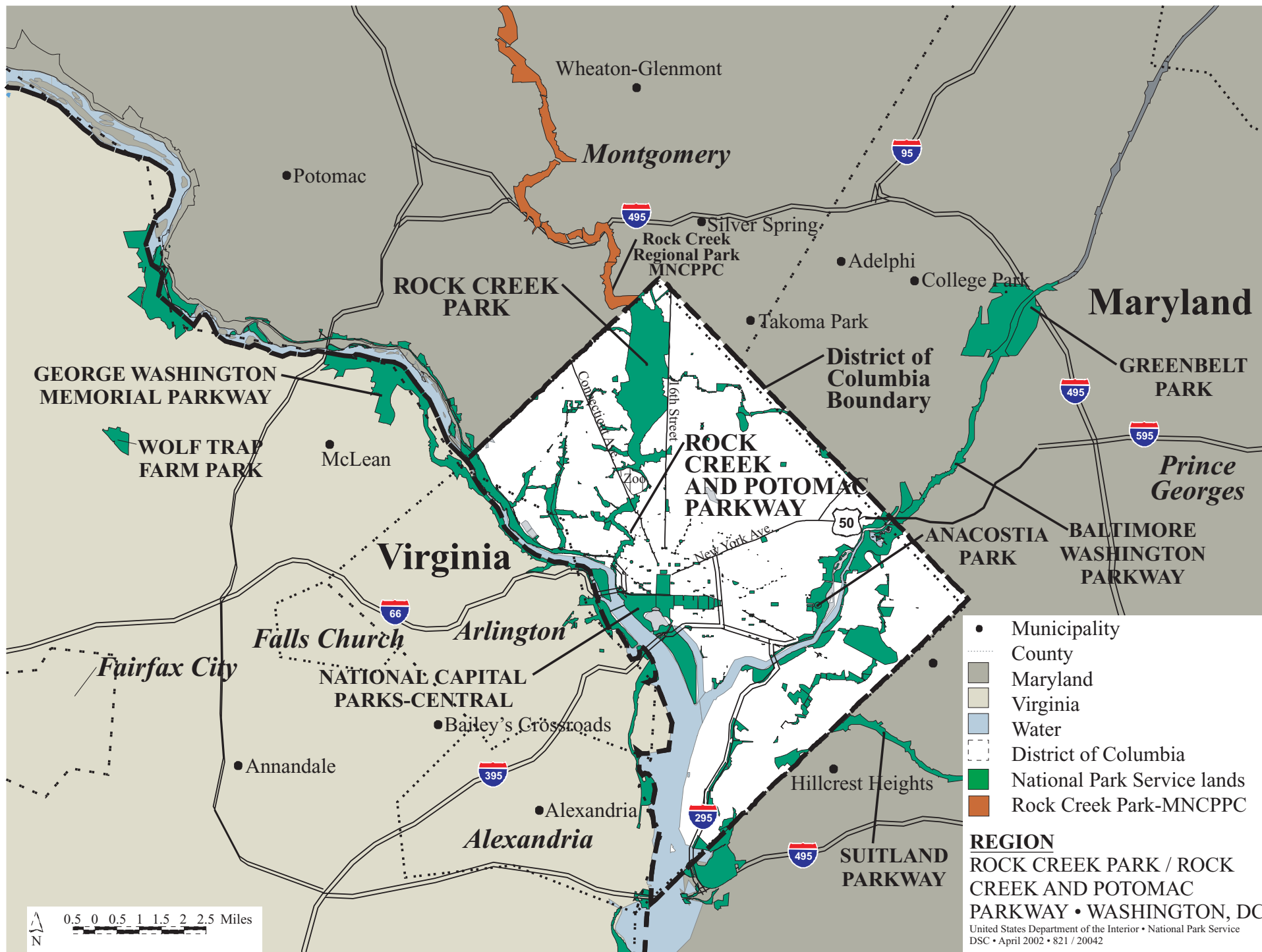
Rock Creek Park was set aside as an asset in anticipation of its envelopment by Washington, D.C. and its suburbs. As the area became more urbanized, the park's value has been recognized not only for the recreation opportunities it provides, but also for the protection it affords to remnant native wildlife populations and their habitats, and to historic structures and cultural landscapes.

Beach Drive, which bisects the length of the park from the Maryland state line to the Rock Creek and Potomac Parkway, was originally designed as an internal park touring road to provide recreational access to the valley. In the 1918 master plan for the park, the Olmsted brothers warned against bringing the "noise and tangle" of city traffic into the heart of the park. At the same time, they recognized a need to accommodate urban traffic across the park.

The Rock Creek and Potomac Parkway was established by the Public Buildings Act of March 4, 1913. According to Section 22 of that legislation, which is provided in appendix A, the parkway was authorized "for the purpose of preventing pollution and obstruction of Rock Creek." It also was intended as a travel corridor "connecting Potomac Park with the Zoological Park and Rock Creek Park."

There are differences in the legislative purposes of the park and parkway. However, both were intended to blend recreation with the preservation of natural scenery and environmental quality.

In 1916, Congress passed the Organic Act, which created the National Park Service. Through this act, Congress established the NPS' mission to "preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations." Thus, any management actions in Rock Creek Park must recognize that preserving the natural and cultural resources and values of the park is paramount, and that



any visitor activities associated with “enjoyment, education, and inspiration” can occur only to the extent that they do not impair the natural and cultural resources and values for future generations.

Since the parkway opened in 1936, it has served as a scenic roadway in the city. Since 1937, the National Park Service has been managing traffic on weekdays by making the parkway one-way inbound during the morning rush-hour and one-way outbound during the afternoon rush-hour. Traffic management techniques implemented by the National Park Service within Rock Creek Park have included replacing fords with bridges and providing turning lanes at intersections.

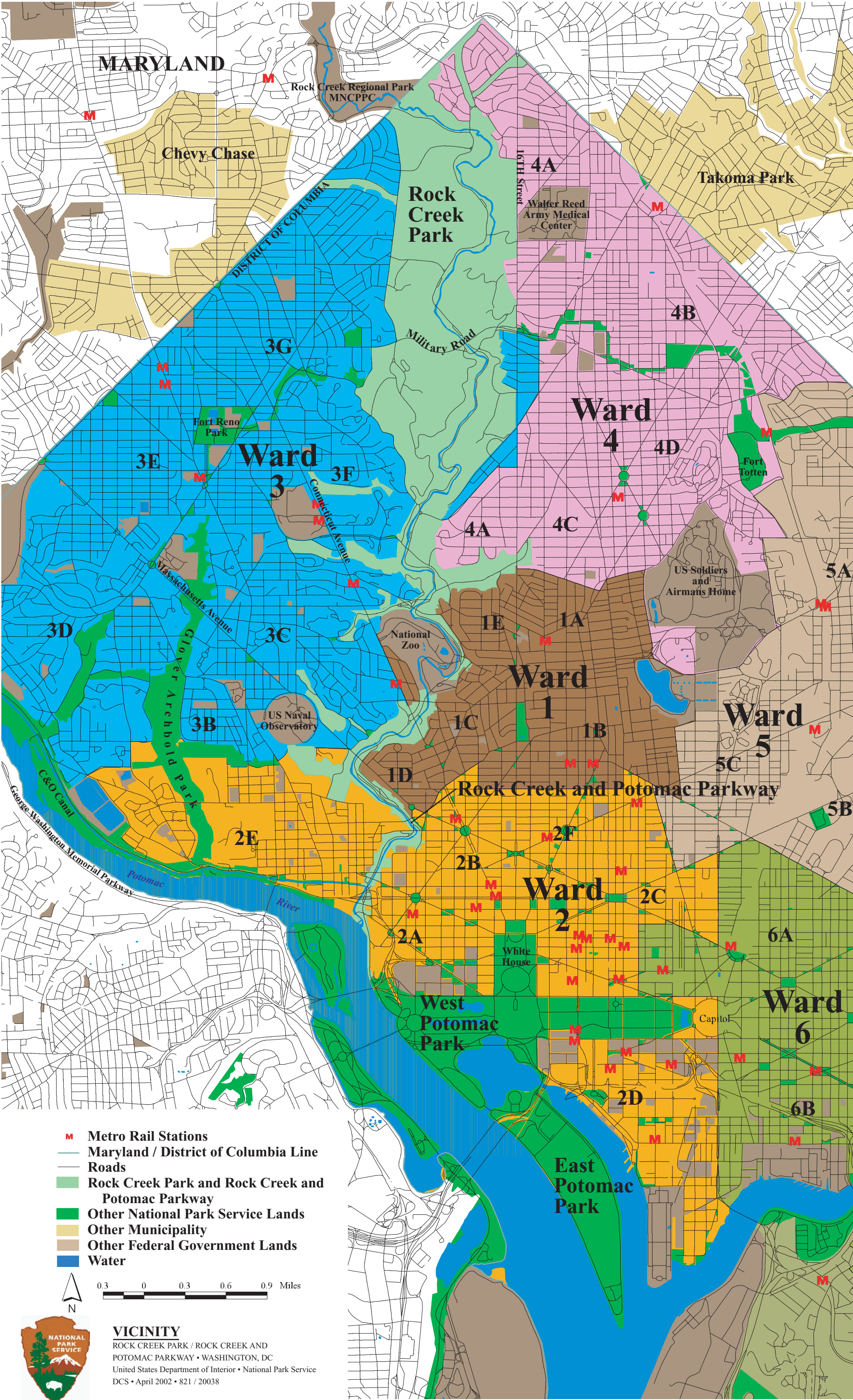
The opening of the Zoo Tunnel in 1966 removed a major impediment to traffic. The inadvertent result was to make the corridor consisting of Beach Drive and the Rock Creek and Potomac Parkway into a preferred commuter route for many residents of northwest Washington, D.C. and suburban Montgomery County, Maryland. As discussed in detail in the “Affected Environment” section, weekday traffic averages 9,000 vehicles per day on parts of Beach Drive, while 55,000 vehicles typically use the busiest portion of the Rock Creek and Potomac Parkway. More than 95 percent of the vehicles entering the park during commuting hours pass through without stopping (Robert Peccia & Associates 1997).

As the population of Washington, D.C. has increased, so has the demand for recreational opportunities. As described in the “Affected Environment” section, Rock Creek Park currently supports more than 2 million recreation visits per year.

Since the 1970s, the National Park Service has been closing sections of Beach Drive and some other park roads to motorized traffic during weekends and holidays to better accommodate recreational uses in the park. These closures have been very popular with the recreating public.

The most controversial management issue to be resolved by this draft general management plan involves the use of park roads by commuters on weekdays. Specifically, this issue includes determining the appropriate management of commuter traffic in Rock Creek Park and the degree to which park values would be affected by nonrecreational commuter use. During scoping, many members of the public indicated that the recreational and environmental values of the park are compromised by heavy, high-speed commuter traffic. They would like to reduce and control traffic to enhance park recreational values and visitor safety. Some called for extensive road closures in favor of bicycling and other more recreational and less polluting forms of travel through the park. Others said that the current mix of recreational and nonrecreational use of the park and parkway, including urban traffic, is appropriate and enhances the quality of life in the city and surrounding region.

Another key management issue, which has been expressed both by the National Park Service and members of the public, is the current limited ability to provide adequate orientation, interpretation, and education services to visitors in the park. In addition, park services have outgrown the historic structures in which they are located. These include administrative and operational activities at headquarters in the Peirce-Klingler Mansion at Linnaean Hill and the U.S. Park Police District 3 substation in the Lodge House. Continuing the current arrangement would lead to increased inefficiencies and could affect the historical integrity of these buildings.



PURPOSE AND NEED FOR ACTION

These key management issues of Rock Creek Park can be summarized in three questions.

How should traffic be managed in Rock Creek Park and on the Rock Creek and Potomac Parkway?

What are the most appropriate levels of service and locations for visitor interpretation and education in the park?

What are the most appropriate locations to support administration and operations functions with respect to minimizing resource disturbance?

The potential solutions to these questions are reflected in the four management alternatives analyzed in this draft general management plan and environmental impact statement. The alternatives also address the adequacy and appropriateness of park services and facilities, and the challenges posed by managing a large, undeveloped area in the center of a major city.

GEOGRAPHIC AREA COVERED BY THE GENERAL MANAGEMENT PLAN

Rock Creek Park, as an administrative unit of the national park system, is composed of 99 separate areas, known as reservations, located in the northern part of Washington, D.C. However, not all of those reservations are included in this general management plan. The area covered by this general management plan is shown in the Existing Conditions map and includes

the 1,754 acres administered by the National Park Service in the Rock Creek valley from the Maryland state line south to the National Zoo

the Rock Creek and Potomac Parkway from the National Zoo to Virginia Avenue

selected tributaries to Rock Creek and associated roadways, including Pinehurst Parkway, Melvin Hazen Park, Klinge Valley, Soapstone Valley Park, Normanstone Parkway, Portal Parkway, and Beach Parkway

Areas that are not included in this general management plan include the following.

The Rock Creek Tennis Stadium and adjoining playing fields. Management direction for this area was established in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park* (NPS 1995b).

The Carter Barron Amphitheater complex.

The similarly named Rock Creek Regional Park in Maryland, which is administered by the Maryland National Capital Park and Planning Commission (MNCPPC).

A number of historical and recreational reservations administered by the staff of Rock Creek Park but not within the park proper. Such sites include the Civil War defenses of Washington, D.C. other than Fort DeRussy (for example, Fort Reno and Fort Stevens), Dumbarton Oaks Park, the Old Stone House, Meridian Hill Park, Montrose Park, and Glover Archbold Park. These sites have specific management and design needs because

of their special historic value and/or because their public uses are different from those of Rock Creek Park.

PLANNING DIRECTION OR GUIDANCE

This section defines the basis for any actions taken at Rock Creek Park and the Rock Creek and Potomac Parkway. Guidance and direction include the purpose and significance of the park and parkway, the goals of the National Park Service for the park and parkway, any park- and parkway-specific mandates and administrative commitments, and servicewide mandates and commitments that the National Park Service applies to all units under its administration.

Park Mission

This section describes the legislatively established missions of Rock Creek Park and the Rock Creek and Potomac Parkway. It defines why the park and parkway were created and why they are special. These are the fundamental criteria against which the appropriateness of all plan recommendations, operational decisions, and actions are tested.

Park and Parkway Purposes. The 1890 legislation establishing Rock Creek Park is provided in appendix A.

It states that the area is to be “perpetually dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States.”

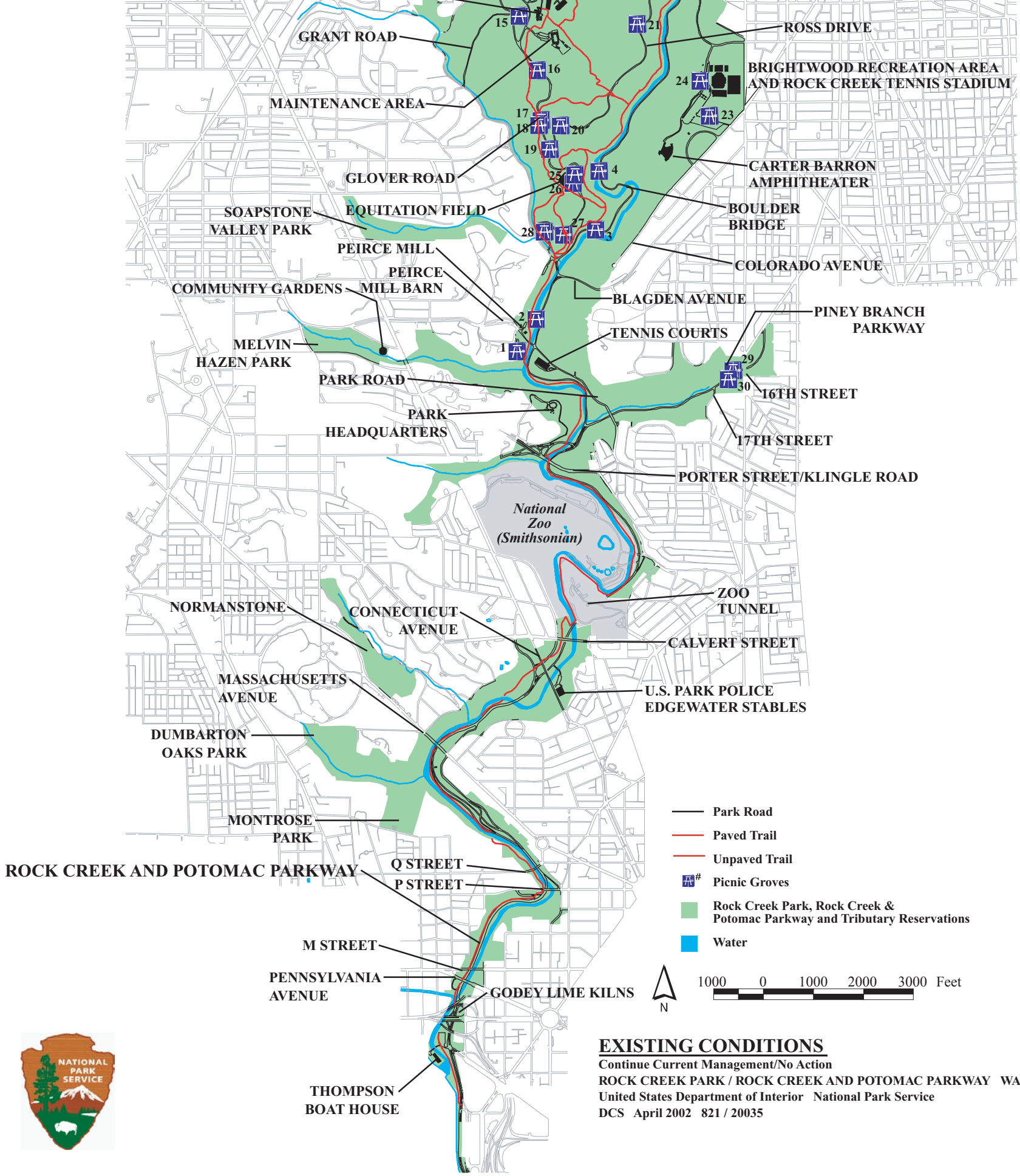
It specifies that the park is to “provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible.”

It directs park managers to provide for public recreation, specifically to “lay out and prepare roadways and bridle paths, to be used for driving and for horseback riding, respectively, and footways for pedestrians.”

Portions of tributaries to Rock Creek, such as Soapstone Valley and Hazen Park, have been added to the park management unit over the years as separate reservations. The legislative language for tributary additions typically states that they are to preserve the flow of water in Rock Creek, prevent pollution of Rock Creek and the Potomac River, and preserve forests and natural scenery in and around Washington, D.C.

Rock Creek Park is linked to the Potomac River and the monumental core of Washington, D.C. by the Rock Creek and Potomac Parkway. Congress established the parkway in 1913 for “the purpose of preventing pollution and obstruction of Rock Creek and of connecting Potomac Park with the Zoological Park and Rock Creek Park.” The parkway corridor is managed contiguously with Rock Creek Park.

The following purpose statements are based on and represent the NPS’ interpretation of the above legislative mandates and NPS policies. These purpose statements are the most fundamental criteria against which the appropriateness of all plan recommendations, operational decisions, and actions are to be tested.



PURPOSE AND NEED FOR ACTION

Rock Creek Park exists to

- preserve and perpetuate for this and future generations the ecological resources of the Rock Creek valley within the park in as natural a condition as possible, the archeological and historic resources in the park, and the scenic beauty of the park

- provide opportunities for the public to experience, understand, and appreciate the park in a manner appropriate to the preservation of its natural and cultural resources

- provide opportunities for recreation appropriate to the park's natural and cultural resources

The Rock Creek and Potomac Parkway exists to

- connect Rock Creek Park and the National Zoological Park (National Zoo) to Potomac Park with a scenic road

- prevent pollution and obstruction of Rock Creek

Park areas that contain tributaries to Rock Creek exist to

- preserve the flow of water in Rock Creek

- prevent the pollution of Rock Creek and the Potomac River

- preserve forests and natural scenery in and around Washington, D.C.

Park and Parkway Significance. Park significance statements capture the essence of the park's importance to the nation's natural and cultural heritage. Understanding park significance helps managers to make decisions that preserve the resources and values necessary to the park's purposes. The following significance statements recognize the important features of the park and parkway.

- Rock Creek Park is one of the oldest and largest naturally managed urban parks in the United States.

- The park and parkway contains approximately 2,100 acres of valuable plant and wildlife habitat, providing protection for a variety of native species within a heavily urbanized area.

- Rock Creek Park encompasses a rugged stream valley of exceptional scenic beauty with forested, natural landscapes and intimate natural details, in contrast to the surrounding cityscape of Washington, D.C.

- Rock Creek Park's forests and open spaces help define the character of the nation's capital.

- Rock Creek valley was important in the early history of the region and in the development of the nation's capital, and the park's cultural resource are among the few tangible remains of the area's past.

Rock Creek Park is an oasis for urban dwellers, offering respite from the bustle of the city.

The Rock Creek and Potomac Parkway is the first federally constructed parkway and one of the best examples of early parkway design.

The Rock Creek and Potomac Parkway provides a scenic gateway to the city's monumental core.

Rock Creek Park is a historic designed landscape incorporating early 20th century picturesque and rustic features designed to enhance the visitors' experience of the naturalistic park scenery.

Located in the heart of a densely populated cosmopolitan area, Rock Creek Park serves as an ambassador for the national park idea, providing outstanding opportunities for education, interpretation, and recreation to foster stewardship of natural and cultural resources.

Mission Goals

This section defines in broad terms the ideals that the National Park Service is striving to attain, as they are applicable to Rock Creek Park and the Rock Creek and Potomac Parkway.

Park mission goals articulate the broad ideals and vision that the National Park Service is trying to achieve at Rock Creek Park. The goals for the park are directly linked to the NPS servicewide mission goals contained in the *National Park Service Strategic Plan* (NPS 2000). They are written as desired outcomes in keeping with the Government Performance and Results Act. Mission goals for Rock Creek Park are as follows.

The natural and cultural resources and associated values of Rock Creek Park are protected, preserved, and maintained in good condition and managed within their broader ecosystem or cultural context (Service Mission Goal Ia).

Visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities (Service Mission Goal IIa).

Park visitors and the general public understand and appreciate the preservation of the park and its resources for this and future generations (Service Mission Goal IIb).

Natural and cultural resources are conserved through formal partnership programs (Service Mission Goal IIIa).

Through partnerships with other federal, state, and local agencies and non-profit organizations, Rock Creek Park contributes to a nationwide system of parks, open spaces, rivers, and trails and provides educational, recreational, and conservation benefits for the American people (Service Mission Goal IIIb).

The National Park Service uses current management practices, systems, and technologies to accomplish its mission at Rock Creek Park (Service Mission Goal IVa).

The National Park Service increases its managerial capabilities through initiatives and support from other agencies, organizations, and individuals (Service Mission Goal IVb).

Special Mandates and Administrative Commitments

Special mandates and administrative commitments refer to park-specific requirements. These formal agreements often are established concurrently with the creation of a park. Rock Creek Park and the Rock Creek and Potomac Parkway do not have any special mandates that would affect this general management plan and future planning activities.

Servicewide Mandates and Policies

This section identifies what must be done at Rock Creek Park and the Rock Creek and Potomac Parkway to comply with federal laws and with the policies of the National Park Service. These are measures that the National Park Service must strive to meet, regardless of the alternative selected for the long-term management of the park and parkway.

As with all NPS units, management of the park and parkway is guided by numerous congressional acts and executive orders, in addition to the establishing legislation. Many of the laws and executive orders that guide park management, with their legal citations, are identified in appendix B. Some of these laws and executive orders are applicable primarily to units of the national park system. These include the 1916 Organic Act creating the National Park Service, the General Authorities Act of 1970, and the act of March 27, 1978 relating to the management of the national park system. Others have broader application, such as the Endangered Species Act, the National Historic Preservation Act, and Executive Order 11990 addressing the protection of wetlands.

The National Park Service also has established policies for all units under its stewardship. These are identified and explained in the NPS guidance manual entitled *Management Policies 2001* (NPS 2001b).

Some of the conditions prescribed by servicewide mandates and policies are summarized below. These servicewide legal mandates and policies can all be categorized as

- natural resource management requirements
- cultural resource management requirements
- visitor experience and park use requirements
- special use management requirements

The alternatives considered in this document incorporate and comply with the provisions of these mandates and policies. In addition to the approaches specified in this draft general management plan, the National Park Service will strive to implement all of the servicewide mandates and policies at Rock Creek Park. The general management plan is not needed to state, for instance, that it is appropriate to protect endangered species, control invasive species, improve water quality, protect archeological sites, preserve historic structures, provide access for citizens with disabilities, and conserve artifacts.

Natural Resource Management Requirements. Categories included in natural resource management requirements are air quality, water resources, geologic resources, native species, and wildfire.

Air Quality – Current laws and policies require that the following conditions be achieved in the park.

Desired Conditions	Sources
Air quality in the park and parkway meets national ambient air quality standards (NAAQS) for specified pollutants.	Clean Air Act NPS <i>Management Policies</i>
Park activities do not contribute to deterioration in air quality.	Clean Air Act NPS <i>Management Policies</i>

The National Park Service has little control over air quality within the metropolitan Washington, D.C. regional airshed, which encompasses the park. Therefore, the park must cooperate with regional agencies and the Environmental Protection Agency to monitor air quality and to work toward air quality improvements. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to air quality in Rock Creek Park and the Rock Creek and Potomac Parkway.

Conduct air quality monitoring in conjunction with regional air quality agencies. This could include enhanced monitoring of localized air quality, either by establishing long-term monitoring stations in the Rock Creek valley or by conducting sampling during pollution high-risk periods.

Participate in regional air pollution control plans and regulations.

Review permit applications for major new air pollution sources that could affect the park.

Conduct park operations in compliance with federal, state, and local air quality regulations.

Water Resources – Current laws and policies require that the following condition be achieved in the park.

Desired Condition	Source
Rock Creek and its tributaries within the park and parkway are free flowing.	Rock Creek Park and Rock Creek and Potomac Parkway enabling legislation
Surface waters and groundwater are protected or restored such that water quality as a minimum meets all applicable Washington, D.C. water quality standards.	Clean Water Act Executive Order 11514 NPS <i>Management Policies</i>
NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface waters and groundwater.	Clean Water Act Executive Order 12088 NPS <i>Management Policies</i>

Desired Condition	Source
Natural floodplain values are preserved or restored.	Executive Order 11988 Rivers and Harbors Act Clean Water Act <i>NPS Management Policies</i>
The natural and beneficial values of wetlands are preserved and enhanced.	Executive Order 11990 Rivers and Harbors Act Clean Water Act <i>NPS Management Policies</i>

Rock Creek is the central feature of Rock Creek Park. As shown in the Rock Creek Watershed map, Rock Creek Park is located within the lower watershed. The park comprises only a small portion of the watershed and, therefore, has limited opportunities to control actions that affect water quality. Activities occurring elsewhere in the watershed outside the boundaries of the park have a greater influence on water quality in the park than activities inside the park.

The basin drains approximately 77 square miles and includes urban, suburban residential, agricultural, and parkland areas. About 70 percent of the watershed is developed, and much of the developed area contains impervious surfaces. As a result, the park is increasingly subjected to flooding caused by rapid runoff, abnormal stream bed scouring in some places and sedimentation in others, bank erosion, organic and chemical pollution, and accumulation of litter and other solid waste. Park waters do not meet quality standards for human contact, thus limiting water-oriented recreation. Observations by NPS water quality specialists indicate that water quality appears to be depressed or declining in some areas.

As with air quality, the National Park Service must cooperate with regional agencies to improve water quality. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to water resources.

Improve coordination with other agencies to ensure proper monitoring, inspection, and repair of sanitary sewers in and around the park to reduce the impacts on park water and land. Work toward the NPS' long-term goal of eliminating contaminant releases from all sanitary and storm sewers in the park. Work with other agencies in the watershed to trace and eliminate illegal discharges into the storm sewer networks that drain into Rock Creek. Coordinating agencies include, but are not limited to, the

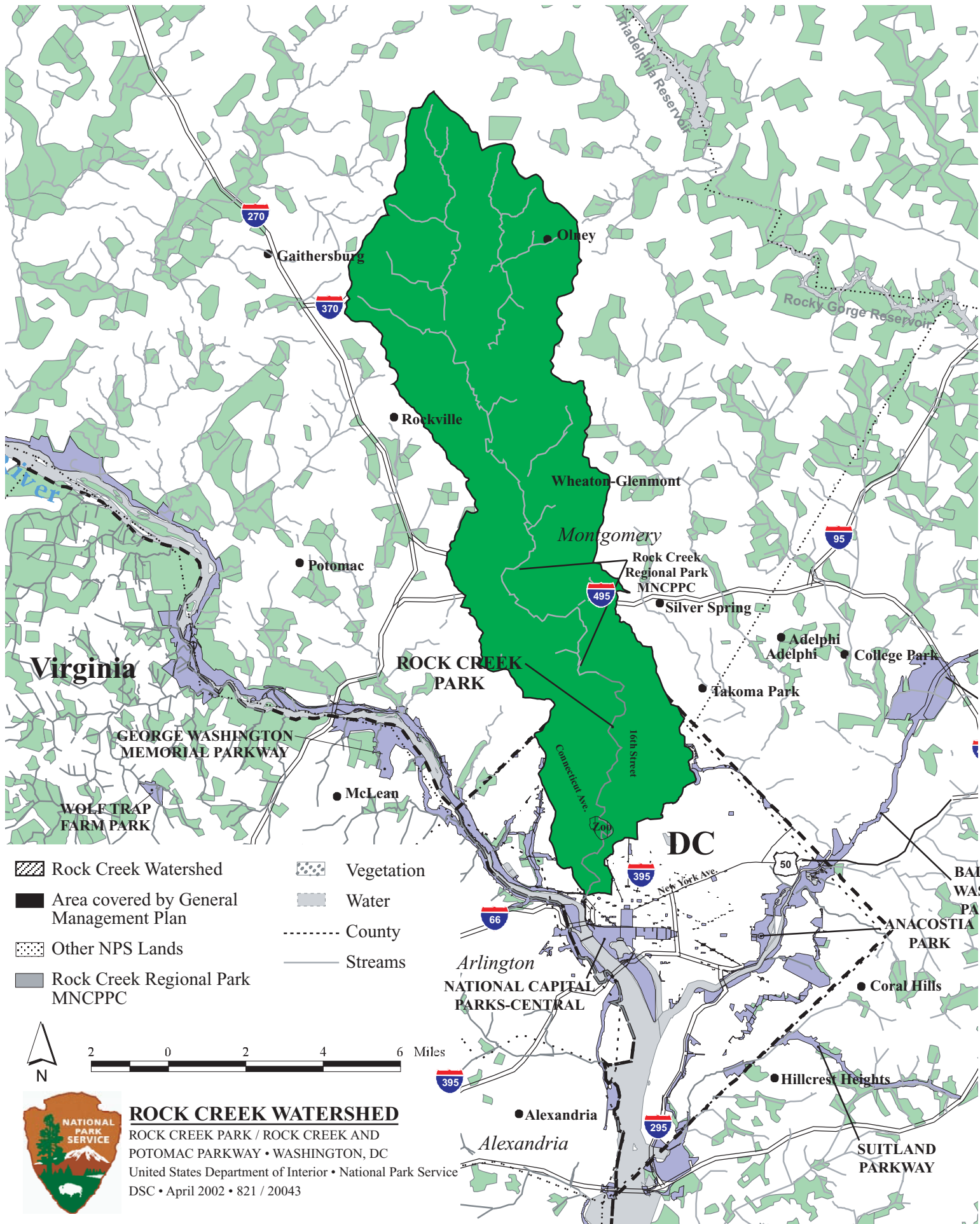
District of Columbia Water and Sewer Authority

Montgomery County Department of Public Works and Transportation

Washington Suburban Sanitary Commission

Maryland National Capital Park and Planning Commission

U.S. Environmental Protection Agency



ROCK CREEK WATERSHED

ROCK CREEK PARK / ROCK CREEK AND
 POTOMAC PARKWAY • WASHINGTON, DC
 United States Department of Interior • National Park Service
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Support the investigation and mitigation of artificially accelerated streambank erosion and stream bed incision and their effects on natural riparian habitats. This could include implementing erosion control measures, such as establishing new streambank vegetation in eroded areas and riprap placement.

Apply best management practices to all pollution-generating activities and facilities in the park, such as operation of stables (both by a concessionaire and the National Park Service), maintenance and storage facilities, the golf course, and parking areas.

Minimize the use of pesticides, fertilizers, and other chemicals and manage them in conformance with NPS policy and federal regulations.

Promote greater public understanding of water resource issues in the park and encourage public support for and participation in improvements in the Rock Creek watershed.

Continue to support the goals of the Chesapeake Bay Program as they relate to Rock Creek and its tributaries and continue to participate in the regional program as a partner. Encourage and support the formation of a Rock Creek watershed coordinating group to foster a broad spectrum of water resource projects and activities to protect and improve the Rock Creek watershed.

Support initiatives by the U.S. Environmental Protection Agency, State of Maryland, and local governments, including the District of Columbia and Montgomery County, that monitor, reduce, or eliminate the pollution in urban, non-point-source runoff that affects Rock Creek or its tributary streams. These could include implementation of best management practices in communities within the watershed, improved methods or enforcement of erosion control, assistance to watershed agencies for dry weather outfall surveys, and public outreach to gain cooperation of watershed residents in reducing their contributions to pollution from fertilizers, pesticides, pets, and vehicles.

Support strategies and initiatives of the District of Columbia and Montgomery County to reduce storm flow volumes into Rock Creek and its tributaries. Examples could include installing surface or underground storm water detention and storage ponds, and the use of permeable materials for parking lots and road surfaces.

Geologic Resources – Current laws and policies require that the following condition be achieved in the park for geologic resources, which include soils.

Desired Condition	Source
Natural soil resources and processes function in as natural a condition as possible, except where special management considerations are allowable under policy. Areas of special management considerations are determined through management zoning decisions in this draft general management plan.	Rock Creek Park enabling legislation NPS <i>Management Policies</i>
Soils classified by the U.S. Department of Agriculture, Natural Resources Conservation Service as prime or unique farmland soils are retained.	Council on Environmental Quality 1980 memorandum on prime and unique farmlands

Soil resources in some portions of the park are adversely affected by accelerated erosion, compaction, and deposition caused by human activities. The National Park Service will take the following kinds of actions to comply with legal and policy requirements related to geologic resources.

Survey areas of the park with soil resource problems and take actions appropriate to the management zone to prevent further artificial erosion, compaction, or deposition and to restore original contours, as practical.

Avoid disturbance of prime farmland soils. These include Chillum silt loam on 0 to 8 percent slopes and Glenelg Loam on 0 to 8 percent slopes.

Participate in interagency efforts to reduce erosion from accelerated runoff and stream-flows in conformance with “Water Resources,” above.

Apply effective best management practices to problem soil erosion and compaction areas in a manner that stops or minimizes erosion, restores soil productivity, and re-established or sustains a self-perpetuating vegetative cover.

Native Species – Current laws and policies require that the following conditions be achieved in the park.

Desired Condition	Source
Federal- and state-listed threatened or endangered species and their habitats are protected and sustained.	Endangered Species Act and equivalent state protective legislation <i>NPS Management Policies</i>
Populations of native plant and animal species function in as natural a condition as possible except where special management considerations are warranted. Areas of special management considerations are determined through management zoning decisions in this draft general management plan.	Rock Creek Park enabling legislation <i>NPS Management Policies</i>
Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.	Rock Creek Park enabling legislation <i>NPS Management Policies</i>
Invasive species are reduced in numbers and area, or are eliminated from the natural areas of the park.	<i>NPS Management Policies</i>

Rock Creek Park represents one of the oldest and largest protected areas of natural vegetation in the region. Despite its small size, the capability of the park to sustain native species is valuable. The National Park Service will take the following kinds of actions to comply with legal and policy requirements related to native species.

Implement measures to protect the federally endangered Hays spring amphipod and the rare Kenk’s groundwater amphipod and their habitats. These actions include, but are not limited to

protecting springs and seeps known to contain these species from disturbance

protecting the watersheds immediately upgradient from such springs and seeps from earth moving, pollution, or changes in groundwater supply or hydrology

developing a management plan for the continued protection of the amphipods, including an assessment of recharge areas for amphipod sites and a monitoring strategy

informing the public about the presence and value of groundwater amphipods in the park without disclosing site-specific information that could increase the risks from illegal collection or disturbance

Initiate and maintain measures to protect plant and animal species listed as rare (both currently and in the future) by Maryland or Virginia. These measures include, but are not limited to,

protecting the habitats known to contain these species from disturbances such as pollution, changes in hydrology, visitor uses, mowing or maintenance activities, and earth moving or trail construction

developing a management plan for the continued protection of these rare species on park lands, including regular monitoring of populations, assessing current or potential threats, implementing mitigation approved for their protection, and continuing limitations on providing information regarding their locations

Inventory the plants and animals in the park. Use the inventory as a baseline against which to regularly monitor the distribution and condition of selected species, including indicators of ecosystem condition and diversity, rare or protected species, and invasive non-native species. Modify management plans to be more effective, based on monitoring results.

Monitor native species that are capable of creating resource problems, such as overgrazing associated with over-population of white-tailed deer. If unacceptable levels of habitat degradation are indicated, implement humane measures to control the animal population.

Support research that contributes to management knowledge of native species.

Implement measures to restore native species and natural habitats. In particular, protect and restore natural aquatic and floodplain habitats in the park where they can be sustained, including freshwater springs and ephemeral wetlands.

Review park fishing regulations and revise fish management as appropriate to support native fish populations.

Continue to participate in regional ecosystem-level undertakings to restore native species, such as the Chesapeake Bay Program effort to restore migratory fish to Rock Creek. Facilitate implementation of the Woodrow Wilson Bridge mitigation project, which will remove or mitigate nine man-made obstructions to fish migration in Rock Creek, including the Peirce Mill dam, fords, and sewerline crossings.

PURPOSE AND NEED FOR ACTION

Manage vegetation in accordance with *Management Policies* (NPS 2001b). In natural zones, manage vegetation exclusively for native plant species. In other management zones, use native species to the maximum extent possible. Where non-native species are justified within cultural resource zones, limit these plantings to non-aggressive species.

Control or eliminate invasive plants and animals, exotic diseases, and pest species where there is a reasonable expectation of success and sustainability. Base control efforts on the potential threat to

legally protected or uncommon native species and habitats

visitor health or safety

scenic and esthetic quality

common native species and habitats

Provide interpretive and educational programs on preservation of native species for visitors and for residents neighboring the park boundary. Subjects could include low-impact landscaping, control of domestic animals, and avoidance of boundary encroachments, and could be presented through such forums as workshops and newsletters.

Fire Management – Current laws and policies require that the following conditions be achieved in the park.

Desired Condition	Source
All wildfires are suppressed or controlled as soon as possible.	NPS <i>Management Policies</i>

The deciduous forests of Rock Creek Park are relatively moist, and fires do not play a major role in maintaining the native vegetation. An average of only two woodland fires occur in the park each year, with most burning less than an acre. Most fires are human-caused, rather than from natural ignition sources. Wildfires in the park usually are not intense and consume only fallen leaves and duff. Barriers such as streams, mowed fields, roads, and trails usually limit the spread of fires.

Large wildfires in the park, if they were to occur, could pose a threat to residences and commercial development adjoining the park and would produce unacceptable levels of smoke pollution. To prevent these types of fires, the National Park Service will take the following kinds of actions to comply with fire management legal and policy requirements.

Suppress all wildfires as quickly as possible.

Maintain a cooperative agreement with the Washington, D.C. fire department for wildfire suppression in the park.

Management fires, or prescribed burns, would be used sparingly if at all and only on a case-by-case basis.

Cultural Resource Management Requirements. Categories included in cultural resource management requirements are archeological resources, historic structures and cultural landscapes, and collections.

Archeological Resources – Current laws and policies require that the following conditions be achieved in the park.

Desired Condition	Source
Archeological sites are identified and inventoried, and their significance is determined and documented.	National Historic Preservation Act Executive Order 11593
Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable.	Archeological and Historic Preservation Act Archeological Resources Protection Act
In those cases where disturbance or deterioration is unavoidable, the site may be professionally documented and salvaged.	<i>Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation</i> (1992) Programmatic Memorandum of Agreement among the National Park Service, Advisory Council on Historic Preservation, and National Council of State Historic Preservation Officers (1995) <i>NPS Management Policies</i>

The archeological sites in the park have not been systematically surveyed or inventoried. Precise information about the location, characteristics, significance, and condition of the majority of archeological resources in the park is lacking, and impacts are difficult to measure. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to archeological sites.

Survey and inventory archeological resources and document their significance.

Treat all archeological resources as eligible for listing on the National Register of Historic Places (NRHP) pending the opinion of the District of Columbia State Historic Preservation Officer (DCSHPO) and a formal determination by the Keeper of the National Register as to their significance.

Protect all archeological resources determined eligible for listing or listed on the NRHP. If disturbance to such resources is unavoidable, conduct formal consultation with the Advisory Council on Historic Preservation (ACHP) and DCSHPO in accordance with the National Historic Preservation Act.

Historic Structures and Cultural Landscapes – Current laws and policies require that the following conditions be achieved in the park for historic properties, such as buildings, structures, roads, trails, and cultural landscapes.

Desired Condition	Source
Historic structures and cultural landscapes are inventoried and their significance and integrity are evaluated under National Register criteria.	National Historic Preservation Act Executive Order 11593 Archeological and Historic Preservation Act
The qualities of historic properties that contribute to their actual listing or their eligibility for listing on the National Register of Historic Places are protected in accordance with the Secretary of the Interior's standards, unless it is determined through a formal process that disturbance or natural deterioration is unavoidable.	Standards for the Treatment of Historic Properties (Secretary of the Interior 1996) Programmatic Memorandum of Agreement among the National Park Service, Advisory Council on Historic Preservation, and National Council of State Historic Preservation Officers (1995) <i>NPS Management Policies</i>

Many of the historic structures and cultural landscapes in Rock Creek Park exhibit deterioration that has resulted from a lack of systematic preservation. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to historic properties.

Complete a survey, inventory, and evaluation of historic properties under National Register criteria.

Analyze the design elements, such as materials, colors, shape, massing, scale, architectural details, and site details, of historic structures and cultural landscapes in the park and parkway. These could include such features as bridges, trails, roads and intersections, curbing, signs, picnic tables, and parkway embayments. Use this information to guide rehabilitation and maintenance of sites and structures and to ensure that future park structures are compatible with the historic character in design and materials.

Submit the inventory and evaluation results to the DCSHPO and the Keeper of the National Register with recommendations for eligibility to the National Register.

Determine the appropriate level of preservation for each historic property formally determined to be eligible for listing or actually listed on the National Register, subject to the Secretary of the Interior's standards.

Implement and maintain the appropriate level of preservation for such properties.

Collections – Current laws and policies require that the following conditions be achieved in Rock Creek Park.

Desired Condition	Source
All museum objects and manuscripts are identified and inventoried, and their significance is determined and documented.	National Historic Preservation Act American Indian Religious Freedom Act
The qualities that contribute to the significance of collections are protected in accordance with established standards.	Archeological and Historic Preservation Act Archeological Resources Protection Act Native American Graves Protection and Repatriation Act NPS <i>Management Policies</i>

The Rock Creek Park museum collections are at risk. Improper storage and lack of adequate security and fire protection at facilities where the collections are housed threaten their safety and integrity. Portions of the archeological and historical collections are not yet cataloged and need to be consolidated in one location. The National Park Service will take the following kinds of actions to meet legal and policy requirements related to collections.

Inventory and catalog all of the park's museum collection in accordance with standards outlined in the *Manual for Museums* (NPS, Lewis 1976).

Develop and implement a collection management program according to NPS standards to guide protection, conservation, and use of museum objects.

Visitor Experience and Park Use Requirements. Current laws and policies require that the following conditions be achieved in Rock Creek Park.

Desired Condition	Source
Visitor and employee safety and health are protected.	NPS <i>Management Policies</i>
Visitors understand and appreciate park values and resources and have the information necessary to adapt to the park environments. Visitors have opportunities to enjoy the park in ways that leave park resources unimpaired for future generations.	NPS Organic Act Rock Creek Park enabling legislation NPS <i>Management Policies</i>
Park recreational uses are promoted and regulated. Basic visitor needs are met in keeping with the park purposes.	NPS Organic Act Rock Creek Park enabling legislation Title 36 of the Code of Federal Regulations NPS <i>Management Policies</i>

Desired Condition	Source
To the extent feasible, facilities, programs, and services in the park are accessible to and usable by all people, including those with disabilities.	Americans with Disabilities Act Architectural Barriers Act Rehabilitation Act <i>NPS Management Policies</i>

Regulations governing visitor use and behavior in units of the national park system are contained in Title 36 of the U.S. Code of Federal Regulations (36 CFR). These regulations have force of law and include a variety of use limitations, such as limits on commercial activities. The following two regulations are especially pertinent to planning for Rock Creek Park because of issues raised by the public during scoping.

Pets must be crated, caged, restrained on a leash (6 feet long or less), or otherwise physically confined at all times (36 CFR 2.15).

Bicycles are prohibited except on roads, parking areas, and designated routes (36 CFR 4.30).

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to visitor experience and park use.

Provide opportunities for visitors to understand, appreciate, and enjoy the park.

Ensure that all park programs and facilities are accessible to the extent feasible.

Continue to enforce the regulations in 36 CFR.

These laws, regulations, and policies leave room for judgment regarding the best mix of types and levels of visitor use activities, programs, and facilities. The alternatives evaluated in this draft general management plan represent four approaches to visitor experience and park use.

Special Use Management Requirements. Special uses refer to the use of park and parkway lands for non-park purposes. Current laws and policies require that the following conditions be achieved in the park and parkway with regard to the management of special uses.

Desired Condition	Source
Park resources or public enjoyment of the park are not denigrated by nonconforming uses.	Telecommunications Act 16 United States Code (USC) 5
Only telecommunication structures that do not jeopardize the park's mission and resources may be permitted within the park.	16 USC 79 23 USC 317 36 CFR 14
No new nonconforming use or rights-of-way are permitted through the park without specific statutory authority and approval by the director of the National Park Service or his representative and only if there is no practicable alternative to such use of NPS lands.	<i>NPS Management Policies</i> Director's Order 53A, Wireless Telecommunications

Rock Creek Park has ongoing special use concerns associated with the presence of sanitary and storm sewerlines within the park, including the antiquated, combined sanitary and storm water sewers that discharge raw sewage into Piney Branch and Rock Creek in association with storm events. The water resource section describes the types of actions that the National Park Service will take to meet legal and policy requirements related to sewers.

A more recent special use management issue at Rock Creek Park involves locating telecommunications infrastructure inside the park. The Telecommunications Act of 1996 directs all federal agencies to assist in achieving a seamless telecommunications system throughout the nation by accommodating requests from telecommunication companies for the use of property, rights-of-way, and easements to the extent allowable under the agency's mission. However, the National Park Service is legally obligated to issue right-of-way permits only for those requests for which there is no feasible and prudent alternative and will not result in a derogation of the resources, values, and purposes for which the park was established (*RM-53 Special Park Uses, Rights-of-Way, Wireless Telecommunications Facilities*, Appendix 6, Exhibit 6, page A6-51).

Actions Outside of the Park. Rock Creek Park and the Rock Creek and Potomac Parkway include only part of the natural resources, cultural sites, and scenic vistas of the Rock Creek valley. As a result, actions by others in the watershed can affect park resources and visitor experiences. Similarly, NPS activities may have impacts outside of the park's boundaries. Therefore, service-wide mandates and policies recognize the need for the superintendent and other park staff to be involved with actions outside of the park. This includes working with the city, other public agencies, and landowners to address park integrity concerns and deal with issues relating to the protection and enhancement of resources, even when the resources are outside of the park.

Desired Condition	Source
Resources outside of the park are managed in such a way that the park will be safeguarded.	NPS Organic Act Redwood Amendment to the General Authorities Act
The National Park Service works cooperatively with others to anticipate, avoid, and resolve potential conflicts and address mutual interests.	NPS <i>Management Policies</i>

Examples of this type of participation were described in the "Air Quality" and "Water Resources" sections. Other actions could include, but would not be limited to, the following.

Supporting the establishment of land use agreements and easements to ensure green space.

Monitoring the park boundaries and working with the city and landowners to ensure that private developments do not encroach on the park or have visual impact.

Working with the city to control stray and feral pets that can prey on native wildlife or be hit by cars, and to educate citizens on the importance of animal control.

Planning projects so that noise and visual effects within the park are minimized and perceptions of solitude are enhanced.

Providing alternate transportation modes so that visitors can arrive at the park by means other than privately owned, motorized vehicles.

Improving visitor management so that special events at facilities such as the tennis stadium and the Carter Barron Amphitheater do not adversely affect traffic in surrounding neighborhoods for extended periods.

PLANNING OPPORTUNITIES AND ISSUES

The previous section summarized major legal and policy requirements for Rock Creek Park. This section identifies the decisions that need to be made through the general management planning process and summarizes the resources and other values that are at stake (impact topics).

Decision Points

This section identifies the major resource condition and visitor experience issues that need to be addressed in the general management plan.

A variety of issues and concerns were identified by the public, park staff, and other agencies during scoping for this general management plan. Comments were solicited at public meetings, through planning newsletters, and on the park web site and telephone hotline. Additional information on issues identification is provided in the “Consultation and Coordination” section.

Some of the comments were outside of the scope of this general management plan. Some concerns identified during scoping are already prescribed by law, regulation, or policy, or would be in violation of such requirements. These types of issues were discussed in the preceding section entitled “Servicewide Mandates and Policies.” Because they are mandatory requirements, these matters are not subject to decision in this general management plan.

Other issues identified during scoping were at an operational or developmental level of detail. Such issues are most appropriately associated with the park’s 5-year strategic plan or annual implementation plans. Those plans will be based on the resource conditions and visitor experiences to be achieved in Rock Creek Park that are established in the final general management plan. However, some of the concepts behind operational or developmental issues were incorporated into the alternatives considered in this draft general management plan.

Scoping demonstrated that there is much that the public likes about the park. Indeed, one of the most common comments during scoping was that the park is fine just the way it is today. In particular, people want the traditional character of the park to continue. However, without management, some park uses that could adversely affect the park-like atmosphere, particularly commuter traffic, are projected to increase. In addition, continued use of some of the park’s historic resources as administration offices may affect their historic integrity. It has been proposed that these structures may be more appropriate for interpretive or educational activities, and that administrative functions could be performed more efficiently from modern office facilities.

Based on public comments and agency concerns, three major resource condition and visitor experience issues, called “decision points,” were identified. This draft general management plan focuses on addressing these decision points, which are identified below.

How Should Traffic Be Managed in Rock Creek Park and on the Rock Creek and Potomac Parkway

The most controversial issue to be resolved by this plan involves establishing the appropriate level of through-traffic in Rock Creek Park and on the Rock Creek and Potomac Parkway. As discussed in the section on park history and use, some people feel that park values are compromised by heavy, high-speed traffic, and that nonmotorized recreation should be promoted by closing parts of Beach Drive and other park roads to automobiles. Others believe that the current mix of recreational and nonrecreational traffic is appropriate and that automobile access through the park enhances the quality of life in the region.

The Rock Creek and Potomac Parkway was established as a scenic travel corridor for the city. In contrast, until 1966 Beach Drive was used primarily as an internal park touring road to provide recreational access to the valley. When the Zoo Tunnel opened in 1966, it made the corridor consisting of Beach Drive and the Rock Creek and Potomac Parkway into a preferred commuting route for many residents living north of the park. As a result, weekday traffic averages 9,000 vehicles per day on parts of Beach Drive, while 55,000 vehicles typically use the busiest portion of the Rock Creek and Potomac Parkway.

Traffic models predict that the volume of regional traffic will increase substantially by the year 2020. Projections indicate that without additional management, traffic on portions of Beach Drive could more than double by 2020 (Robert Peccia & Associates 1997). This traffic growth would further compromise the suitability of park roads for recreational uses.

Another traffic-related issue on Beach Drive involves the effort to provide a continuous, regional bicycle trail system that is free of automobile traffic. Paved trails and roads in Rock Creek Park and along the parkway connect with the Rock Creek Trail and the Capital Crescent Trail both to the north and south and to the C and O Canal Trail to the south. However, the paved recreation trail system through Rock Creek valley is discontinuous. Recreationists must use portions of Beach Drive in the upper valley between the Maryland boundary and Bingham Drive and in the gorge section between Joyce Road and Broad Branch Road.

Both of these road sections are constricted, winding, and have narrow or no shoulders. During the weekend, both sections are closed to automobiles, except for the short section between West Beach Drive and Wise Road. During the week, they carry heavy automobile traffic.

A 1980 study by the National Park Service recommended constructing a separate paved trail through the upper valley and gorge sections (NPS 1980). During the current planning effort, NPS landscape architects, resource specialists, and a civil engineer reconnoitered these sections. They also consulted with representatives of the U.S. Fish and Wildlife Service and the District of Columbia State Historic Preservation Officer about potential effects on endangered species and properties listed on the National Register of Historic Places. The team concluded that there are no acceptable routes along these sections to construct a separate, paved trail. Impediments include potential damage to endangered species habitat, wetlands, National Register properties, and other environmental obstacles that would be extremely difficult and expensive to mitigate. They concluded that the only way to provide a continuous recreational trail through the valley would be to permanently close sections of Beach Drive to automobiles.

The following statement in regard to through-traffic routes in national parks is included in Section 9.2.1.2.1 of *Management Policies* (NPS 2001b):

Where a determination is made that existing through-traffic routes have adverse impacts on park resources and values, the Service will work with the appropriate government authorities to minimize the impacts, or to have the traffic flow re-routed over an alternative route. Where feasible and practicable, roads that are no longer needed will be closed or removed, and the area restored to a natural condition.

During scoping, there was strong disagreement among the public about whether some sections of Beach Drive should be permanently closed and about the degree to which through-traffic should be controlled in the park and on the parkway. To address these views, four approaches for managing through-traffic are analyzed in this draft general management plan and environmental impact statement.

What are the Most Appropriate Levels of Service and Locations for Visitor Interpretation and Education in the Park?

This draft general management plan and environmental impact statement analyzes two alternatives regarding the appropriate levels of service and locations for visitor interpretation and education. Factors that led to the development of these alternatives include the following.

It currently is difficult to reach the thousands of visitors who recreate each week in the Rock Creek valley, especially those who are unfamiliar with the park and its broader purposes. Visitors to Rock Creek Park often do not receive any initial orientation to the park, what it has to offer, or how to safely and appropriately experience park resources. As a result, many visitors do not even know that they are in a national park.

Interpretive programming in the park has evolved without the benefit of an interpretive plan. This has resulted in a hodgepodge of stories and facts that may not help the public understand the significance of the park and its resources. Many opportunities for reaching the public in the park are unrealized.

Over the past two decades, recreational visitation to Rock Creek Park has almost doubled while the park's visitor services have been severely reduced because of funding limitations. This has resulted in a substantial decline in visitation to the main interpretive sites in the park, which consist of the nature center and planetarium, and Peirce Mill.

Some facilities are in need of attention. Some exhibits need updating, and the buildings are open only on a limited schedule because of a lack of personnel.

In spite of current limitations, Rock Creek Park has a long tradition of providing a wide range of visitor interpretive and educational services. Its location in the nation's capital makes the park particularly well suited to provide a large, richly diverse population with resource interpretation and educational opportunities and to serve as an ambassador for the national park idea.

It is important within this draft general management plan to establish the desired resource condition and visitor experience for interpretation and education with regard both to location and levels of service. Two approaches for responding to this issue were included in this document.

What Are the Most Appropriate Locations to Support Administration and Operations Functions with Respect to Minimizing Resource Disturbance?

The following have been identified with regard to the use of the existing infrastructure to support administration and operations of the park.

Some administrative and operations functions are housed in historic structures. Examples include the location of the park headquarters in the Peirce-Klingbe Mansion and the U.S. Park Police station in the Lodge House on Beach Drive. These uses may not effectively protect the historic resources of the park or efficiently serve administrative and operational needs. They also preclude the ability to use these historic resources for educational or interpretive purposes.

Spaces available for office, work, and storage activities are insufficient.

Aging buildings have been repeatedly adapted beyond their original capacities to accommodate growing functions and required personnel.

Facility expansion is necessary for administration and operations functions in the park to keep pace with increasing visitor use and resource protection demands.

Two alternatives for supporting administration and operations functions are analyzed in this draft general management plan and environmental impact statement. This document also analyzes two options for the U.S. Park Police station.

Alternatives or Actions Eliminated from Further Study

Several actions that were suggested by the public are not incorporated into this draft general management plan. This section identifies those actions and provides rationale of why they were not included.

As described in the “Consultation and Coordination” section, the identification of issues and development of alternatives evolved through a series of meetings and other opportunities for public input. However, not all of the actions suggested by the public are included in this draft general management plan.

As the National Park Service learned more about public concerns, the alternatives were modified to more effectively address the public’s comments. This evolution resulted in the elimination from further consideration of some possible management actions that were proposed early in the process. Other actions raised by the public were not considered because they

were not feasible

are already prescribed by law, regulation, or policy

would be in violation of laws, regulations, or policies

This section briefly describes each of these actions and the basis for excluding them from this draft general management plan.

Other Traffic-Related Actions. Throughout the planning process, the public commented on the management of park roads more than any other topic. Many of their suggestions were incorporated into the four alternatives that are analyzed in this draft general management plan. However, many other suggestions on how to manage traffic were not addressed in any of the alternatives. The most common suggestions, and the reasons they were not included, are described below.

Suggestion: The National Park Service should charge a fee for entering the park or levy a toll for using Beach Drive or the Rock Creek and Potomac Parkway to discourage commuter traffic.

Response: Both of these approaches would be impractical because of logistical problems associated with the more than 20 road entrances to Rock Creek Park. Charging an entrance fee or a toll high enough to discourage commuter traffic could also discourage recreational use, which would be contrary to the purpose of the park.

Suggestion: Close Beach Drive to all private automobiles and use the road as a mass transit route for city buses.

Response: This option would duplicate mass transit services already available in the area via Metrobus and the Metro Rail Red and Green lines and would require reengineering of Beach Drive and other park roads to accommodate buses.

Suggestion: Extend the twice-daily lane reversals (one-way traffic) on the Rock Creek and Potomac Parkway to include Beach Drive. Variants on this idea included

- closing one lane of Beach Drive to automobiles and using it for bicycles
- reversing the one-way flow against the general flow of commuter traffic

Response: These measures were considered unsafe and technically impractical.

Suggestion: Close Beach Drive to motorized traffic overnight, from the end of the evening rush hour to the start of the next morning rush hour.

Response. Visitors are not allowed in the park after dark except in a vehicle. Therefore, this approach would effectively close large segments of the park after dark.

Suggestion: Allow motorized traffic on portions of Beach Drive only during weekday rush hours. Close these segments to motorized traffic twice daily, during the middle of the workday and overnight. Vary the time of weekday closures seasonally or based on time of sunrise and sunset.

Response: This approach had multiple disadvantages that led to its exclusion.

It would double the burden for barrier placement and removal on the U.S. Park Police, compared to any other alternative.

It would restrict the access throughout the park that visitors with limited mobility currently have during weekday evenings and would eliminate driving for pleasure except during rush hours.

Variable opening and closing times would be confusing and difficult to implement.

Like the preceding suggestion, it would effectively close large segments of the park after dark.

Suggestion: During the summer, close segments of Beach Drive to motorized traffic on weekdays after rush hour to promote nonmotorized recreation during the long evenings.

Response: The National Park Service analyzed sunset during the summer, including the effect of daylight savings time. The analysis showed that during the longest evenings of the year, at the end of June and beginning of July, the sun sets at 8:37 P.M. Rush hour through Rock Creek Park ends about 7:00 P.M. This would provide recreationists with little more than an hour and a half to enter the park after rush hour, reach their destinations, and exit from the park to avoid being stranded in the unlit park after the dark. By the end of August, there would be only 40 minutes between the end of rush hour and sunset. This action would also have most of the detriments of the preceding suggestion. Therefore, it was not incorporated into any of the alternatives.

In summary, many variations for traffic management and road closure were considered based on scoping comments. The range of traffic management alternatives addressed in this draft general management plan was selected because they are technically feasible, are most responsive to public concerns, and are consistent with NPS policies and authorities.

Remove Community Gardens, the Rock Creek Horse Center, and the Rock Creek Park Golf Course. Public comments during early scoping indicated that some people wanted to see the park managed more as a natural preserve, with a substantial reduction in developed areas within the park. Therefore, in newsletter 3, the National Park Service responded to this general direction with preliminary alternative scenarios 3 and 4. Both of these scenarios included removal of community garden sites in the park and eliminated the Rock Creek Horse Center as a public facility. Preliminary alternative scenario 4 also included removal of the Rock Creek Park Golf Course.

Once these provisions were incorporated into preliminary alternative scenarios, few people supported removal of these established uses. Public response to newsletter 3 overwhelmingly supported continuing these facilities as appropriate to the recreational purposes of the park.

The National Park Service agrees that these facilities and activities are legitimate recreational uses in the park. The golf course and the boarding stables are established concession operations under the provisions of 36 CFR, which assures concessionaires of a reasonable opportunity to make a profit so long as the operations are appropriate to the purposes of the park.

There is no apparent substantive public desire to discontinue these established uses. Therefore, elimination of these facilities was dropped from further consideration in the range of alternatives evaluated in detail in this draft general management plan.

Construct a Continuous Paved Recreation Trail in Rock Creek Valley. As mentioned previously in the section entitled “Decision Points,” the planning team for this general management plan considered the installation of a paved recreation trail parallel to Beach Drive through the entire length of the Rock Creek valley in the park. Such a trail was proposed previously in a bicycle trail study for the park (NPS 1980) and in *Paved Recreation Trails of the National Capital Region* (NPS 1990c).

For the segments between the Maryland boundary and Bingham Drive, and between Joyce Road and Broad Branch Road, major environmental obstacles were encountered that would be difficult and expensive to mitigate. As described below, each of the suggestions for installing a trail through the corridor had substantial drawbacks.

Suggestion: Convert the streamside segment of the Blackhorse Trail south of Joyce Road to a paved recreation trail and construct a parallel horse trail to replace the Blackhorse Trail.

Response: This action could adversely affect sites known to support the federally endangered Hays spring amphipod. It would be questionable whether mitigation could ensure the long-term protection of amphipod populations. Water quality problems may result from increased disturbance related to increased visitor activity and potential increases in sedimentation and nutrient pollution from changes in horse use. Other effects could include the loss of trees, increased erosion, higher visibility, and substantial cutting.

Suggestion: Provide a paved recreation trail immediately beside or within the shoulder of Beach Drive.

Response: Representatives of the District of Columbia State Historic Preservation Officer advised that this approach would adversely affect the original design of the road, which is a central feature of the park and contributes to its listing on the National Register. They also advised that construction of a paved trail segment and new bridge alongside or within view of the Boulder Bridge, which is individually listed on the National Register, would be considered an adverse effect on the historic setting.

Suggestion: Construct a new paved trail north of Bingham Drive, and particularly north of picnic grove 10.

Response: This approach would require extensive clearing of mature forests, extensive side-slope cutting, and/or the occupation and modification of wetlands and floodplains along Rock Creek. None of these impacts is considered acceptable by the National Park Service.

The analysis also considered whether user numbers and use patterns would justify the construction of a paved recreation trail through sensitive environmental areas. Currently, weekday use of the existing paved recreation trail north of Tilden Street is relatively low, typically ranging from 20 to 35 users per hour. During weekends, when most recreation occurs in the park and sections of Beach Drive are closed to automobiles, the same segments support 185 to 300 users per hour, a 5- to 15-fold increase. It is anticipated that the segments between the Maryland boundary and Bingham Drive, and between Joyce Road and Broad Branch Road show similar use patterns, and that most recreation needs are already being met by the weekend road closures in these areas.

Alternate paved routes through the park already exist for weekday recreational riders. These include the Oregon Avenue trail – Bingham Road trail, Military Road trail, and Glover-Ross Roads. However, the National Park Service recognizes that these routes may be less attractive to some recreationists because they are less level and less direct than a trail through the Rock Creek valley.

Even if the parallel trail were constructed, Beach Drive would continue to be the most level and direct route through the park. As a result, many bicycle commuters probably would continue to use Beach Drive as the most expedient route for their weekday commute.

This analysis indicated that the construction of two new segments of paved recreation trail in the valley north of Broad Branch Road would pose unacceptable risks to park natural and cultural resources, and that the trail would provide relatively little public benefit. Therefore, the construction of the paved recreation trail was eliminated from further analysis.

Construct Additional Facilities for Organized Sports. Preliminary alternative scenario 2 in newsletter 3 included developing facilities for organized sports at Military Field and, potentially, at other sites in the park. While there is considerable demand for sports facilities in the district, few members of the public who commented on the preliminary alternatives supported constructing additional sports facilities in Rock Creek Park. Many people opposed such a move as inappropriate to the purposes of the park as a natural landscape.

The Brightwood area of Rock Creek Park is currently dedicated to fields supporting organized sports. Sport facilities also are provided elsewhere in the region, including NPS sites such as Fort Reno, West Potomac Park, and Anacostia Park.

Based on these considerations, the National Park Service determined that additional facilities for organized sports are neither desired nor needed at Rock Creek Park. Construction of such facilities was eliminated from further consideration in this draft general management plan.

Construct a New U.S. Park Police Substation at Brightwood. It was proposed that a new D-3 substation for the U.S. Park Police be constructed in the Brightwood area of the park near the Tennis Stadium. However, as stated in the section “Geographic Area Covered by the General Management Plan,” management of the Brightwood area was established in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park* (NPS 1995b) and is beyond the scope of from this general management plan.

The Brightwood area is to remain unchanged because of the decisions made in the Tennis Stadium plan. While the Brightwood site is attractive for a U.S. Park Police substation from an access and engineering perspective, constructing the D-3 substation there would be perceived as adversely affecting the neighbors’ quality of life and would probably be strongly opposed by much of the public.

Allow Bicycling off Currently Permitted Roads and Trails. Bicycles are restricted to roads, parking areas, and designated paved trails in the park. This management approach is specified in the Rock Creek Park Compendium, section 1.5 (a)(2), and is consistent with Title 36 of the U.S. Code of Federal Regulations, Sections 1.5 and 4.30 (36 CFR 1.5 and 4.30).

During public scoping meetings, a few members of the public recommended that mountain biking be allowed on unpaved hiking and bridle trails in Rock Creek Park. This was eliminated from consideration by the National Park Service because such use is

contrary to park and NPS management policies

inconsistent with protecting the park's natural, cultural, and esthetic values and resources

a potential threat to the safety of visitors who use the trails for established purposes such as hiking and horseback riding

Allowing Pets to Run Unleashed in the Park. NPS policy, federal regulations (36 CFR 2.15), and park regulations (Rock Creek Park Compendium section 2.15) require all pets to be restrained on a leash or otherwise physically confined in national parks. The National Park Service reviewed requests for allowing running-at-large dogs within Rock Creek Park, but rejected this as inappropriate for the following reasons.

The activity would be in conflict with NPS policy and regulations.

Unrestrained pets constitute a threat to park resources, particularly the native wildlife species that are recognized as important by the park's establishing legislation.

Unrestrained pets could cause personal injury or annoyance to other visitors and conflicts with appropriate visitor uses and experiences.

Closures for Special Events. NPS policy, federal regulations, and park regulations provide the authority to implement selected closures for special events such as Rock Creek Park Day, Earth Day, and Bike Day. Roads and other facilities also can be closed for maintenance needs, even during rush hours. This authority will remain in effect, regardless of the management actions included in this general management plan. Therefore, there was no need to incorporate special closures into any of the alternatives.

Impact Topics - Resources and Values at Stake in the Planning Process

This section identifies the resources and values (impact topics) that were considered in the planning process. It also identifies the criteria used to establish the relevance of each impact topic to long-term planning for the park and parkway.

Specific resources and values, called impact topics, were used to focus the planning process and the assessment of potential consequences of the alternatives. The following four criteria were used to determine major resources and values for Rock Creek Park:

Resources cited in the establishing legislation for the park or the parkway. The establishing legislation for the park and parkway is provided in appendix A. Summaries of rele-

vant elements of the legislation are provided in the sections entitled “Park History and Use Relative to Management Planning” and “Park Mission.”

Resources critical to maintaining the significance and character of the park. The significance statements in the “Park Mission” section describe the defining features of Rock Creek Park and the Rock Creek and Potomac Parkway that were used to establish the resources that are critical to maintaining their significance and character.

Resources recognized as important by laws or regulations. A list of many of the important congressional acts and executive orders that guide the management of all NPS facilities, including this park, is provided in appendix B. A summary of some of the relevant elements of these acts and orders is provided in the section entitled “Servicewide Mandates and Policies.”

Values of concern to the public during scoping for the general management plan. The National Park Service conducted an extensive public information and scoping program to acquire input from the public and from other agencies. This helped the National Park Service develop alternatives and identify resources and values that are of high interest in the park.

Table 1 shows the criteria that helped establish each impact topic as a resource or value at stake in the planning process. Brief descriptions of each impact topic relative to these criteria are provided below. More detailed descriptions of each impact topic and the effects of each of the management alternatives are described in the “Environmental Analysis” section.

Natural Resources. A major reason for establishing Rock Creek Park as a national park was to protect its natural resources and its abundant natural scenery. Natural resources in Rock Creek Park are particularly valuable because the park is located within a large metropolitan area and they are remnant vestiges of the region’s natural heritage.

TABLE 1: CRITERIA USED TO ESTABLISH EACH IMPACT TOPIC

Impact Topic	Cited in Establishing Legislation	Critical to Park Significance and Character	Recognized by Laws or Regulations	Cited during Scoping
Air quality			✓	✓
Rock Creek and its tributaries	✓	✓	✓	✓
Wetlands and floodplains			✓	✓
Deciduous forests	✓	✓	✓	✓
Protected and rare species			✓	✓
Other native wildlife	✓	✓	✓	✓
Cultural resources		✓	✓	✓
Traditional park character and visitor experience	✓	✓		✓
Local and regional transportation				✓
Community character				✓

Air Quality – Compliance with air quality standards is mandated by the Clean Air Act. In addition, during scoping members of the public expressed concerns over threats to air quality from heavy automobile traffic in the park. Poor air quality has the potential to adversely affect biological resources, cultural resources, and visitor health and experience.

Rock Creek and Its Tributaries – The establishing congressional acts for Rock Creek Park, the Rock Creek and Potomac Parkway, and tributary additions to the park specify that Rock Creek and its tributaries are essential resources to be protected. In addition, there are many federal laws and executive orders that protect the nation's waters.

As the park's name suggests, Rock Creek is fundamental to the park's character. The undeveloped creek and its tributaries represent a unique natural resource in the Washington, D.C. metropolitan area. While surrounding urbanization adversely affects water quality and quantity, the creek and its tributaries continue to be inhabited by a variety of native fish and other aquatic species. The importance of Rock Creek as a central scenic and recreational attraction in the park was reaffirmed by numerous scoping comments.

Wetlands and Floodplains – Wetlands and floodplains were included in the discussion of water resources in the "Servicewide Mandates and Policies" section. Wetlands and floodplains are regulated by legislation and executive orders because of their value as biological resources and their contributions to flood control.

In the park, wetlands are located along the Rock Creek valley floor and at seeps along the lower slopes of the valley walls and along tributaries. Some of the floodplains along Rock Creek and major tributaries support riparian vegetation. Both of these sensitive areas have unusually large numbers of plant and animal species and contribute more to the biological diversity of the park than their small sizes would suggest.

Deciduous Forests – The establishing legislation for Rock Creek Park identifies "timber . . . in [its] natural condition" as an essential resource of the park. The National Park Service interprets this in an ecological context to mean not individual trees but the interrelated plants and animals that make up the forest biotic community. Forest stands are also an essential component of the scenic quality of the park that is mentioned in the establishing legislation.

The statements of park and parkway significance include several references to the forest's contribution to the park's character. The forest is an essential component of the landscape and scenic qualities of the park, buffers the park from the surrounding urbanization, and provides protected habitat for wildlife and plant species. During scoping, many comments were received about the value of the forests and the need to maintain them.

Protected and Rare Species – The protection of rare species and their habitats is mandated by the Endangered Species Act and *Management Policies 2001* (NPS 2001b). Rock Creek Park provides habitat for at least one federally endangered animal, at least one rare animal, and approximately 40 native plant species that are protected by Maryland and Virginia laws. (The District of Columbia does not have laws addressing native plant species protection.)

Other Native Wildlife – The 1916 legislation establishing the National Park Service directs the service to conserve wildlife in all national parks and to provide for public enjoyment of the same while leaving them unimpaired for future generations. Similarly, the legislation for Rock Creek Park states that the park will “provide for the preservation from injury or spoliation of all . . . animals . . . within said park, and their retention in their natural condition.”

In Rock Creek Park, native animals represent an important resource that captures the public’s attention. During scoping, many people commented on the value of seeing wildlife in the park, especially in contrast to the surrounding urban environment. White-tailed deer, the largest and most conspicuous mammal, was most frequently mentioned. Recreational birding also was identified as an important park activity during scoping.

The breeding bird census area is a 65-acre tract of forested land in the park with exceptional scientific value related to native species. Monitoring of breeding birds has occurred since 1948. The continuous record of bird populations is an important information resource for park management and also serves as an indicator of environmental health for a much larger region.

Cultural Resources. The park’s cultural resources are recognized as exceptional because they illustrate significant aspects of the historic development of the park area from prehistoric times to the present. Historic features such as the Rock Creek and Potomac Parkway, the Boulder Bridge, Fort DeRussy, historic park roads, and the Peirce Mill complex help define the significance and character of the park and are protected by multiple legislative, executive, and NPS actions. These and other cultural features were cited in scoping as contributing to the appealing ambiance of the park.

Visitor and Community Values. In reviewing the range of comments received during scoping, the following topics appear to capture the values expressed by the public.

Traditional Park Character and Visitor Experience – The park and parkway significance statements presented near the beginning of this general management plan reflect the importance of the overall visitor experience in defining the park’s character. Frequent scoping comments were associated with protecting the park’s and parkway’s naturalness, not only for the ecological resources, but for its restorative value to people as a place of natural beauty and decompression from the nearby urban setting. Scenery, opportunities to learn about the natural world, natural quiet, and the ability to hear natural sounds were often highlighted. Despite contention about other management approaches, there was near unanimity that the natural character should be preserved and protected from disturbance from additional development.

People also emphasized the traditional, familiar character of the park and parkway’s recreational features and their desire to see this character maintained. While many said that park roads and trails need repair and improved maintenance, the public appeared to be mostly satisfied with the range of recreational opportunities offered by the park. Other comments emphasized

the value of the park as a gathering place for family and friends

the importance of shared experiences such as walking, picnicking, golfing, horseback riding, gardening, attending concerts, and participating in other activities that have come to be associated with the park

individual and physically challenging recreation such as biking, jogging, in-line skating, and hiking

the historic design of structures as a contributing factor to the esthetic character of the park and the parkway

Local and Regional Transportation – Local and regional transportation was identified as an impact topic primarily because of scoping.

Some members of the public identified the value of park roads, the parkway, and paved trails as a transportation corridor. The Washington, D.C. metropolitan area has a serious traffic congestion problem, and scoping comments pointed out that park roads and paved trails are part of the regional transportation system. Other people stressed that any actions to change automobile use within the park or on the parkway would affect traffic patterns on surrounding city streets. They value the parkway and park roads because of their contribution to moving automobiles through the city.

Other people value the park roads and paved trails corridor for the opportunity to promote non-motorized and less polluting alternatives, especially bicycle use, to single-occupancy automobiles. These people want to see a reduction in automobile traffic in the park and parkway not only to improve chances for auto-free recreation, but also as part of a larger effort to reduce dependency on personal automobile use in the region.

Community Character – Community character was identified as an impact topic primarily because of scoping. Many of those who commented during scoping described the park and parkway as a major asset to the quality of life in the Washington, D.C. metropolitan area. The scenic and recreational amenities are much appreciated, and many said that proximity and access to the park and parkway were important factors in their choice of neighborhoods. A number of people who identified themselves as park neighbors also stressed that their neighborhoods could be affected by changes in park or parkway management, particularly in regard to transportation management.

Impact Topics Dismissed from Further Consideration

This section describes why some impact topics that commonly are considered during the planning process were not relevant to the development of a draft general management plan for Rock Creek Park and the Rock Creek and Potomac Parkway.

Thirteen impact topics that must be considered in any environmental impact statement prepared by the National Park Service are identified on page of 53 *Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001a). All but four of those topics are included in the impact topics that were established as being applicable to Rock Creek Park and the Rock Creek and Potomac Parkway, based on the four criteria discussed in the previous section and summarized in Table 1. The four topics, and justification for not considering them further, are provided below.

Prime and Unique Farmlands. Guidelines from the Council on Environmental Quality (1980) require federal agencies to assess the effects of their actions on soils classified by the Natural Resources Conservation Service (NRCS) as prime or unique farmlands. A letter from the NRCS state soil scientist for Maryland provided the following information (NRCS 1998).

There are no soils classified as unique within Rock Creek Park.

Two soil mapping units classified as prime farmland soils are within park boundaries.

Chillum silt loam on 0 to 8 percent slopes makes up much of the soil in the Rock Creek and Pinehurst Branch floodplains in the northern end of the park, is found along the tributary parallel to Joyce Road, and is located in isolated lenses in the floodplain of Rock Creek along the parkway.

Glenelg Loam on 0 to 8 percent slopes is located on seven isolated ridge tops around the park.

Neither of the prime farmland soil types within the park would be disturbed by management prescriptions proposed in any of the alternatives. They would continue to be generally protected within the park, and there would be no new impact on the regional production of food, forage, or fiber crops from any of the alternatives under consideration. Therefore, prime farmland soils were dropped from further consideration as an impact topic.

Environmental Justice. Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. Although public scoping comments for Rock Creek Park did not identify this as a concern, the traffic analysis in the environmental impact statement evaluated this type of potential effect. This analysis is included in the transportation analysis rather than a separate section on environmental justice.

The traffic management provisions of Alternatives A, C, and D may divert some traffic that currently uses park roads onto nearby streets. Therefore, the transportation analysis for each alternative examined anticipated changes in traffic in minority and low-income neighborhoods versus nonminority and higher-income neighborhoods to determine if disproportionately high adverse effects would occur to disadvantaged populations.

Sacred Sites. There are no Native American sacred sites within the area covered by this general management plan. Therefore, this is not a relevant impact topic for Rock Creek Park and the Rock Creek and Potomac Parkway.

Indian Trust Resources. There are no Indian trust resources or assets within the area covered by this general management plan. Therefore, this is not a relevant impact topic for Rock Creek Park and the Rock Creek and Potomac Parkway.

Connected, Cumulative, and Similar Actions

This section identifies actions that are direct or indirect consequence of the alternatives. It also identifies actions that could have an additive impact on environmental resources, regardless of

who takes the actions or whether they occurred in the past, are current, or will occur in the reasonably foreseeable future.

Cooperating Agencies. This draft general management plan and environmental impact statement does not have any cooperating agency involvement, as defined in the Council on Environmental Quality's (1978) "Regulations for Implementing Procedural Provisions of the National Environmental Policy Act." However, numerous agencies were consulted in the preparation of this document, as described in the "Consultation and Coordination" section.

Connected and Similar Actions. Connected and similar actions for this draft general management plan refer to other planning projects in the vicinity. Appendix C describes the relationship of the general management plan to other planning in the area of Rock Creek Park and the Rock Creek and Potomac Parkway. It includes other NPS planning efforts, and planning currently in force or underway by entities other than the National Park Service.

Cumulative Actions. Cumulative actions are actions by the National Park Service or others that may have additive impacts on one or more of the resources of Rock Creek Park or the Rock Creek and Potomac Parkway. It is irrelevant whether they occurred in the past, are currently taking place, or may be planned for the reasonably foreseeable future. The actions described below were included in the cumulative impact analyses in the "Environmental Consequences" section of this general management plan and environmental impact statement.

Past Urbanization of the Washington, D.C. Area – The Washington, D.C. metropolitan area completely surrounds Rock Creek Park, so that the park in effect is an island of natural resources within an urban zone. In the area around the park, forests and fields have been replaced by street-scapes, creeks have been routed into storm sewers, and archeological and historic sites were lost during construction of the city. These past actions are included to determine the effects of park management within the larger regional setting.

Continuing Urbanization of the Rock Creek Watershed – Continuing urbanization of the Rock Creek watershed will affect several of the resources of Rock Creek Park, regardless of management actions taken by the National Park Service within the park. Watershed development will be particularly important in the consideration of effects on Rock Creek, its floodplains, and aquatic life.

Altered Transportation Patterns – In addressing the cumulative effects of altering transportation patterns through the park, the National Park Service considered incremental park changes added to regional programs, policies, and objectives. Several important transportation plans helped shape the analysis of alternatives.

The Metropolitan Washington Council of Governments (1997) *Draft Vision Document* outlines regional transportation policies, objectives, and strategies for the metropolitan area. The policies support an intermodal transportation system that includes rail, bus, ride sharing, bicycle, and pedestrian improvements that reduce reliance on the single-occupant automobile.

The *Transportation Plan for the District of Columbia* (District of Columbia Government 1997b) promotes development of a transportation system that intercepts automobile traffic at the edges of the city and reduces dependency on single-occupancy vehicles. The plan also advocates the development of bicycle paths along Beach Drive and the Rock Creek and Potomac Parkway.

Similar bicycle paths are called for in the *National Capital Region Bicycle Plan* (Metropolitan Washington Council of Governments 1995).

Chesapeake Bay Program – On October 29, 1993, the National Park Service signed a memorandum of understanding with the Environmental Protection Agency and became a formal participant in the Chesapeake Bay Program. In joining the program, the Park Service agreed to contribute to the restoration, interpretation, and conservation of the many valuable resources of the Chesapeake Bay. Information on the Chesapeake Bay Program is available on the internet at <http://www.chesapeakebay.net/>. The activities of the Chesapeake Bay Program are included as cumulative actions that are considered in the impact analysis.

Fish Passage Improvements in Rock Creek – The Woodrow Wilson Bridge, which crosses the Potomac River approximately 7 miles downstream from the mouth of Rock Creek, currently is being reconstructed. Mitigation for this project includes the installation of improvements in Rock Creek to remove barriers to fish migration. These improvements will allow fish to migrate from the mouth of the creek upstream to Needwood Lake in Montgomery County, Maryland (Madaras 2001).

Modifications will be made at nine sites in Rock Creek. Construction will start in the summer of 2002 and should be completed before the start of the fish migratory season in February or March 2003. The cost will be approximately \$1.4 million, about half of which will provide for improvements at Peirce Mill Dam.

A fish bypass structure will be installed to allow fish to swim past the 8-foot-high Peirce Mill Dam. This Denil fishway will be located between the dam abutment and Beach Drive. It will provide a sloped channel with baffles at regular intervals to slow the velocity of the water and create resting pools to conserve the energy of migrating fish. Its slope and length will be designed based on the swimming ability of the migratory fish in Rock Creek (blueback herring, alewife, and American eel). The angle and velocity of the flow leaving the bypass will be designed to assist fish in finding the passage. According to the Chesapeake Bay Program website (<http://www.chesapeakebay.net>), Denil fishways are probably the most common design used in the Chesapeake Bay watershed.

Milkhouse Ford will be reconstructed so that it remains passable by automobiles, and all of its historic structures above the waterline will be retained. The existing concrete of the ford will be removed and replaced with concrete of similar color and texture that is configured to provide a flow depth and velocity that will allow the passage of fish. The abandoned sewerline on the upstream lip of the ford will be removed.

Two abandoned roadway fords in Rock Creek near the National Zoological Park will be removed. In addition, an abandoned sewerline upstream from the Boulder Bridge will be removed.

PURPOSE AND NEED FOR ACTION

Passage over four active sewerlines will be provided by installing natural-appearing pool and weir structures. Engineers examined the existing “boulder field” area of Rock Creek, which is a natural fish passage. Within this stretch, they measured flow velocities, flow depths, and sizes of openings. They then developed designs for the area immediately downstream of each sewerline that will mimic the boulder field concept and provide fish with a stair-step effect. These features will be installed below a sewerline just upstream from Boulder Bridge, a sewerline upstream from Milkhouse Ford, and two sewerlines in the vicinity of Sherrill Drive.

ALTERNATIVES

This section first describes each management prescription developed for Rock Creek Park and the Rock Creek and Potomac Parkway. It then describes how the alternatives were formulated and provides descriptions of each alternative, using zoning to apply management concepts to park resources.

A description of how the alternatives were created based on scoping is provided in the section entitled “Formulation of Alternatives.” Following their general definition, the development of the alternatives was a two-step process.

The National Park Service identified management prescriptions that potentially were applicable to the park and parkway. Each management prescription was defined by desired visitor experiences and resource conditions. This helped establish the kinds of activities or facilities within each prescription that would achieve those targeted conditions.

The management prescriptions were then mapped to specific areas of the park to create the four alternatives evaluated in this draft general management plan.

Each alternative is a combination of several management prescriptions. None of the alternatives uses all of the prescriptions, and the locations where the prescriptions would be applied vary among alternatives.

POTENTIAL MANAGEMENT PRESCRIPTIONS

This section defines all of the management prescriptions that could be applied to Rock Creek Park and the Rock Creek and Potomac Parkway under any of the alternatives. The management prescriptions define the desired resource conditions and visitor experiences, including the appropriate kinds and levels of management, use, and development.

A management prescription is an approach for administering or treating the resources or uses of a specified area that is based on desired outcomes. Management prescriptions include target goals or objectives for one or more resources and/or visitor experiences that are present within the prescription area.

At some NPS units, management prescriptions apply to an entire park. However, all of the alternatives for Rock Creek Park and the Rock Creek and Potomac Parkway consist of multiple zones with different management prescriptions. Together, all of the management prescriptions within an alternative meet all of the goals for the park and parkway.

Different physical, biological, and social conditions are emphasized in each zone. The factors that define each management prescription are the

desired natural and cultural resource conditions

desired visitor experience

These factors then indicate the types of activities or facilities that are appropriate within the zone.

Regardless of the target visitor experience or resource condition, all of the management prescriptions conform to all of the park-specific purpose, significance, and mission goals, and the servicewide mandates and policies, that were described earlier in this draft general management plan. For example an archeological site would be protected, regardless of whether it occurs in the forest zone, cultural resource zone, or valley floor automobile access zone. However, the *use* of that site for interpretive or educational purposes could vary, depending on the management prescription to which its vicinity was assigned.

The 12 management prescriptions identified as potentially applicable to Rock Creek Park and the Rock Creek and Potomac Parkway are described below and summarized in table 2. Consistent with the high level of concern expressed in scoping about the use of roadways, seven of the prescriptions apply to roads. The others emphasize desired conditions and visitor experiences for forests, cultural resources, recreation areas, visitor facilities, and administration and operations areas.

FOREST ZONE

Largely undisturbed forests characterize this zone. Forests on the valley slopes and ridge tops provide opportunities for solitude, nature study, and wilderness-like scenery. This is the only zone where a visitor expects a low to moderate number of encounters with other park visitors.

Impacts on natural resources from human activities are avoided or largely mitigated. Cultural resources are managed compatibly with the natural environment.

Unpaved trails provide for hiking, horseback riding, and jogging. A few paved trails provide for mechanized activities such as bicycling and in-line skating.

Desired Visitor Experience

In the interior of this zone, visitors are immersed in a natural landscape. The zone provides opportunities for exploration and contemplation of the forest, and respite from the sounds and views of the city.

Paved trails within the zone support active recreation and also provide opportunities for visitors in wheelchairs or with young children in strollers to experience a natural setting. On paved trails in the forest zone, the chance of a visitor encountering someone else are moderate to high on busy weekends. Away from paved trails, the encounter rate is low to moderate.

Desired Resource Conditions

Natural processes function in this zone with relatively little interference except for restorative actions to protect or promote native biota, mitigate pollution, and control erosion. Natural and cultural resources within the zone are documented and understood through nondisruptive research. Archeological, historic, and ethnographic resources are managed compatibly with the natural environment, while recognizing that some disturbance to the forest currently occurs and will continue to occur in these areas.

TABLE 2: SUMMARY OF MANAGEMENT PRESCRIPTIONS

Management Prescription	Description	Visitor Experience and Resource Condition	Appropriate Activities and Facilities
Forest Zone	Natural landscape of forests on the valley slopes and ridge tops	Provides opportunities for exploration and contemplation of the forest Low to moderate encounter frequency with other visitors Mostly undisrupted natural processes	Activities: hiking and nature study Facilities: mostly undeveloped, other than trails
Cultural Resource Zone	Contains the key cultural resources related to the significance and purposes of the park	Provides a sense of history High encounter frequency with other visitors and park personnel Protects the integrity and ambiance of cultural features Documents and interprets resources Manages natural resources compatibly with cultural resource	Activities and facilities are compatible with cultural resource protection Activities: education and interpretation, adaptive uses Facilities: cultural resources, which could be adaptively used
Valley Floor Automobile Access Zone	Roadways and mowed areas along the Rock Creek and Piney Branch valley floors Provides scenic views of the creek and forested valley	Provides motorized and nonmotorized access to the valley and informal recreational areas Moderate to very high encounter frequency with other visitors Heavy urban traffic on weekdays On weekends and holidays, motorized traffic is excluded and nonmotorized recreation occurs Landscape is largely forested, but shoulders and grassy bays are maintained by mowing	Activities: motorized and nonmotorized touring, nonrecreational traffic through or across the valley, and informal recreation such as picnicking, nature study, and hiking Facilities: rustic picnic areas, paved trails, roadways, and traffic control devices
Valley Floor Controlled Automobile Access Zone	Similar to Valley Floor Automobile Access Zone but with reduced traffic volumes and speeds	Same as Valley Floor Automobile Access Zone	Same as Valley Floor Automobile Access Zone

TABLE 2: SUMMARY OF MANAGEMENT PRESCRIPTIONS (Continued)

Management Prescription	Description	Visitor Experience and Resource Condition	Appropriate Activities and Facilities
Valley Floor Nonmotorized Recreation Zone	Excludes motorized traffic Includes Beach Drive and adjacent mowed areas Provides scenic views of the creek and forested valley	Visitors enjoy natural sights, sounds, and smells, uninterrupted by motor vehicle traffic Relaxed and unhurried experience Moderate to very high encounter frequency with other visitors Landscape is largely forested, but shoulders and grassy bays are maintained by mowing	Activities: nonmotorized recreation such as walking, bicycling, in-line skating, and picnicking Facilities: paved trails or former road bed, rustic picnic areas, and interpretive waysides
Valley Floor Mid-Weekday Recreation Zone	Excludes motorized traffic on weekdays between 9:30 A.M. and 3:30 P.M. At all other times, is similar to the Valley Floor Controlled Automobile Access Zone	During mid-weekday closures, same as the Valley Floor Nonmotorized Recreation Zone At all other times, same as the Valley Floor Controlled Automobile Access Zone	Same as Valley Floor Automobile Access Zone
Rock Creek and Potomac Parkway Zone	Highly developed parkway that provides a scenic driving experience Mix of grassy fields and woodlands with limited city views	Esthetically pleasing landscape provides a sense of decompression and relaxation High to very high encounter frequency with other visitors Heavy traffic is accepted Natural and historic features are maintained, including parkway design	Activities: motorized and nonmotorized recreation such as driving, walking, bicycling, and in-line skating Facilities: roadways and paved trails
Park Road Zone	Park roads, including associated shoulders, pullouts, parking areas, paved trails, historic bridges, and scenic viewpoints	Provides motorized and nonmotorized park access High to very high encounter frequency with other visitors Unhurried drive or bicycle ride, despite heavy urban traffic at times Surrounding landscape is forested, but shoulders are maintained by mowing	Activities: motorized and nonmotorized touring, nonrecreational traffic across the park Facilities: roadways, paved trails, and traffic control devices

TABLE 2: SUMMARY OF MANAGEMENT PRESCRIPTIONS (Continued)

Management Prescription	Description	Visitor Experience and Resource Condition	Appropriate Activities and Facilities
Visitor Facility Zone	Developed zone defined by facilities for information, interpretation, education, and other visitor services	Receive introduction to park's natural and cultural history Obtain information on recreation opportunities High encounter frequency with other visitors and park personnel Substantial maintenance and intervention to accommodate concentrated visitor use	Activities: information, interpretation, education, and other visitor services Facilities: buildings and waysides to support information and interpretive activities; historic structures could be adaptively used
Urban Recreation Zone	Developed recreation facilities such as picnic areas, community gardens, stables, sport fields, and golf course Background setting is rustic and park-like	Developed facilities for recreation High levels of intervention and maintenance to support concentrated visitor use Very high encounter frequency with other visitors	Activities: gardening, picnicking, tennis, performances, golf, horseback riding, and informal sports Facilities: developed recreation features and structures
Administration/Operations Zone	Includes structures and grounds used for park administration and operations	Most visitors are unaware of the facilities When necessary, visitors are able to locate facilities easily and find them user friendly Best management practices protect resources, prevent pollution, and reduce noise and visual impacts	Activities: park administration and operation Facilities: offices and maintenance yards; historic structures could be adaptively used
Urban Transit Zone	Includes non-NPS roads within the park and parkway boundaries that provide access across the park and connections with the urban street grid	Visitors experience the sights and sounds of urban traffic Very high encounter frequency with other visitors	Activities: urban transportation; where possible, links the park to local trails for nonmotorized recreation Facilities: roadways and traffic control devices

Some open spaces are maintained within the Forest Zone using processes such as mowing and brush cutting. These include, but are not limited to, picnic groves and meadows like Military Field. Long-standing vegetation management practices involving thinning or limbing-up of trees are used along the stream banks to maintain glimpses of the water and occasional views up or down the creek. Some historic clearings may be restored within the Forest Zone, potentially including the vista at Pulpit Rock, specific views of the boulder dam at Peirce Mill, and the historic entry drive at Linnaean Hill. However, areas of modified vegetation are limited in size, have a well-defined purpose, and could be reversed by ending the management practice and allowing natural vegetation succession to occur.

Appropriate Kinds of Activities or Facilities

A strong emphasis is placed on natural and rustic scenic and esthetic quality. Structures or activities that would disrupt such a setting are not permitted.

This zone is mostly undeveloped. Park facilities are limited to bridle paths, foot trails, limited paved recreation trails, and a few picnic sites to assist visitors in enjoying the forest. Nondisruptive environmental and cultural research and monitoring, consistent with the park purpose, are permitted.

CULTURAL RESOURCE ZONE

The cultural resource zone contains lands that are managed primarily for the preservation, protection, and interpretation of their cultural resource values. Typically, these lands include key cultural resources related to the significance and purposes of the park and parkway.

Not all lands that contain valuable cultural resources would be assigned to the cultural resource zone. For example, the park's entire circulation network of historic roads and trails contributes to the listing of the Rock Creek Historic District on the National Register of Historic Places. However, these roads also fulfill transportation functions that justify a different management prescription. Similarly, a historic building that houses administrative offices would be assigned an administrative rather than a cultural resource management prescription.

Desired Visitor Experience

Visitors are offered the opportunity to learn about and contemplate the prehistoric and historic resources in the park and obtain a sense of past human occupation and use of the park area. The resource management objectives for each facility are based on site-specific visitor activities and encounter rates. Visitors expect a high number of encounters with other park visitors, and with NPS personnel.

Desired Resource Conditions

Archeological and historic sites, buildings, structures, circulation networks, features, and landscapes are protected and preserved. Cultural resources in the zone are documented and interpreted.

Cultural landscapes in this zone generally are managed to reflect their historic design. Nonnative plant species are used sparingly, and only in a manner that is consistent with their historic use (see *Management Policies 2001*, NPS 2001b).

Natural resources are managed compatibly with cultural resource preservation procedures and programs. Natural processes are maintained wherever possible.

Appropriate Kinds of Activities or Facilities

Activities are limited to those compatible with maintaining the integrity of the featured cultural resources. Historic buildings or structures could be adaptively used for various park purposes subject to NPS policies for protection, preservation, and utilization of cultural resources.

VALLEY FLOOR AUTOMOBILE ACCESS ZONE

This zone lies along the Rock Creek and Piney Branch valley floors. It includes the roadways and adjacent mowed areas that are maintained for recreation and esthetics. The zone features scenic views of the creek and the forested valley. Grassy areas and rustic facilities are maintained for picnicking and other informal recreation.

On weekdays, the zone is managed for pleasure driving and for urban traffic, which at times is very heavy. On weekends and holidays, motorized traffic is excluded from this zone, and it provides nonmotorized recreation such as walking, bicycling, and in-line skating.

Desired Visitor Experience

Visitors have convenient access to the valley and to informal recreational areas along Rock Creek and Piney Branch. Visitors enjoy being in a picturesque landscape of fields and forests. Informal recreation in the corridor contributes to social interaction. The frequency of visitor encounters with other visitors is moderate to very high, although secluded spots on the creek offer a chance for solitude.

Desired Resource Conditions

The landscape beside the road and creek is modified from natural conditions. Shoulders and established grassy bays along Beach Drive are maintained by mowing. Forested areas within this zone are managed in a natural condition, similar to that in the Forest Zone. Wetlands and seeps are kept in a natural condition. Historic bridges and picnic facilities are maintained for heavy daily use.

Appropriate Kinds of Activities or Facilities

During weekdays, motorized and nonmotorized touring are accommodated. This includes nonrecreational traffic through and across the valley, which results in heavy traffic, particularly during rush hours. Traffic control devices, such as signal lights, are used judiciously to control volumes and speeds with as little detraction from the rustic setting as practical. Speed limits and other traffic regulations are enforced. During weekends and holidays, roadways are closed to motorized traffic.

Informal recreation such as picnicking, casual ball games, and contemplation are supported, for both individuals and groups. Facilities include rustic-style picnic tables, grills, and shelters; parking and staging areas; comfort stations; and interpretive waysides and information boards.

VALLEY FLOOR CONTROLLED AUTOMOBILE ACCESS ZONE

The configuration of and desired experiences and resource conditions in this zone are similar to the Valley Floor Automobile Access Zone described above. However, different kinds of activities and facilities are used to control the level of traffic in the park. The management goals are to slow traffic to posted speed limits and to reduce the volume of nonrecreational traffic in the valley.

Desired Visitor Experience

The desired visitor experience is the same as the Valley Floor Automobile Access Zone.

Desired Resource Conditions

The desired resource conditions are the same as the Valley Floor Automobile Access Zone.

Appropriate Kinds of Activities or Facilities

Motorized and nonmotorized touring are accommodated, similar to the Valley Floor Automobile Access Zone. However, nonrecreational traffic through or across the valley is more rigorously controlled. Traffic-calming measures are used judiciously to control volumes and speeds with as little detraction from the rustic setting as practical. Speed limits and other traffic regulations are enforced. Even with controls, traffic is heavy at times.

Other activities and facilities are similar to those described in the Valley Floor Automobile Access Zone.

VALLEY FLOOR NONMOTORIZED RECREATION ZONE

Motorized traffic is excluded from this zone, which includes former roads and adjacent mowed areas. The zone features scenic views of the creek and the forested valley. Grassy areas and rustic facilities support picnicking and other informal recreation. The zone provides nonmotorized recreation such as walking, bicycling, and in-line skating.

Desired Visitor Experience

The zone provides visitors with opportunities to enjoy the natural sights, sounds, and smells of the creek valley, uninterrupted by motor vehicle traffic. Visitors enjoy being in a scenic landscape of fields and forests in contrast to the surrounding city. The experience is relaxed and unhurried. Informal recreation in the corridor contributes to social interaction. The frequency of visitor encounters with other visitors is moderate to very high, although secluded spots on the creek offer a chance for solitude.

Desired Resource Conditions

Shoulders and some established grassy bays along Beach Drive are maintained by mowing for esthetics and informal recreation. Some currently mowed areas are allowed to succeed to meadow and forest. Forested areas within this zone are managed in a natural condition, similar to that in the Forest Zone. Wetlands and seeps are kept in a natural condition. Historic bridges and picnic facilities are maintained.

Appropriate Kinds of Activities or Facilities

This zone supports a variety of informal, nonmotorized recreational uses along the creek. Activities range from passive recreation and repose to the physically challenging. Activities include bicycling, walking, picnicking, nature study, in-line skating, and jogging. The road corridor remains along the existing alignment of Beach Drive. Facilities include rustic picnic tables, grills, and interpretive waysides and information boards.

VALLEY FLOOR MID-WEEKDAY RECREATION ZONE

On weekdays between 9:30 A.M. and 3:30 P.M., this zone is managed in a manner similar to the Valley Floor Nonmotorized Recreation Zone. At all other times, its management is identical to that of the Valley Floor Controlled Automobile Access Zone.

Desired Visitor Experience

Except during mid-weekday hours, the desired visitor experience is the same as the Valley Floor Automobile Access Zone. During mid-weekdays, the desired visitor experience is like that in the Valley Floor Nonmotorized Recreation Zone and includes unhurried enjoyment of the natural sights, sounds, and smells of the creek valley, uninterrupted by motor vehicle traffic.

Desired Resource Conditions

The desired resource conditions are the same as the Valley Floor Automobile Access Zone.

Appropriate Kinds of Activities or Facilities

Except during mid-weekday hours, activities are identical to those of the Valley Floor Controlled Automobile Access Zone. This includes the use of traffic-calming measures to control volumes and speeds. However, traffic is heavy even when controls are in place, particularly during rush hours. During mid-weekdays, activities are limited to nonmotorized uses, similar to those described for the Valley Floor Nonmotorized Recreation Zone. Facilities are similar to those described in the Valley Floor Automobile Access Zone.

ROCK CREEK AND POTOMAC PARKWAY ZONE

The developed parkway zone connects the National Zoo, Rock Creek Park, and the monumental core of the city with a scenic driving experience. It consists of the parkway, non-forested areas of the right-of-way, and the paved recreation trail.

This zone provides a scenic corridor through a park-like setting consisting of a mix of forests and fields with limited views of the surrounding city. Landscapes are managed in a sustainable fashion, and the defining features of the historic parkway are preserved.

Desired Visitor Experience

Visitors drive along a well-maintained paved road, or they bicycle, walk, or skate on a paved recreational trail. Views include the creek, overhead bridges, the artistically designed roadway, planting of trees and shrubs, and forest edges.

The experience is linear and sequential in character and is transitional between the adjacent urban landscape, particularly at the southern end of the parkway, and the more natural landscape of Rock Creek Park to the north. Visitors entering the parkway from city streets have a sense of decompression and relaxation. The Godey Lime Kilns offer visitors an opportunity to view a historic industrial ruin. The visitor encounter rate with other visitors in the zone is very high at times, and heavy traffic is accepted.

Desired Resource Conditions

The landscape is substantially modified compared to natural conditions. Native plant materials are used to create an esthetically pleasing landscape in keeping with the historic parkway design.

Nonnative, noninvasive plant species are used sparingly in this zone within the standards of NPS policies. Historic parkway design features are maintained, as are the ruins of Godey Lime Kilns.

Appropriate Kinds of Activities or Facilities

Visitor activities include driving, bicycling, walking, jogging, and in-line skating. Landscape management is relatively intensive, including such activities as mowing and trimming, tree planting or removal, and invasive plant control. Existing levels of development are maintained. Some intersections or other points are rehabilitated for visitor safety or esthetics, but the redesign avoids increasing the capacity of the roadway or encouraging increased speeds. Speed limits and other traffic regulations are enforced.

PARK ROAD ZONE

The Park Road Zone includes all paved roads, other than Beach Drive and the Rock Creek and Potomac Parkway, that are owned and maintained by the National Park Service and are open to automobile use by the public. The zone is a narrow corridor that includes the road surface, shoulders, and associated pullouts, parking areas, and paved trails. These corridors provide scenic driving, as well as pedestrian and bicyclist access, to park recreational and interpretive facilities.

Desired Visitor Experience

The primary visitor experience goal for this zone is an unhurried drive or bicycle ride through a scenic, esthetically pleasing natural landscape. The roadways and paved trails within this zone are used by visitors for touring the park, enjoying scenic vistas, and accessing interpretive and recreational fa-

cilities and other zones. The visitor experience generally depends on a motorized vehicle or bicycle, and involves traveling on a well-maintained, paved surface designed to complement the forest setting.

The frequency of visitor encounters with other visitors on park roads is high to very high. The latter condition occurs most often during weekday rush-hours, when many of the roads in this zone are used by commuters to travel across or through the park. Although such nonrecreational use is viewed as a secondary purpose for park roads, it is accepted so long as traffic volumes do not pose an undue threat to visitor safety, cause resource damage, or create excessive traffic congestion in the park.

Desired Resource Conditions

On park roads that have been identified as cultural resources, a strong emphasis is placed on the esthetic quality of the roadways, including their ability to harmonize with the surrounding forest and retain the historic, rustic design of early park facilities. Within the goal of maintaining the historic appearance and function of the roads, some modern traffic signage and traffic control devices are accepted for visitor safety, and curbing and drainage structures may be rehabilitated to improve storm water control.

Appropriate Kinds of Activities or Facilities

All roads, recreational trails, and associated facilities in this zone are managed to complement the natural setting and historic road design. The design and capacity of the roads are not adjusted to meet nonrecreational traffic volumes. Rather, traffic-calming measures, possibly including temporary closures, are used to reduce nonrecreational traffic volumes and congestion if they become a problem. Sidewalks or paved trails are provided adjacent to the road in some corridors to improve pedestrian and bicycle access from adjacent streets and neighborhoods. Temporary closures are appropriate after snow storms to allow winter recreational opportunities such as sledding and skiing.

VISITOR FACILITY ZONE

This is a developed zone that is defined by facilities for information, interpretation, education, and other visitor services. High maintenance and intervention are required to accommodate concentrated visitor use. In some cases, the zone includes historic structures that have been adapted for visitor services.

Desired Visitor Experience

Visitors in this zone are introduced to the natural and cultural history of the park and are provided with information on recreation opportunities. They participate in variety of activities related to environmental and cultural history. Access is easy and convenient. Social interaction is common, and the encounter rate with other visitors and park staff is very high.

Desired Resource Conditions

The developed areas in this zone receive a high degree of maintenance and intervention to accommodate concentrated visitor use. Historic buildings and grounds that have been adaptively used for visitor services are maintained in keeping with NPS policies and the Secretary of the Interior's (1992 and 1996) standards for the protection of cultural resource values. Natural and cultural resources are integrated into educational and interpretive programs where appropriate. Nonnative plant species are used sparingly in this zone within NPS policies.

Appropriate Kinds of Activities or Facilities

This zone includes facilities where the predominant use involves providing information and interpretive services. Facilities include exhibits and other media, auditorium, book sales, and other aids for promoting visitor understanding of the park and its resources. Consistent with NPS policies for preservation and use of cultural resources, historic structures could be adaptively used for visitor services.

URBAN RECREATION ZONE

The urban recreation zone includes facilities and grounds associated with reserve picnic areas, community gardens, horseback riding facilities, sport fields, the golf course, entertainment areas, and other active recreation that is consistent with traditional uses of the park. Although the natural environment is substantially modified within the zone, the background is rustic and park-like.

High levels of intervention and maintenance are required to support concentrated visitor use. Noise and visual impacts are mitigated to avoid disturbances to other visitors and park neighbors.

Desired Visitor Experience

The visitor experience in this zone is strongly associated with the presence of developed facilities. Social interactions are supported, and the visitor encounter rate with other visitors is very high. Visitors participate in active recreation and entertainment events within a background provided by the rustic setting.

Desired Resource Conditions

Vegetation within the zone is managed to support the designated recreational activities for each site. Native vegetation is preferred, although nonnative species are used within this zone in keeping with *Management Policies 2001* (NPS 2001b). Facilities within the zone are buffered to avoid noise and visual impacts to other visitors and neighbors. Storm water leaving the zone meets district storm water codes and does not contribute to the pollution of Rock Creek or its tributaries.

Appropriate Kinds of Activities or Facilities

Activities in this zone include group picnicking, tennis, performances, golf, horseback riding, and informal sports. Facilities include the structures and land modifications that support these activities, with associated infrastructure such as parking areas and public toilets.

ADMINISTRATION/OPERATIONS ZONE

This zone is defined by structures and grounds used for park administration and operations, such as offices, maintenance shops, storage areas, holding cells, horse patrol stables, and laboratories. This zone typically is highly modified and intensively maintained.

Desired Visitor Experience

Most visitors are unaware of the facilities in this zone during their visit, and the encounter rate among visitors is low. Visitors with special needs, such as permits or first aid, are able to locate facilities easily and find them to be user friendly. Facilities in the zone provide a safe and esthetic work environment for park staff.

Desired Resource Conditions

The zone is limited to existing developed or disturbed sites in the park. Facilities in this zone result in sustainable development through the application of best management practices. The spatial extent of structures and stored materials in the zone is minimized.

While the natural environment is highly modified within the zone, pollutants or other disturbances are contained or mitigated and do not affect adjoining areas. In particular, storm water leaving the zone meets district storm water codes and does not contribute pollution to Rock Creek or its tributaries. Sites in this zone are buffered to avoid noise and visual impacts on visitors and neighbors.

Consistent with NPS policies for preservation and use of cultural resources, historic structures could be adaptively used for administration. Other cultural resources within the zone are documented and salvaged if necessary. Nonnative plants are used sparingly, if at all.

Appropriate Kinds of Activities or Facilities

Facilities support park administration and operational needs. They may include office space; police facilities such as holding cells, laboratories, and stables; storage facilities for fuel, salt, sand, stone, and equipment; vehicle maintenance areas; shops for carpentry and plumbing; staff conference sites; and employee parking.

URBAN TRANSIT ZONE (NON-NPS ROADS)

This zone includes roads that are owned and maintained by the District of Columbia that are within the boundaries of the park and parkway. Examples include Military Road, Broad Branch Road, Porter Street/Klinge Road, Calvert Street, Connecticut Avenue, Massachusetts Avenue, Q Street, P Street, M Street, Pennsylvania Avenue, and the Whitehurst Freeway/K Street. These roads provide access across the park and connections with the urban street grid.

The zone encompasses nonconforming (nonpark) uses. In most cases, the right-of-way within the zone is under the jurisdiction of the District of Columbia.

The National Park Service works with district and other agencies to maintain the zone as compatibly as possible with park values. This includes emphasizing scenic views, the historic character of road structures, and linkages between the park and local trails.

Desired Visitor Experience

The presence of bridges and cross roads reminds visitors that they are still within the city while in Rock Creek valley. Within this zone, visitors experience the sights and sounds of urban traffic, although measures are taken to minimize noise to the extent practical. The frequency of encounters among visitors within the zone is very high.

Desired Resource Conditions

Storm water runoff from the zone meets district standards before it enters Rock Creek. Bridges and roads crossing the park are compatible in design and management with the rustic and historic scene. Scenic views of the park from roads and bridges in the zone are protected and contribute positively to the character of the city.

Appropriate Kinds of Activities or Facilities

This zone primarily supports urban transportation rather than the purposes of the park. The National Park Service cooperates with other agencies to link the park to local trails for nonmotorized recreation within these corridors where practical.

FORMULATION OF ALTERNATIVES

This section describes how, in concert with public input, the National Park Service developed the four alternatives that are presented in this draft general management plan.

PUBLIC INPUT AND THE DEVELOPMENT OF ALTERNATIVES

Many aspects of the desired future condition of Rock Creek Park and the Rock Creek and Potomac Parkway are defined in the establishing legislation, park purpose and significance statements, and servicewide mandates and policies that were described earlier. Within these boundaries, the National Park Service solicited input from the public regarding the long-term goals for the park, and measures that could be implemented to achieve those goals.

The public was first invited to suggest ideas for the future of the park and parkway during scoping at the beginning of the general management planning project in June 1996 (see “Consultation and Coordination”). About 800 people responded. A large majority favored closing some of or all park roads and providing increased protection of the environment.

Based on early public comments, and within the framework established by legislation and mandates, the planning team developed four “preliminary alternative scenarios” that attempted to reflect the range of ideas proposed by the public. These approaches, which are described below, were published for public review and comment in newsletter 3 in June 1997.

Preliminary Alternative Scenario 1: The National Park Service would maintain the current management direction.

Preliminary Alternative Scenario 2: Current management would be adjusted to reduce costs, emphasize group recreational opportunities, and control traffic on existing roads.

Preliminary Alternative Scenario 3: Leisurely driving, walking, cycling, and other recreation would be emphasized by permanently closing a short section of Beach Drive north of Broad Branch Road and restricting traffic elsewhere. The scenario also called for removal of boarding stables and community gardens from the park to reduce environmental disturbance and provide more equitable public access.

Preliminary Alternative Scenario 4: The “urban wilderness” scenario called for restoring the golf course and Military Field to forest. The scenario also called for removal of boarding stables and the community gardens and permanently closing four sections of Beach Drive to automobiles.

About 1,000 people responded to newsletter 3. Public comments overwhelmingly favored retaining the kinds of experiences and opportunities currently provided by the park and parkway. Removal of established recreational facilities, including community gardens, horse stables, and the golf course, was almost universally opposed. Respondents generally supported improving interpretation and education opportunities in the park. Public comments on the traffic management approaches proposed in newsletter 3 fell into three general responses, including

maintaining the current traffic pattern

reducing current traffic volumes and speeds in the park on the existing road system

closing selected park roads and improving control of traffic on open segments

The great majority of respondents in the third category indicated that they were not satisfied with either preliminary alternative scenarios 3 or 4. Instead, they supported extending the current weekend road closures to full time. Consequently, the National Park Service included this position as part of Alternative C in this draft general management plan.

A summary of comments was provided in newsletter 4. Based on these comments and NPS management concerns, the National Park Service developed the three decision points described earlier in the section entitled "Decision Points." Other actions that were suggested by the public, and the justifications for not incorporating them into any of the alternatives, are described in the section "Alternatives or Actions Eliminated from Further Study."

Based on the public comments and decision points, the four preliminary alternative scenarios were modified into three of the alternatives that are evaluated in this draft general management plan. The alternatives are:

Alternative A: Improved Management of Established Park Uses. Alternative A would modify current management to improve visitor safety, better control traffic volumes and speeds through the park, enhance interpretation and education opportunities, and improve the protection of park resources. It generally would retain the current scope of visitor uses.

Alternative B: Continue Current Management/No Action. Alternative B would continue the current management pattern into the future. It represents the "no action alternative" required by the Council on Environmental Quality (1978) guidelines for implementing the National Environmental Policy Act (NEPA).

Alternative C: Nonmotorized Recreation Emphasis. Alternative C is based on comments by members of the public who favor promotion of nonmotorized recreation. Alternative C would eliminate automobile through-traffic in northern portions of the park and control through-traffic in the southern portion of the park and on the parkway. Non-traffic-management proposals for Alternative C would be the same as in Alternative A.

In January 2001, the National Park Service received a letter from Mr. Anthony A. Williams, the mayor of Washington, D.C. The letter encouraged the National Park Service to consider another alternative, which would implement "weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush-hour periods." The goals stated in the letter would include "reducing automobile traffic in the most sensitive portions of Rock Creek Park, while minimizing any impact on surrounding neighborhoods and commuters." A copy of the letter is provided in appendix D. The alternative developed to address this letter is:

Alternative D: Mid-Weekday Recreation Enhancement. On weekdays, Alternative D would close three segments of Beach Drive to motorized traffic between 9:30 A.M. and 3:30 P.M. This would not change cross-park traffic patterns, but would provide a nonmo-

torized setting for recreation through much of the northern portion of the park during non-rush-hour periods. It would also maintain driving for pleasure along the length of Beach Drive as an allowed activity during such popular times as weekday summer evenings. This alternative would include all of Alternative A's non-traffic-management actions, as well as most of the traffic-calming measures of that alternative.

These four alternatives embody the range of what the public and the National Park Service want to see accomplished with regard to visitor experience, natural resource conditions, and cultural resource conditions. They are based on outcomes, or actual conditions on the ground, as expressed by the management prescriptions.

The configurations for future park conditions and management within each alternative were developed by placing the management prescriptions described previously on the map. None of the alternatives contains all of the management prescriptions. Instead, each consists only of those prescriptions that achieve the goals for the park under that alternative.

In some cases, all four alternatives apply the same management prescription to the same area. For example, Fort DeRussy and the Godey Lime Kilns are within the Cultural Resource Zone in all four alternatives. This occurs because this appears to be the most appropriate way to manage these facilities, regardless of the alternative selected for the park.

MITIGATION

Mitigation is a key concept in resource management planning. It provides a means for accommodating visitor interactions and park operations with natural and cultural resources and their tolerances for disturbances.

Mitigation and best management practices are regularly used to ensure that the park's natural and cultural resources are protected and preserved for future visitors without impairment. In the legislation that created the National Park Service, Congress charged it with managing lands under its stewardship "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations"(NPS Organic Act, 16 USC 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of park resources.

Mitigation was included throughout the formulation of the alternatives included in this general management plan. A few examples include considering different options for the park's administrative offices, identifying approaches to reduce roadkill of terrestrial wildlife, and incorporating best management practices to reduce non-point discharges of animal wastes from stable areas.

THE PREFERRED ALTERNATIVE

The preferred alternative is the agency-preferred course of action at the time the public review document is released. Guidelines stipulate that unless the decision-maker has no preference, the preferred alternative must be identified in the draft environmental impact statement so that agencies and the public can understand the lead agency's orientation. All final environmental impact statements must identify the preferred alternative.

All of the alternatives would preserve the important historic, cultural, and natural resources in Rock Creek Park and along the Rock Creek and Potomac Parkway for future generations. As funds allowed under each alternative, activities would continue in keeping with NPS policies and federal laws and regulations. These would include such actions as surveying native species and archeological sites, controlling invasive species, restoring habitats, and improving water quality.

The largest differences among the alternatives are associated with the three decision points, including managing traffic, providing visitor information and interpretive services, and meeting administration and operational needs. Within these broad categories are such differences as the most appropriate use of some cultural resources, and the need to reduce risk to wildlife from collisions with vehicles (roadkill).

The most difficult decision to be made in the general management planning process is the management of traffic on the park road system. Park roads are recognized historic resources and the primary means for most visitors to experience the park. They are also used as part of the city's traffic grid. Displacement of motorized traffic from park roads, particularly during rush hours, could increase traffic on arterials and neighborhood roads outside of the park. It could also encourage the use of mass transit, and/or promote commuting by bicycle or on foot.

The councils of the District of Columbia and Montgomery County have passed formal resolutions emphasizing the importance of Beach Drive and the Rock Creek and Potomac Parkway to the local and regional transportation system. The councils have urged that these corridors remain open with no new restrictions to motor vehicles because of their concerns for potential adverse effects on the heavily burdened regional street grid. This position is supported by the Maryland Department of Transportation, the District of Columbia Department of Public Works, several neighborhood organizations, and many individuals who commented during scoping.

This traffic management approach is included in Alternative B, Continue Current Management/No Action.

Alternative D, Mid-Weekday Recreation Enhancement, would comply with the intent of these resolutions. While it would include traffic-calming measures and mid-day closures, Alternative D would keep park roads and the parkway open without restrictions (such as requiring at least two people per vehicle, called HOV-2) during rush hours.

Traffic modeling indicates that regardless of park management actions, commuter traffic will increase throughout the region. By the year 2020 with Alternative B, commuter traffic along some portions of Beach Drive would routinely include near-gridlock conditions, with average travel speeds only a third of free-flow speeds, vehicular backups, and long delays. This situation in Rock Creek valley would increase risks to visitors and disrupt their appreciation of the park.

In addition to providing inadequate traffic management, Alternative B presents several other environmental and park management concerns.

Increasing pedestrian and bicycling use would not be served by maintaining the paved recreational trail system in its existing, inadequate condition.

The park would continue to have inadequate capability to provide environmental education to students and basic orientation and interpretation services to other visitors.

Future administration and operational efficiency would be impaired by the inadequate, existing support facilities.

Continued use of the Peirce-Klingler Mansion and the Lodge House for expanding administrative purposes could further affect these historic structures.

Consequently, the National Park Service does not consider Alternative B to be satisfactory.

Differences in environmental consequences of the three action alternatives are not great, and each action alternative is environmentally acceptable. None of the action alternatives would likely cause substantial adverse impacts to environmental or cultural resources.

Guidelines for preparing environmental impact statements (CEQ 1978; NPS 2001a) require that the preferred alternative be identified in the draft environmental impact statement unless the decision-maker has no preference. As shown in table 3, each of the action alternatives has advantages. The National Park Service would find any of these alternatives acceptable as the basic guidance approach for managing Rock Creek Park and the Rock Creek and Potomac Parkway. Therefore, the National Park Service does not currently have a preferred alternative. Public input on this document will help the National Park Service select the preferred alternative in the final general management plan.

TABLE 3: ADVANTAGES OF THE ACTION ALTERNATIVES

Advantage	Alternative A	Alternative C	Alternative D
Reduces rush-hour motorized traffic volumes in the park	✓	✓	
Reduces non-rush-hour motorized traffic volumes in the park		✓	✓
Slows the speeds of traffic through the park	✓	✓	✓
Improves conditions for nonmotorized recreation and transportation	✓	✓	✓
Promotes recreational and commuter cycling and walking in the park and the region	✓	✓	✓
Supports regional efforts to discourage single-occupancy-vehicle use and promote high-occupancy-vehicle use during peak-traffic hours	✓	✓	
Continues the tradition of motor touring on the park road system, which would help preserve the historic integrity of the park design	✓		✓
Improves the protection of the park's natural and cultural resources	✓	✓	✓
Enhances the enjoyment of natural sounds and setting		✓	✓
Increases the safety of cyclists and pedestrians	✓	✓	✓
Improves opportunities for recreation	✓	✓	✓

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

This section identifies the alternative that will best promote the national environmental policy expressed in the National Environmental Policy Act. This alternative causes the least damage to the biological and physical environment, and best protects, preserves, and enhances historic, cultural, and natural resources.

Section 101(b) of the National Environmental Policy Act identifies the following policies to help determine the environmentally preferred alternative. The act directs that federal plans should:

fulfill the responsibilities of each generation as trustee of the environment for succeeding generations

ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings

attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences

preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice

achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities

enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

Alternatives A, C, and D all meet these goals more effectively than Alternative B, Continue Current Management/No Action. Each of the action alternatives would reduce traffic through the park, improve the protection of the park's natural resources, and make better use of the park's cultural resources.

Of the three action alternatives, Alternative C is environmentally preferred by a close margin.

By permanently closing portions of Beach Drive to motorized vehicles, Alternative C would promote the safety and health of recreational users and nonmotorized commuters. The reduction of traffic noise and exhaust fumes on these segments would provide visitors with more "esthetically . . . pleasing surroundings."

Alternative C would attain "the widest range of beneficial uses of the environment" by providing the greatest opportunities for nonmotorized recreational use while also allowing parts of the park road system to be used for motor touring and urban transportation.

Alternative C would support the greatest "diversity and variety of individual choice" in the range of activities available to visitors on a daily basis. By providing the greatest reduction in roadkill, it would be most effective in preserving natural aspects of the park.

By closing road segments, Alternative C would best acknowledge Rock Creek Park as a unique amenity that enhances the standard of living in the Washington, D.C. area and would “balance . . . population and resource use” by establishing the park as a quiet place within this major urban center.

By encouraging the use of nonmotorized methods of travel, both for recreation and commuting, Alternative C would reduce the use of depletable petroleum resources.

However, Alternative C would not preserve historic use of Beach Drive for scenic driving.

ALTERNATIVE A: IMPROVED MANAGEMENT OF ESTABLISHED PARK USES

This section describes Alternative A, including the concept that defines the alternative, where the management prescriptions that would be included in this alternative would be applied, and the approximate costs.

CONCEPT

The goals of Alternative A would be to

- preserve traditional visitor experiences and activities
- enhance natural, cultural, and scenic values in the park
- assert more control over nonrecreational use of park roads and improve visitor safety
- optimize the use of structures for purposes such as interpretation, visitor contact, and park administration

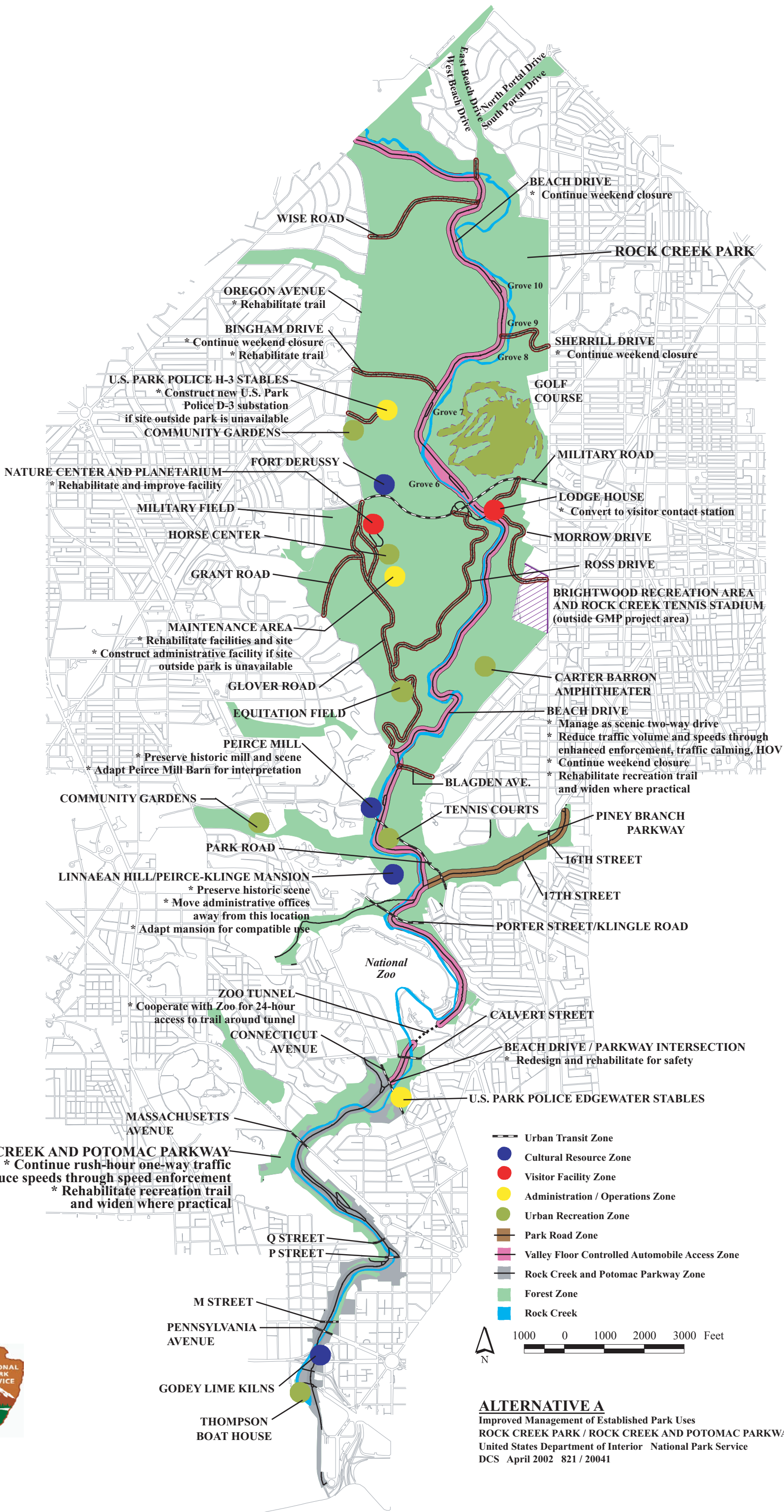
The existing park roadway system would be retained and nonrecreational through-traffic would be accommodated. However, to improve visitor safety and the quality of the visitor's experience, traffic would be managed to reduce levels compared to levels that would occur if current management were continued (Alternative B).

Weekend and holiday road-segment closures would be continued to promote recreational bicycling and other nonmotorized recreation in the valley. Weekday bicycle commuters choosing to ride through the park would continue to share the roads with automobile traffic, but at reduced traffic levels.

Better use of the park's cultural resources would be made in Alternative A. This would include moving some park functions out of historic buildings and converting those structures to visitor contact, education, and interpretation. Improvements to existing facilities would also be made. Park administrative and police functions that currently occur in historic buildings would be moved to nearby commercial space outside of the park, or to new facilities constructed within already-developed areas of the park.

Alternative A would improve the protection of the park's natural resources. For example, poorly designed sections of foot and horse trails would be rerouted, and the abandoned trail sections would be restored to natural conditions. During these activities, each trail site would be evaluated to determine effects on safety and on cultural and natural resource values. Improvements would be designed to maximize the former while protecting the latter. To improve protection of terrestrial wildlife, the National Park Service would identify the most frequent locations of roadkill and would implement measures, possibly including traffic controls or protected crossways (culverts), to reduce mortality to wildlife from collisions with vehicles.

Measures that could be taken to achieve the Alternative A goals are embodied in the management prescriptions presented below. These are shown on the Alternative A map and summarized in table 4.



ALTERNATIVE A
Improved Management of Established Park Uses
ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY
United States Department of Interior National Park Service
DCS April 2002 821 / 20041

ALTERNATIVES

TABLE 4: MANAGEMENT PRESCRIPTION ZONING UNDER EACH ALTERNATIVE

Management Prescription	Acres/Percent of Total Park Area			
	Alternative A Improved Management	Alternative B Continue Past Management	Alternative C Nonmotorized Emphasis	Alternative D Mid-Weekday Recreation
Forest Zone	2,331 acres/79%	2,331 acres/79%	2,331 acres/79%	2,331 acres/79%
Cultural Resource Zone	6 acres/0.2%	2 acres/<0.1%	6 acres/0.2%	6 acres/0.2%
Valley Floor Automobile Access Zone	--	184 acres/6%	--	--
Valley Floor Controlled Automobile Access Zone	184 acres/6%	--	134 acres/5%	134 acres/5%
Valley Floor Nonmotorized Recreation Zone	--	--	50 acres/2%	--
Valley Floor Mid-Weekday Recreation Zone	--	--	--	50 acres/2%
Rock Creek and Potomac Parkway Zone	161 acres/5%	161 acres/5%	161 acres/5%	161 acres/5%
Park Road Zone	74 acres/2%	74 acres/2%	74 acres/2%	74 acres/2%
Visitor Facility Zone	1 acre/<0.1%	3 acres/0.1%	1 acre/<0.1%	1 acre/<0.1%
Urban Recreation Zone (includes Brightwood area)	200 acres/7%	200 acres/7%	200 acres/7%	200 acres/7%
Administration/Operations Zone	5 acres/0.1%	7 acres/0.2%	5 acres/0.1%	5 acres/0.1%
Urban Transit Zone	8 acres/0.2%	8 acres/0.2%	8 acres/0.2%	8 acres/0.2%

MANAGEMENT PRESCRIPTIONS

Management prescription zoning under Alternative A is shown in the Alternative A map. The management prescriptions were described previously in this draft general management plan.

Forest Zone

The Forest Zone would be applied to 79 percent of the park (2,331 acres). There would be no major change in the management of forested areas of the park from current management practices.

Existing horse and foot trails would be maintained. The trail system would be reevaluated (NPS 1993b) and, based on the results, poorly designed trail sections would be rerouted and abandoned trail sections would be restored to natural conditions. As discussed previously, bicycles would not be allowed off of roads, parking areas, and designated paved trails. An estimated 2 miles of paved trail parallel to Oregon Avenue would be rehabilitated under Alternative A to improve the trail surface.

Military Field and other, smaller meadows in the park would be managed as part of the Forest Zone to promote the diversity of native plants and habitats and to preserve the scenic variety in

the park. However, rather than allowing these areas to revert to forest, they would be mowed periodically to maintain them as meadows with early successional native plants and open space for nonorganized recreation. Treatment of the meadow areas would be designed to ensure protection of archeological resources. This management approach is consistent with current management of park meadows.

Cultural Resource Zone

Alternative A would increase the area of the park managed primarily for protection of park historic resources to about 6 acres (0.2 percent of the park). The types of actions that could be implemented at some of the historic sites in the park are identified below.

Peirce Mill Complex. The Peirce Mill complex would be the primary location for interpreting the history of milling and historic land use in the Rock Creek area. Cultural resource management would include a historically accurate representation of a typical mill complex in the region. Visitor understanding and appreciation of the mill complex would be emphasized. Measures that could be taken to achieve this condition include the following.

The mill would be managed consistent with the recommendations of a historic structure report, currently nearing completion. The mill would provide demonstrations of the historic milling industry in the valley.

The Peirce Mill Barn would be rehabilitated and converted for use as an interpretive and education facility to support visitor programs at the mill.

The landscape of the complex would be rehabilitated to retain the historic character while allowing continued use.

Linnaean Hill Building Complex. The Linnaean Hill building complex and its associated designed historic landscape would be rehabilitated. Park administrative offices currently housed in the Peirce-Klingel Mansion would be relocated to a another facility, which is described in the Administration/Operations Zone, below.

The exterior of the historic buildings would be accorded appropriate preservation treatment to protect their documented resource values.

The building interiors would be adaptively used for activities compatible with park resource values and the maintenance of the historic structures.

The landscape of the complex would be rehabilitated to retain the historic character while accommodating continued park use.

Other Cultural Features. Other cultural features, including but not limited to Fort DeRussy, the Godey Lime Kiln, and the Miller cabin, would be maintained according to accepted NPS practices. Interpretive enhancements would be guided by future interpretive plans.

Valley Floor Controlled Automobile Access Zone

The Valley Floor Controlled Automobile Access Zone (184 acres, 6 percent of the park) would continue to be managed to preserve the valley's characteristic mix of forest, grassy openings, and floodplain terraces interspersed with rustic facilities. Types of actions that could be taken within this zone include the following.

Beach Drive. The tradition of auto touring the length of Beach Drive would be maintained. However, the road would be managed primarily as a scenic drive, rather than as a commuter route, encouraging slower speeds and fewer nonrecreational vehicles. The National Park Service would work with surrounding jurisdictions to reduce the volume of nonrecreational traffic through the park and to help mitigate traffic impacts on adjoining neighborhoods.

The following types of measures could be implemented to reduce traffic speeds and the volume of nonrecreational traffic on Beach Drive.

Impose high-occupancy vehicle (HOV) restrictions during rush-hours on segments of Beach Drive that would not interfere with cross-park traffic. HOV restrictions are consistent with regional transportation policies aimed at reducing reliance on single-occupant vehicles, reducing traffic congestion, improving air quality, and encouraging responsible commuting.

Improve speed limit enforcement on Beach Drive. This could include new technologies such as automated photography to more effectively ticket violators.

Implement traffic-calming measures to slow vehicle speeds. Such measures might include rumble strips, speed humps, and intersection modifications such as all-way stops, traffic circles, reduced turning radii, and raised intersections.

Adjustments over time may be required to determine the best methods of controlling nonrecreational traffic volume and vehicle speeds. To support modeling and environmental assessment in the "Environmental Consequences" section, the following conditions were used as a reasonable scenario to characterize management of traffic on Beach Drive under Alternative A.

Traffic-calming measures and improved enforcement would hold traffic speeds to the posted speed limit of 25 miles per hour.

Two-way traffic would be maintained.

HOV requirements for a minimum of two people per vehicle (HOV-2) would be implemented directionally, in the southbound lane during morning rush-hours and in the northbound lane in the evening.

HOV-2 would be implemented in the following two sections of Beach Drive.

Joyce Road south to Broad Branch Road – this would reduce traffic volume in the gorge section of the park and discourage commuter single-occupant vehicles from entering Beach Drive in the northern portion of the park.

Porter Street / Klinge Road south to the parkway intersection near Connecticut Avenue – this would reduce through-traffic volume south of Broad Branch Road, while allowing for cross-park traffic between Broad Branch Road and Porter Street / Klinge Road.

Current weekend and holiday closures would continue for sections of Beach Drive (as well as Sherrill and Bingham Drives, which are in the Park Road Zone). The goal would be to provide opportunities for nonmotorized recreation in the corridor without traffic interference on weekends, when demand for nonmotorized recreation is highest. Ross Drive would remain open as an alternate route for motorists.

Paved Recreational Trail. An estimated 5.3 miles of trail in the Valley Floor Controlled Automobile Access Zone would be upgraded under Alternative A. The existing paved recreational trail sections paralleling Beach Drive would be rehabilitated for visitor safety. This could include widening and/or realigning some sections. The park would work with the National Zoological Park to keep the tunnel bypass trail open 24 hours a day.

Reduction of Roadkill. Within this zone, the National Park Service would improve monitoring of the frequencies and locations of animals killed or injured by collisions with vehicles. The mapping of roadkill sites would indicate locations where methods to reduce road mortality would be most effective. Techniques that could be implemented to reduce roadkill under Alternative A, either singly or in combination, may include public education about vehicle hazards to wildlife; warning signs, road striping, and speed humps to reduce speeds and enhance driver alertness; and strategically placed underpasses (culverts) for small animals such as reptiles and amphibians.

Rock Creek and Potomac Parkway Zone

The parkway corridor, which covers 161 acres (5 percent of the park) would continue to be managed for a landscape mix of fields and forest. This would provide both a pleasant esthetic experience, and visual and sound buffers.

The paved recreational trail paralleling the parkway would be improved and realigned in segments. The goal would be to provide a safe pathway separated from the roadway. An estimated 2 miles of trails would be upgraded within the Rock Creek and Potomac Parkway Zone.

Rush-hour lane reversals (one-way traffic) would continue on the parkway. Traffic modeling indicates that discontinuing the practice would lead to increased traffic on Beach Drive. An automated system for accomplishing lane reversals may be implemented.

The intersection of the parkway with Beach Drive near Connecticut Avenue would be improved to increase safety for pedestrians, cyclists, and motorists. The intersection redesign would not increase traffic capacity or encourage increased speeds through the intersection. Improvements may require reconfiguration of existing roads, potentially including closure of Cathedral Avenue access.

Speed limit enforcement on the parkway would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. This could include the use of automated photographic equipment. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Park Road Zone

Other park roads (74 acres, 2 percent of the park) would continue to be managed to provide vehicular routes into and through the park. However, park roads would not be widened to increase capacity for nonrecreational traffic. The management emphasis in Alternative A would be on improving linkages between the park and the surrounding neighborhoods.

Improvements could include rehabilitating or constructing recreational trails adjacent to roads to minimize pedestrian and vehicular conflicts, and incorporating better directional and information signs for visitor orientation. About 0.5 miles of trail along Bingham Drive would be upgraded within the Park Road Zone. Up to a mile of new trail also may be provided. A feasibility study would be conducted to determine the optimal locations for new pedestrian trails.

Bingham Drive and Sherrill Drive would continue to be closed on weekends and holidays for nonmotorized recreation. Following snow storms, several roads in this zone could be closed to provide winter recreational opportunities such as sledding and skiing. These could include, but may not be limited to, Glover Road, Ross Drive, Bingham Drive, Sherrill Drive, and Morrow Drive.

Speed limit enforcement on park roads would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Visitor Facility Zone

Alternative A would improve park information, interpretation, and education services. Under this alternative, the Visitor Facility Zone would occupy about 1 acre (less than 0.1 percent of the park). Potential actions that could be implemented to improve visitor services include converting the Lodge House to a visitor contact station and upgrading the nature center and planetarium.

Lodge House. The Lodge House is an attractive, rustic building in a scenic setting in Rock Creek valley just south of the intersection of Beach Drive and Military Road. Under Alternative A, this building would be converted from a U.S. Park Police District 3 (D-3) substation to a visitor contact station to provide park orientation, information, and interpretation.

Visitors could obtain general park information, park brochures and other publications, directions, event schedules, and permits at the building.

The building would be staffed by an interpretive ranger during high visitation periods. The site also would provide information and orientation when staff were not present.

U.S. Park Police officers would be stationed at the Lodge House to provide a police presence and visibility at this popular location in the park.

The exterior of the structure would be rehabilitated to preserve its documented cultural resource values. Its interior would be converted for visitor contact. Landscaping in front of the building would be rehabilitated to better reflect its rustic and historic character and to better serve visitors. However, the area occupied by the building, its parking lot, and its landscaping, would not be expanded beyond the current area of disturbance.

Rock Creek Nature Center and Planetarium. The nature center area would continue to serve as the park's primary facility for environmental education and natural history interpretation. The building would first be evaluated for inclusion on the National Register of Historic Places, and then rehabilitated and/or expanded to improve the effectiveness of programs for the public. Improvements may include additional classroom space, a covered group shelter for bad weather, and staff offices. The planetarium would be upgraded, including increased seating capacity. Rehabilitation of the building would be esthetically compatible with the natural setting. Expansion of the structure would be within the existing grounds of the center.

Urban Recreation Zone

Most facilities and activities in the Urban Recreation Zone (200 acres, 7 percent of the park) would be retained at their current levels. These include the community gardens off Oregon Avenue and at Melvin Hazen Park, the Rock Creek Horse Center and equitation field, the Rock Creek Golf Course, the clay tennis courts near Peirce Mill, and reserve picnic areas. The Brightwood Recreation Area and Rock Creek Tennis Stadium, which are outside of the area covered by this general management plan, would continue to be managed as specified in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park, Washington, D.C.* (NPS 1995b).

The 4,200-seat Carter Barron Amphitheater, which also is not included in this general management plan, is in the early stages of a \$1.5 million program of repair and rehabilitation. This outdoor theater was built to celebrate the Washington, D.C. sesquicentennial in 1951 and was then turned over to the National Park Service. Performances are held from May through September and include a free Shakespeare festival. The amphitheater renovation will include repairing or replacing the concrete slab and drainage system, upgrading or replacing the electrical system, replacing the seats, and renovating the dressing rooms.

Construction of the amphitheater upgrade currently is scheduled to occur in 2002 and 2003. The area occupied by the amphitheater, its parking lot, and its landscaping, will not be expanded beyond the current area of disturbance. Designs will require the use of best management practices to minimize environmental effects, such as air emissions and soil erosion. The use of hardened areas such as parking lots in the immediate vicinity for construction staging will further reduce the effects of construction.

Administration/Operations Zone

Alternative A would address the problems associated with the current location of park administrative offices in the Peirce-Klingbe Mansion and District 3 (D-3) U.S. Park Police operations at the Lodge House. Possible actions for remedying these conditions are described below. In addition, Alternative A would improve the use of the park maintenance area and implement measures to prevent water pollution from runoff at Edgewater.

The area within the Administration/Operations Zone within Alternative A would vary, based on the site selected for the park administrative offices. However, with the configuration shown in the Alternative A map, this zone would occupy approximately 5 acres (0.1 percent of the park).

Park Administration Offices. Park administrative offices currently are located in the Peirce-Klingbecker Mansion. Disadvantages of this arrangement include the following.

The existing buildings are not large enough to accommodate a centralized administrative facility. Substantial alterations to the historic structure would be required to meet future needs of the administrative staff.

The current use precludes the ability to employ this historic resource for interpretation and education of the public.

Under Alternative A, administrative functions would be relocated to another facility. The goal would be to provide adequate, safe, energy-efficient, and cost-effective office and work space in a manner that minimizes impacts on natural and cultural resources. All park administrative staff would be consolidated into a central office, which would create a more efficient, cohesive working environment.

Section 9.1 of *Management Policies 2001* (NPS 2001b) states that:

the Service will not develop, or re-develop, a facility within a park until a determination has been made that . . . it would not be practicable for the facility to be developed, or the service provided, outside the park.

Consistent with this policy, the preferred approach would be to lease or purchase office space outside of, but near the park. This option is made feasible by the location of the park in the Washington, D.C. metropolitan area, which offers a substantial amount of nearby commercial office space.

A less desirable option would involve constructing a new office facility at the park maintenance area. This would not disturb any additional land within the park and would be visually unobtrusive to visitors. However, it would increase development within the park and could result in conflicts between maintenance operations and administrative office functions associated with noise and site constraints. If new facilities were constructed in this area, existing buildings and parking areas might be redesigned to minimize increases in impervious surfaces and disturbance.

U.S. Park Police Substation. The U.S. Park Police station for District 3 (D-3) in the Lodge House currently is overcrowded. There is no opportunity for expanding the existing building because of site limitations and the historic character of the building. Alternative A would move the D-3 substation out of the Lodge House and into a new facility that would be designed to meet police functional needs and improve operational efficiency.

The preferred option would be to relocate these functions into commercial facilities outside of the park in keeping with Section 9.1 of *Management Policies 2001* (NPS 2001b). The National Park Service would work with the General Services Administration to contract for a long-term lease or other arrangement with a private firm that would construct or adapt a facility to U.S. Park Police specifications. However, this option would depend on the availability of adequate commercial

properties at the time of implementation. The outside-the-park site would have to be within a reasonable response distance from Rock Creek Park and other sites protected by the District 3 staff. The U.S. Park Police would determine acceptable areas of northwest Washington for accessing the park and other sites, and a determination would be made on whether suitable properties were available at an acceptable price.

In the event that a suitable commercial facility was not available, a second option would be to construct a new facility within the existing disturbed area near the stables at H-3. The H-3 site would consolidate U.S. Park Police administrative and horse patrol functions. Construction of a new facility at the H-3 area would occur only if assessments established that it clearly was impractical to locate the D-3 structure outside of the park. If new facilities were constructed in this area, existing buildings and parking areas might be redesigned to minimize increases in impervious surfaces and disturbance.

For either option, the existing stables at H-3 would remain, as would the nearby community gardens.

Park Maintenance Area. As described above, Alternative A could involve constructing a new building to house park administrative offices at the maintenance area. Such new development would occur only if suitable commercial office space could not be secured outside of the park and would be restricted to the existing disturbed land at the maintenance area.

Regardless of whether administrative offices were constructed at the site, the maintenance area would be rehabilitated to correct problems with equipment and materials storage, parking, and staff office space. The site would be reorganized and improved within the existing developed area. Best management practices (BMPs) would be developed and implemented to reduce the risk of environmental contamination from operations and to correct drainage problems at the site.

Edgewater. The U.S. Park Police regional stables and training arena at Edgewater would remain unchanged in its current facilities. However, BMPs would be implemented to reduce the potential for polluted runoff from the site.

Urban Transit Zone

Existing rights-of-way in the park for non-NPS roads would be classified under the Urban Transit Zone (8 acres, 0.2 percent of the park). The National Park Service would continue to work with the district government to provide linkages to the surrounding city and to protect the historic character of road structures and scenic views in this zone.

COSTS

Cost estimates for implementing Alternative A, including both one-time capital costs and annual costs for operations and maintenance, are presented in table 5. Capital costs would total almost \$13.4 million.

More than 60 percent of the capital costs (\$8.4 million) would be used to rehabilitate and improve the Rock Creek Nature Center and Planetarium, convert the Lodge House to a visitor contact station, and restore the historic Peirce Mill area.

Approximately \$2 million of the capital costs (15 percent) would be required to bring existing park features up to existing NPS policy and regulatory requirements.

Another \$2 million in capital costs would fund proposed trail improvements.

About \$1 million would pay for safety improvements at the intersection of the parkway and Beach Drive, and for traffic-calming devices on Beach Drive.

Annual costs would be almost \$8.2 million, about \$875,000 more than the annual costs for Alternative B.

The largest part of the new costs (43 percent) would be used to lease commercial space outside of the park for the new D-3 substation.

Almost a quarter of the increased operations costs would fund eight new full-time-equivalent staff positions, including two staff positions for HOV and speed enforcement, and six positions to improve visitor contact, education, and interpretation, primarily at the Lodge House, Peirce Mill complex, and nature center and planetarium.

About 15 percent would be used to lease administrative space for park headquarters outside of the park.

Ten percent would be used annually to lease mobile photo speed detection devices.

TABLE 5: ESTIMATED COSTS OF IMPLEMENTING THE ALTERNATIVES ^{a/}

	Alternative A		Alternative B		Alternative C		Alternative D	
	Annual Costs	Capital Costs	Annual Costs	Capital Costs	Annual Costs	Capital Costs	Annual Costs	Capital Costs
Current annual funds allocated for park and parkway operations	\$6,250,000	--	\$6,250,000	--	\$6,250,000	--	\$6,250,000	--
Funding to meet NPS policy and regulatory requirements								
Natural resource management	\$350,000	--	\$350,000	--	\$350,000	--	\$350,000	--
Cultural resource management	\$200,000	--	\$200,000	--	\$200,000	--	\$200,000	--
Visitor services	\$350,000	--	\$350,000	--	\$350,000	--	\$350,000	--
Special use management	\$50,000	--	\$50,000	--	\$50,000	--	\$50,000	--
Partnership/cooperative activities	\$100,000	--	\$100,000	--	\$100,000	--	\$100,000	--
Bring existing facilities up to standards								
Peirce-Klingling Mansion	--	\$940,000	--	\$940,000	--	\$940,000	--	\$940,000
Maintenance area	--	\$680,000	--	\$680,000	--	\$680,000	--	\$680,000
Miller cabin	--	\$30,000	--	\$30,000	--	\$30,000	--	\$30,000
H-3 U.S. Park Police stables	--	\$210,000	--	\$210,000	--	\$210,000	--	\$210,000
Construct 3,500 feet of new foot/horse trails and restore 3,000 feet of former trail	--	\$60,000	--	\$60,000	--	\$60,000	--	\$60,000
Subtotal	\$7,300,000	\$1,920,000	\$7,300,000	\$1,920,000	\$7,300,000	\$1,920,000	\$7,300,000	\$1,920,000
Proposed facility changes								
Rehabilitate and improve Rock Creek Nature Center and Planetarium	--	\$5,400,000	--	--	--	\$5,400,000	--	\$5,400,000
Convert Lodge House to visitor contact station	--	\$1,300,000	--	--	--	\$1,300,000	--	\$1,300,000
Restore historic Peirce Mill area	--	\$1,730,000	--	--	--	\$1,730,000	--	\$1,730,000
Proposal trail improvements	--	\$2,050,000	--	--	--	\$2,050,000	--	\$2,050,000
Road system changes								
Install six permanent vehicle gates	--	--	--	--	--	\$54,000	--	\$54,000
Construct/install traffic-calming devices on Beach Drive	--	\$220,000	--	--	--	\$220,000	--	\$220,000
Redesign/reconstruct intersection of parkway and Beach Drive	--	\$755,000	--	--	--	\$755,000	--	\$755,000

TABLE 5: ESTIMATED COSTS OF IMPLEMENTING THE ALTERNATIVES (Continued)

	Alternative A		Alternative B		Alternative C		Alternative D	
	Annual Costs	Capital Costs	Annual Costs	Capital Costs	Annual Costs	Capital Costs	Annual Costs	Capital Costs
Additional annual operational costs								
Lease headquarters office space ^{b/}	\$135,000	--	--	--	\$135,000	--	\$135,000	--
Maintain paved trails	\$1,000	--	--	--	\$1,000	--	\$1,000	--
Maintain traffic-calming devices	\$1,000	--	--	--	\$1,000	--	\$1,000	--
Lease two mobile photo speed detection devices	\$85,000	--	--	--	\$85,000	--	\$85,000	--
Enforce HOV/speed (two full-time staff equivalents at GS-7 rate)	\$70,000	--	--	--	\$70,000	--	\$70,000	--
Mid-day closures of Beach Drive	--	--	--	--	--	--	\$30,000	--
Staff Lodge House, Peirce Mill complex, and nature center (six full-time staff equivalents at GS-7 rate)	\$205,000	--	--	--	\$205,000	--	\$205,000	--
Lease new D-3 substation space ^{c/}	\$381,000	--	--	--	\$381,000	--	\$381,000	--
Subtotal	\$878,000	\$11,455,000			\$878,000	\$11,509,000	\$908,000	\$11,509,000
Total	\$8,178,000	\$13,375,000	\$7,300,000	\$1,920,000	\$8,178,000	\$13,429,000	\$8,208,000	\$13,429,000

a/ All costs are in year 2001 dollars.

b/ Costs include 4,500 square feet of office space at a cost of \$30 per square foot per year.

c/ Costs include 10,000 square feet of office space at a cost of \$30 per square foot per year, plus 45 vehicle parking spaces (for cruisers, emergency vehicles, and visitor parking) at \$1,800 annually per vehicle space.

ALTERNATIVE B: CONTINUE CURRENT MANAGEMENT/NO ACTION

This section describes Alternative B, including the concept that defines the alternative, where the management prescriptions that would be included in this alternative would be applied, and the approximate costs.

CONCEPT

The goals of Alternative B would be to

- preserve traditional visitor experiences and activities

- maintain the park's natural, cultural, and scenic values in conformance with the provisions outlined in "Servicewide Mandates and Policies"

Rock Creek Park and the Rock Creek and Potomac Parkway would be maintained as they have evolved thus far. There would not be any major changes in resources management, visitor programs, or facilities beyond regular maintenance. The current park road system would be retained and existing management would continue.

Measures that could be taken to achieve the Alternative B goals are embodied in the management prescriptions presented below. These are shown on the Alternative B map and summarized in table 4.

MANAGEMENT PRESCRIPTIONS

Management prescription zoning under Alternative B is shown in the Alternative B map. The management prescriptions were described previously.

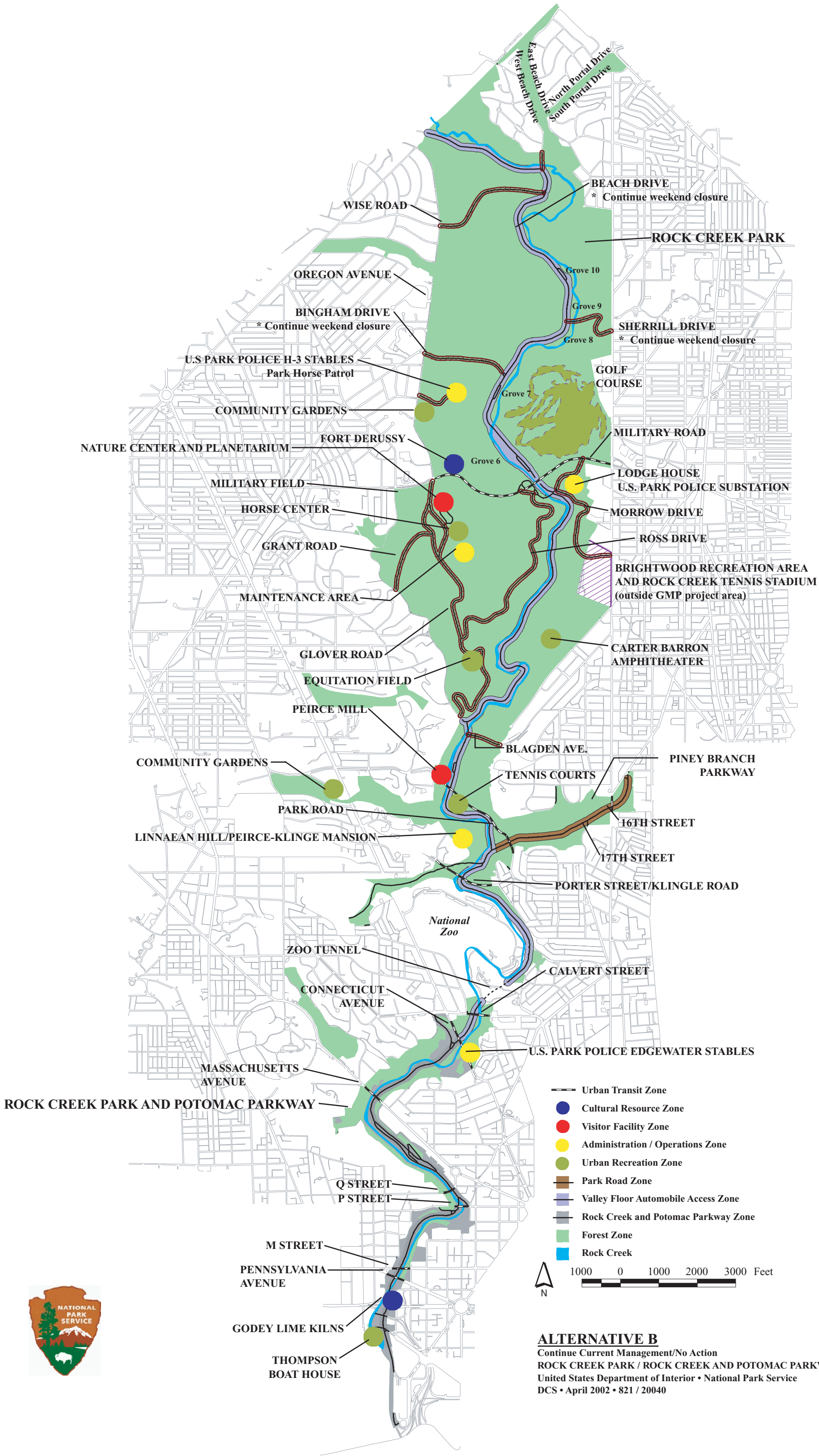
Forest Zone

As in all alternatives, the Forest Zone would be applied to 79 percent of the park (2,331 acres). There would be no major change in the management of forested areas of the park from current management practices. Existing horse and foot trails would be retained and deteriorated segments would be rehabilitated to the extent practical. During these activities, each trail site would be evaluated to determine effects on safety and on cultural and natural resource values. Improvements would be designed to maximize the former while protecting the latter.

Bicycles would continue to be limited to roads, parking areas, and designated paved trails. Military Field and other meadows would be managed in a manner similar to that described in Alternative A, including protection of archeological resources.

Cultural Resource Zone

Under Alternative B, about 2 acres (less than 0.1 percent of the park) would continue to be managed primarily for cultural resource protection. Resources such as Fort DeRussy and the Godey Lime Kilns would be maintained in their current condition in this zone. Historic structures and resources at the Peirce-Kingle Mansion would continue to be maintained, but the sites would be



ALTERNATIVE B
Continue Current Management/No Action
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within the Administration/Operations Zone. The Peirce Mill complex would be in the Visitor Facility Zone.

Valley Floor Automobile Access Zone

The Rock Creek valley would continue to accommodate through-traffic along the length of the park and parkway. The Valley Floor Automobile Access Zone (184 acres, 6 percent of the park) would be managed to preserve the valley's characteristic mix of forest, grassy openings, and floodplain terraces interspersed with rustic facilities. Management actions that could be taken within this zone include the following.

Beach Drive. The tradition of auto touring the length of Beach Drive would be maintained. Two-way traffic would continue during the week along the length of the road for noncommercial vehicles without limits on the number of vehicle occupants.

Segments of Beach Drive would continue to be closed to traffic on weekends and holidays. These include Broad Branch Road to Joyce Road, picnic grove 10 to Wise Road, and West Beach Drive to the Maryland border. Weekend closures of Sherrill and Bingham Drives, which are in the Park Road Zone, also would continue. Piney Branch Parkway would be open to two-way traffic at all times.

Paved Recreational Trail. The existing paved recreational trail paralleling Beach Drive would be retained along the current alignment. The paved trail would be maintained, including repairs and re-paving, but major changes in location, width, or alignment would not be undertaken.

Rock Creek and Potomac Parkway Zone

The parkway corridor, which covers 161 acres (5 percent of the park) would continue to be managed for a mix of open fields and forest. This would provide both a pleasant esthetic experience, and visual and sound buffers. The paved trail paralleling the parkway would be maintained, including repairs and re-paving, but major changes in location, width, or alignment would not be undertaken.

Parkway traffic would be managed as at present. Rush-hour lane reversals (one-way traffic) would continue on the parkway.

Park Road Zone

Other park roads (74 acres, 2 percent of the park) would continue to be managed in their current alignments and widths to provide vehicular routes into and through the park. The existing infrastructure would be maintained, potentially with improvements such as better directional and information signs for visitor orientation.

Bingham Drive and Sherrill Drive would continue to be closed on weekends and holidays for nonmotorized recreation. Following snow storms, several roads in this zone could be closed to provide winter recreational opportunities such as sledding and skiing. These could include, but may not be limited to, Glover Road, Ross Drive, Bingham Drive, Sherrill Drive, and Morrow Drive.

Visitor Facility Zone

Alternative B would continue to use the existing facilities for park introduction and information services. Under this alternative, the Visitor Facility Zone would occupy about 3 acres (0.1 percent of the park).

Rock Creek Nature Center and Planetarium. The nature center area would be maintained in its current configuration. The facility would continue to serve as the park's primary location for environmental education for school groups as well as an information, orientation, and interpretation center for other visitors.

Peirce Mill Complex. The Peirce Mill complex would continue to be managed primarily for visitor information and orientation, resources interpretation, and recreation.

The mill would be managed consistent with the recommendations of a historic structure report, currently nearing completion. The mill would provide demonstrations of the historic milling industry in the valley.

Park interpretive staff in the mill would continue to provide park-wide information and orientation as well as generalized interpretation of milling.

The Peirce Mill Barn would continue to be leased to a nonprofit organization for park-related recreation such as the current art gallery.

Urban Recreation Zone

Most facilities and activities in the Urban Recreation Zone (200 acres, 7 percent of the park) would be retained at their current levels. These include the community gardens off Oregon Avenue and at Melvin Hazen Park, the Rock Creek Horse Center and equitation field, the Rock Creek Golf Course, the clay tennis courts near Peirce Mill, and the reserve picnic areas. The Brightwood Recreation Area and Rock Creek Tennis Stadium, which are outside of the area covered by this general management plan, would continue to be managed as specified in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park, Washington, D.C.* (NPS 1995b). The Carter Barron Amphitheater would be repaired and rehabilitated as described in Alternative A.

Administration/Operations Zone

Under Alternative B, park administration and operations would continue in their present locations. This zone would occupy approximately 7 acres (0.2 percent of the park).

Peirce-Klingel Mansion at Linnaean Hill. The park administrative offices would continue to occupy the Peirce-Klingel Mansion at the Linnaean Hill site. The current level of preservation would be maintained, and only minor interior modifications would be made in the future to avoid further affecting the historic character of the building. Future staff increases would need to be accommodated elsewhere in the park in existing facilities.

Park Maintenance Area. Maintenance shops, equipment and materials storage, parking, and maintenance staff office space would continue to be located at the maintenance area. Administrative staff offices that could not be accommodated at Peirce-Klingling Mansion might also be located here. Consistent with the water resources requirements in the “Servicewide Mandates and Policies” section, best management practices (BMPs) would be developed and implemented to reduce the risk of environmental contamination from operations and to correct drainage problems at the site.

Lodge House. The Lodge House would continue to serve as the U.S. Park Police D-3 substation. All current police functions, including office spaces, holding cell, parking, and motorcycle and bicycle storage, would remain in the existing building.

H-3 Stables. U.S. Park Police horse stables would be maintained at the site off Oregon Avenue. The community gardens near this site also would continue to be used by the public.

Edgewater. The U.S. Park Police regional stables and training arena at Edgewater would remain unchanged in its current facilities. BMPs would be implemented to reduce the potential for polluted runoff from the site.

Urban Transit Zone

Existing rights-of-way in the park for non-NPS roads would be managed under the Urban Transit Zone (8 acres, 0.2 percent of the park). The National Park Service would continue to work with the district government to provide linkages to the surrounding city and to protect the historic character of road structures and scenic views in this zone.

COSTS

Cost estimates for implementing Alternative B, including both one-time capital costs and annual costs for operations and maintenance, are presented in table 5. Capital costs would total almost \$2 million. This money would be required to bring existing park features up to standards.

Annual costs would be \$7.3 million. This would include the \$6.25 million currently spent annually for park and parkway operations, plus additional funding of just over \$1 million to bring existing park operations up to existing NPS policy and regulatory requirements.

ALTERNATIVE C: NONMOTORIZED RECREATION EMPHASIS

This section describes Alternative C, including the concept that defines the alternative, where the management prescriptions that would be included in this alternative would be applied, and the approximate costs.

CONCEPT

The goals of Alternative C would be to

- manage northern portions of the park as an exclusion zone from urban automobile traffic and promote nonmotorized recreation throughout the week

- assert more control over nonrecreational use of park roads and improve visitor safety

- preserve most traditional visitor experiences and activities

- enhance natural, cultural, and scenic values in the park

- optimize the use of structures for purposes such as interpretation, visitor contact, and park administration

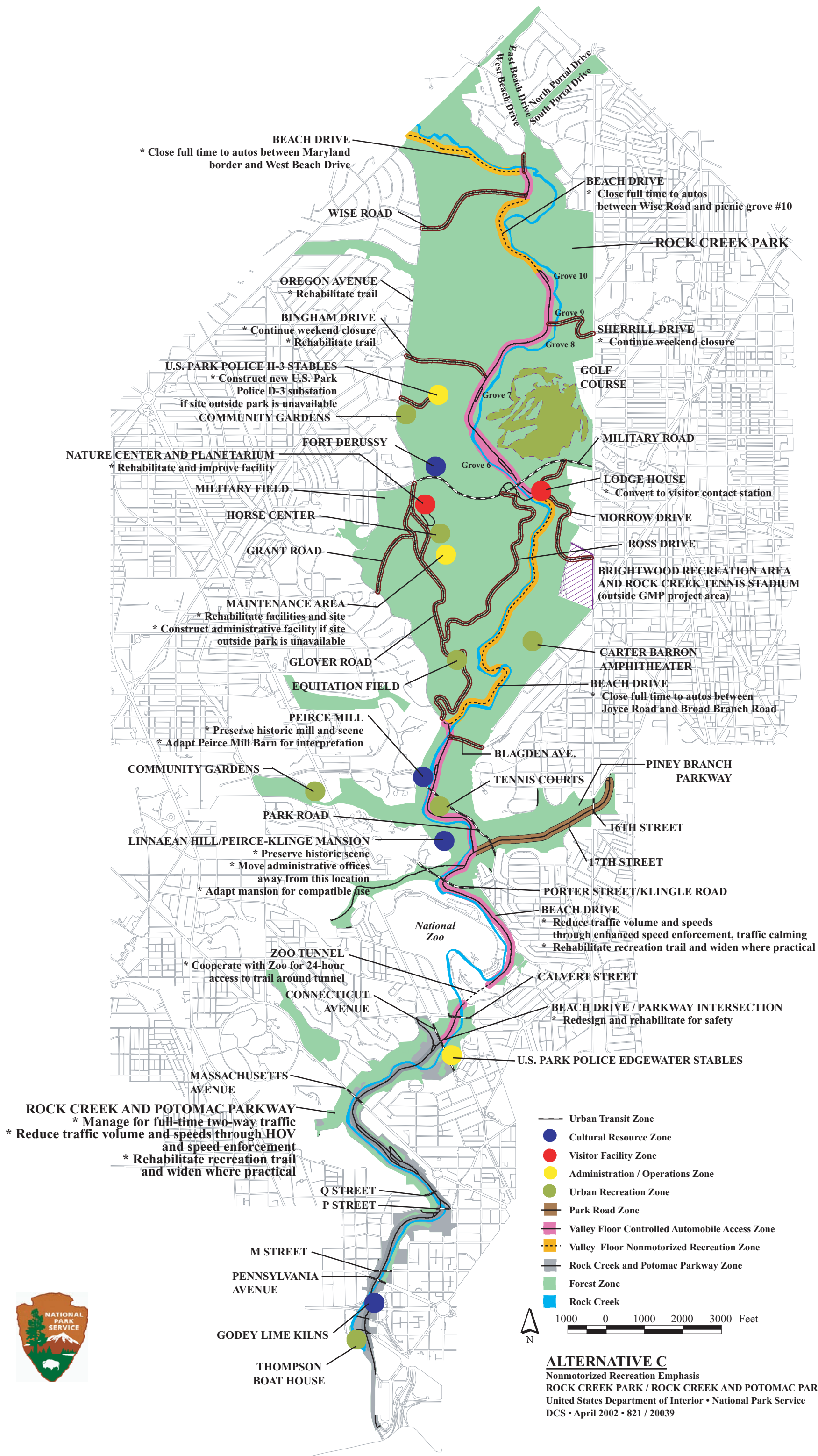
In this alternative, a portion of the northern part of the Rock Creek valley floor would be closed to automobile traffic at all times. The Alternative C map illustrates one possible closure configuration, which would close three segments of Beach Drive between the Maryland state line and Broad Branch Road. This configuration is the basis for the following Alternative C description and was evaluated in the environmental impact statement. However, the actual closure configuration would be selected at a later time, and may be adjusted.

The objectives of closing the road along portions of the Rock Creek valley floor would be to manage this area as a quiet refuge from urban automobile traffic, promote nonmotorized recreation throughout the week, and enhance natural resource protection. This section of the park would become a destination for nonmotorized activities. Alternative C also would create a paved route available throughout the week with little interference from automobile traffic through the Rock Creek valley and connecting to the Potomac River, as envisioned in regional bicycle plans (NPS 1990c; Metropolitan Washington Council of Governments 1995).

The current weekend and holiday closures of Sherrill Drive and Bingham Drive would be continued to promote recreational bicycling and other nonmotorized recreation in the park.

South of Broad Branch Road, including the Rock Creek and Potomac Parkway, the valley would support through-traffic for automobile motor touring and controlled urban transit. However, within the park, traffic would be managed to reduce levels compared to levels that would occur if current management practices were continued (Alternative B). The intent would be to improve visitor safety, the quality of the recreational visitor's experience, and resource protection.

Most traditional recreational experiences currently associated with Rock Creek Park would continue. In addition, all visitor facilities would remain accessible, including picnic groves 6 through



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10. (Locations of these picnic groves are shown on the Existing Conditions map.) However, access by automobile during weekdays would not be permitted in areas of new road closures.

Better use of the park's cultural resources would be made in Alternative C. This could include moving some park functions out of historic buildings and converting those structures to visitor contact, education, and interpretation. Improvements to existing facilities would also be made.

Alternative C would improve the protection of the park's natural resources. For example, poorly designed sections of foot and horse trails would be rerouted and abandoned trail sections would be restored to natural conditions. During these activities, each trail site would be evaluated to determine effects on safety and on cultural and natural resource values. Improvements would be designed to maximize the former while protecting the latter. To improve protection of terrestrial wildlife, the National Park Service would identify the most frequent locations of roadkill and would implement measures to reduce mortality to wildlife from collisions with vehicles.

Measures that could be taken to achieve the Alternative C goals and concept are embodied in the management prescriptions presented below. These are shown on the Alternative C map and summarized in table 4.

MANAGEMENT PRESCRIPTIONS

Management prescription zoning under Alternative C is shown in the Alternative C map. The management prescriptions were described previously.

Forest Zone

Under Alternative C, as with all of the other alternatives, the Forest Zone would be applied to 79 percent of the park (2,331 acres). This zone's features and management would be similar to those described for Alternative A. An estimated 2.5 miles of paved trail would be rehabilitated under Alternative C. Military Field and other meadows would be managed in a manner similar to that described in Alternative A, including protection of archeological resources.

Cultural Resource Zone

Alternative C would increase the area of the park primarily managed for protection of historic resources to about 6 acres (0.2 percent of the park). The types of actions that could be implemented at the various historic sites in the park would be identical to those described in Alternative A and could include the following.

The mill would be managed consistent with the recommendations of a historic structure report, currently nearing completion. The mill would provide demonstrations of the historic milling industry in the valley.

The Peirce Mill Barn would be rehabilitated and converted for use as an interpretive and education facility to support visitor programs at the mill.

The park administrative offices would be moved out of the Peirce-Klingling Mansion at the Linnaean Hill building complex and adaptive use of the buildings would be provided.

The landscapes of the Peirce Mill complex and the Linnaean Hill complex would be rehabilitated to retain their historic characters while allowing continued park use.

Other cultural features, including but not limited to Fort DeRussy, the Godey Lime Kiln, and the Miller cabin, would be maintained according to accepted NPS practices. Interpretive enhancements would be guided by future interpretive plans.

Valley Floor Nonmotorized Recreation Zone

The Valley Floor Nonmotorized Recreation Zone would be applied to 2 percent of the park (50 acres). The portions of Beach Drive within this zone would be closed to motorized vehicles at all times. Lands within this zone would be managed as a corridor providing a variety of nonmotorized recreation throughout the week, such as walking, bicycling, in-line skating, and quiet contemplation. Sections of Beach Drive within this zone would extend from

the Maryland State line to West Beach Drive

Wise Road to picnic grove 10

Joyce Road to Broad Branch Road

A paved surface would be maintained on the sections of Beach Drive in this zone to support wheeled recreation. The width of pavement may be reduced to minimize impervious surfaces and maintenance costs. However, at least a 16-foot-wide paved surface would be maintained. The closed sections would be gated to allow for maintenance and emergency vehicle access.

Valley Floor Controlled Automobile Access Zone

The Valley Floor Controlled Automobile Access Zone (134 acres, 5 percent of the park) would continue to be managed to preserve the valley's characteristic mix of forest, grassy openings, and floodplain terraces interspersed with rustic facilities. Types of actions that could be taken within this zone include the following.

Beach Drive. In the northern portions of the park, sections of Beach Drive from West Beach Drive to Wise Road and from picnic grove 10 to Joyce Road would be open to automobile traffic. They would be managed to provide access to the recreational opportunities of the park and would accommodate cross-park traffic.

Beach Drive south of Broad Branch Road would be managed for improved control of through-traffic volumes and speeds. The National Park Service would work with surrounding jurisdictions to reduce the volume of nonrecreational traffic through the park and to help mitigate traffic impacts on adjoining neighborhoods.

The following measures may be included as ways to reduce traffic speeds and the volume of non-recreational traffic on Beach Drive.

Impose high-occupancy vehicle (HOV) restrictions during rush-hours on segments of Beach Drive that would not interfere with cross-park traffic. HOV restrictions are consistent with regional transportation policies aimed at reducing reliance on single-occupant vehicles, reducing traffic congestion, improving air quality, and encouraging responsible commuting.

Strengthen speed limit enforcement on Beach Drive. This could include new technologies such as automated photography to more effectively ticket violators.

Implement traffic-calming measures to slow vehicle speeds. Such measures might include rumble strips, speed humps, and intersection modifications such as all-way stops, traffic circles, reduced turning radii, and raised intersections.

Adjustments over time may be required to determine the best methods of controlling nonrecreational traffic volume and vehicle speeds. To support modeling and environmental assessment in the “Environmental Consequences” section, the following conditions were used as a reasonable scenario to characterize management of traffic on Beach Drive south of Broad Branch Road under Alternative C.

Traffic-calming measures and improved enforcement would hold traffic speeds to the posted speed limit (25 miles per hour)

Two-way traffic would be maintained.

HOV-2 would be implemented directionally, in the southbound lane during morning rush-hours and in the northbound lane in the evening.

HOV-2 would be implemented from Porter Street / Klinge Road south to the parkway intersection near Connecticut Avenue. This would reduce through-traffic volume south of Broad Branch Road, while allowing for cross-park traffic between Broad Branch Road and Porter Street / Klinge Road.

Paved Recreational Trail. An estimated 5.3 miles of trail within the Valley Floor Controlled Automobile Access Zone would be rehabilitated for visitor safety. This could include improving and realigning some sections of the existing recreational paralleling Beach Drive south of Broad Branch Road.

The continuous alignment connecting the sections of Beach Drive that were closed to automobiles and segments of the paved recreation trail down the valley would be designated as an official bicycle route. The park would work with the National Zoological Park to keep the tunnel bypass trail open 24 hours a day.

Reduction of Roadkill. Within this zone, the National Park Service would improve monitoring of the frequencies and locations of animals killed or injured by collisions with vehicles. The mapping of roadkill sites would indicate locations where methods to reduce road mortality would be most effective. Techniques that could be implemented to reduce roadkill under Alternative C, either singly or in combination, may include public education about vehicle hazards to wildlife; warning signs, road striping, and speed humps to reduce speeds and enhance driver alertness; and strategically placed underpasses (culverts) for small animals such as reptiles and amphibians.

Rock Creek and Potomac Parkway Zone

Rock Creek and Potomac Parkway Zone, which covers 161 acres (5 percent of the park) would continue to be managed for a landscape mix of fields and forest. This would provide both a pleasant esthetic experience, and visual and sound buffers.

The paved recreational trail paralleling the parkway would be improved and realigned in segments. The goal would be to provide a safe pathway separated from the roadway. An estimated 2 miles of trails would be upgraded within the Rock Creek and Potomac Parkway Zone.

The measures that would be used to manage the parkway would include the following.

Rush-hour lane reversals would be ended and two-way traffic would be allowed at all times.

Traffic volume would be moderated by implementing HOV restrictions during rush-hours, southbound in the morning and northbound in the evening. This action would be taken in concert with HOV restrictions on Beach Drive south of Broad Branch Road.

The intersection of the parkway with Beach Drive near Connecticut Avenue would be improved to increase safety for pedestrians, cyclists, and motorists. The intersection redesign would not increase traffic capacity or encourage increased speeds through the intersection. Improvements may require reconfiguration of existing roads, potentially including closure of Cathedral Avenue access.

Speed limit enforcement on the parkway would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. This could include the use of automated photographic equipment. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Park Road Zone

The Park Road Zone would include 74 acres (2 percent of the park). The park road system would be managed to provide access to park resources and to improve linkages between the park and the surrounding neighborhoods. Park roads would not be widened to increase capacity for nonrecreational traffic.

Improvements could include rehabilitating or constructing recreational trails adjacent to roads to minimize pedestrian and vehicular conflicts and incorporating better directional and informational signs for visitor orientation. About 0.5 miles of trail along Bingham Drive would be upgraded

within the Park Road Zone. Up to a mile of new trail also may be provided. A feasibility study would be conducted to determine the optimal locations for new pedestrian trails.

Bingham Drive and Sherrill Drive would continue to be closed on weekends and holidays for nonmotorized recreation. Following snow storms, several roads in this zone could be closed to provide winter recreational opportunities such as sledding and skiing. These could include, but may not be limited to, Glover Road, Ross Drive, Bingham Drive, Sherrill Drive, and Morrow Drive.

Speed limit enforcement on park roads would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Visitor Facility Zone

Alternative C would improve park interpretive, educational, and information services. Under this alternative, the Visitor Facility Zone would occupy about 1 acre (less than 0.1 percent of the park). Potential actions that could be implemented to improve visitor services would be identical to those described for Alternative A and could include

- converting the Lodge House to a visitor contact station

- upgrading the Rock Creek Nature Center and Planetarium

Urban Recreation Zone

Most facilities and activities in the Urban Recreation Zone (200 acres, 7 percent of the park) would be retained at their current levels. These include the community gardens off Oregon Avenue and at Melvin Hazen Park, the Rock Creek Horse Center and equitation field, the Rock Creek Golf Course, the clay tennis courts near Peirce Mill, and the reserve picnic areas. The Brightwood Recreation Area and Rock Creek Tennis Stadium, which are outside of the area covered by this general management plan, would continue to be managed as specified in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park, Washington, D.C.* (NPS 1995b). The Carter Barron Amphitheater would be repaired and rehabilitated as described in Alternative A.

Administration/Operations Zone

Alternative C would address the problems associated with park administrative facilities in a manner similar to that described in Alternative A. This could include

- relocating the park's administrative offices to commercial space outside the park, or to a new facility at the park maintenance area

- relocating the D-3 U.S. Park Police substation to commercial space outside the park, or to a new facility at the H-3 site

- improving the use of the park maintenance area

implementing measures to prevent water pollution from runoff at Edgewater

The area within the Administration/Operations Zone would occupy approximately 5 acres (0.1 percent of the park).

Urban Transit Zone

Existing rights-of-way in the park for non-NPS roads would be classified under the Urban Transit Zone (8 acres, 0.2 percent of the park). The National Park Service would continue to work with the district government to provide linkages to the surrounding city and to protect the historic character of road structures and scenic views in this zone.

COSTS

Cost estimates for implementing Alternative C, including both one-time capital costs and annual costs for operations and maintenance, are presented in table 5. Capital costs would total more than \$13.4 million.

More than 60 percent of the capital costs (\$8.4 million) would be used to rehabilitate and improve the Rock Creek Nature Center and Planetarium, convert the Lodge House to a visitor contact station, and restore the historic Peirce Mill area.

Approximately \$2 million of the capital costs (15 percent) would be required to bring existing park features up to existing NPS policy and regulatory requirements.

Another \$2 million in capital costs would fund proposed trail improvements.

About \$1 million would pay for safety improvements at the intersection of the parkway and Beach Drive, and for traffic-calming devices on Beach Drive.

An estimated \$54,000 would be required to install permanent gates at six locations on Beach Drive to implement the road closures.

Annual costs would be almost \$8.2 million, about \$875,000 more than the annual costs for Alternative B.

The largest part of the new costs (43 percent) would be used to lease commercial space outside of the park for the new D-3 substation.

Almost a quarter of the increased operations costs would fund eight new full-time-equivalent staff positions, including two staff positions for HOV and speed enforcement, and six positions to improve visitor contact, education, and interpretation, primarily at the Lodge House, Peirce Mill complex, and nature center and planetarium.

About 15 percent would be used to lease administrative space for park headquarters outside of the park.

Ten percent would be used annually to lease mobile photo speed detection devices.

ALTERNATIVE D: MID-WEEKDAY RECREATION ENHANCEMENT

This section describes Alternative D, including the concept that defines the alternative, where the management prescriptions that would be included in this alternative would be applied, and the approximate costs.

CONCEPT

As stated in the January 2001 letter sent from the mayor of Washington, D.C. to the National Park Service (see appendix D), the traffic management goals of Alternative D would be to “reduc[e] automobile traffic in the most sensitive portions of Rock Creek Park, while minimizing any impact on surrounding neighborhoods and commuters.” This would be accomplished by “implementing weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush hour periods.” In addition, goals of this alternative would include

- preserving traditional visitor experiences and activities

- enhancing natural, cultural, and scenic values in the park

- asserting more control over nonrecreational use of park roads and improving visitor safety

- optimizing the use of structures for purposes such as interpretation, visitor contact, and park administration

In accordance with the mayor’s request, the concept for Alternative D would involve closing selected park road segments to motorized vehicles on weekdays between the morning and evening rush hours. These closures would enhance recreation opportunities for pedestrians and cyclists. Because mid-weekday motorized traffic typically is light, few drivers would have to alter their commuting patterns and very little traffic would be forced into surrounding neighborhoods.

Weekend and holiday closures under Alternative D would be the same as Alternative B, Continue Current Management/No Action. The road closure actions of Alternative D that are described below would be applied on weekdays.

The Alternative D map illustrates one possible closure configuration, which would close three segments of Beach Drive between the Maryland state line and Broad Branch Road. This configuration was evaluated in the environmental impact statement. However, the actual closure configuration may be adjusted. As shown in the map, Alternative D would close the following three segments of Beach Drive to motorized traffic during the middle part of weekdays:

- The Maryland border to West Beach Drive

- Wise Road to picnic grove 10

- Joyce Road to Broad Branch Road

These are the same three segments that currently are closed to motor vehicles on weekends.

Alternative D would not include the weekday closure of Sherrill Drive or Bingham Drive, but would continue their closure on weekends. Keeping these roads open would minimize weekday effects on cross-park traffic.

Consistent with current management practices, Alternative D would not include any requirements for high vehicle occupancy (such as HOV-2) in any part of the park or parkway. This alternative also would continue current rush-hour lane reversals (one-way traffic) on the Rock Creek and Potomac Parkway.

On weekdays, the road segments would be closed to motorized vehicles at 9:30 A.M. They would be re-opened at 3:30 P.M. to accommodate evening commuter traffic. This approach conforms with the mayor's request to consider "weekday vehicular traffic restrictions . . . in non-rush-hour periods."

(During development of Alternative D, other possible strategies for closing Beach Drive during non-rush-hour periods were considered. Descriptions of these approaches and reasons why they were not incorporated into this or any other alternative are included in the "Other Traffic-Related Actions" discussion of the "Alternatives or Actions Eliminated from Further Study" section.)

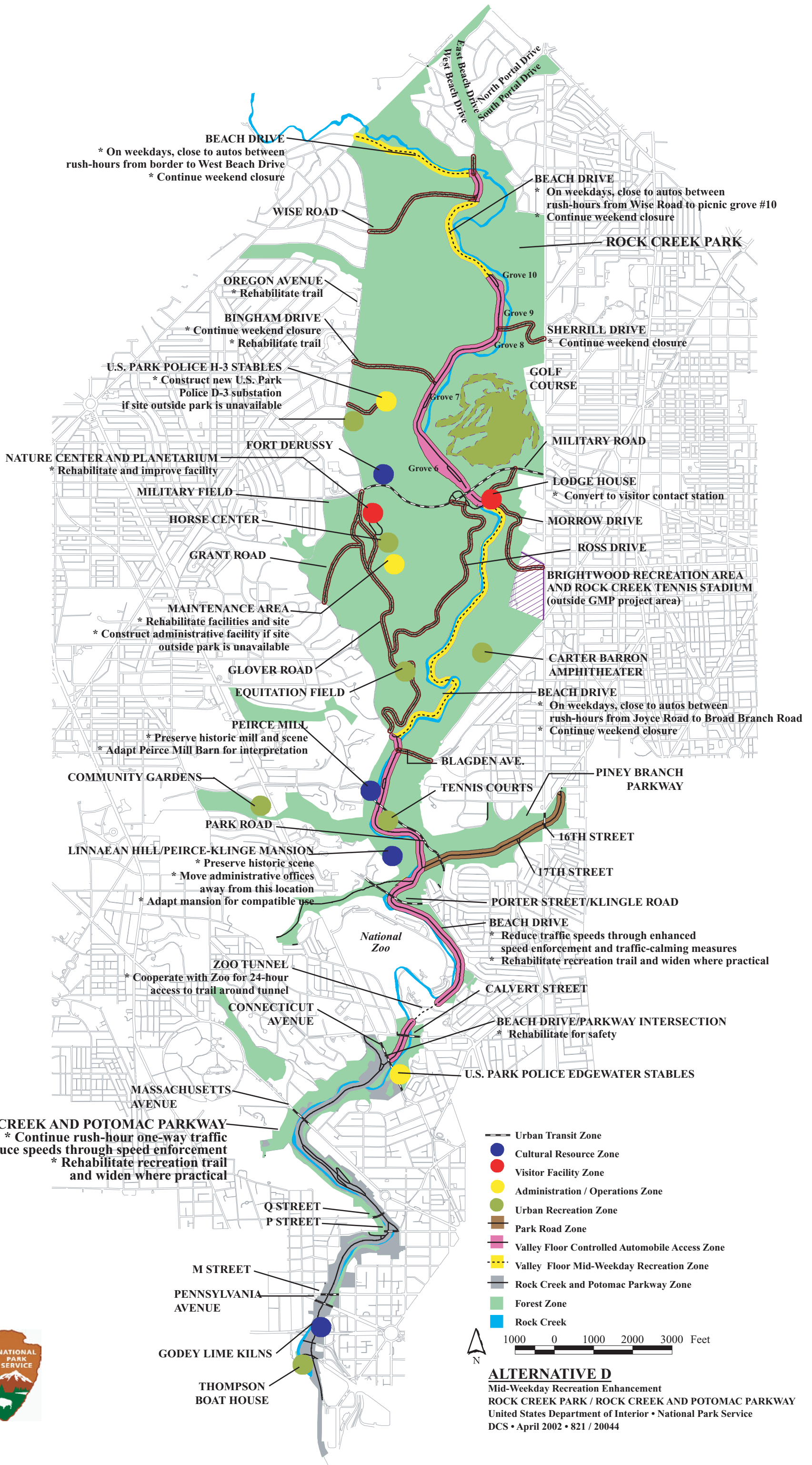
During weekdays from 3:30 P.M. to 9:30 A.M., the valley would support through-traffic, including commuter traffic. However, many of the traffic management measures described for Alternative A would be implemented to reduce speeds compared to speeds that would occur if current management practices were continued (Alternative B). The intent would be to improve visitor safety, the quality of the visitor's experience, and resource protection.

For these 18 hours each weekday, Alternative D would maintain driving for pleasure along the length of Beach Drive as an allowed activity. In the establishing legislation, the park managers were directed to provide "roadways . . . to be used for driving." Commuters could continue to enjoy the slower pace and scenery afforded by their morning and evening drive through the park. In addition, visitors with limited mobility would continue to have vehicular access throughout the park during popular periods such as weekday evenings.

For 6 hours during the middle of each weekday, Alternative D would create a paved trail through the Rock Creek valley and connecting to the Potomac River, as envisioned in regional bicycle plans (NPS 1990c; Metropolitan Washington Council of Governments 1995). During this time, the Rock Creek valley floor north of Broad Branch Road would be managed as a quiet refuge from urban automobile traffic. Nonmotorized recreation would be encouraged, and the increased safety may lead to increases in commuting via bicycle or on foot through the park.

All traditional recreational experiences currently associated with Rock Creek Park would continue. In addition, all visitor facilities would remain accessible by automobile. However, access by automobile during the middle part of each weekday would not be permitted in areas of new road closures.

Compared to Alternative B, Continue Current Management/No Action, Alternative D would make better use of the park's cultural resources, implementing the same measures proposed for Alternative A. This would include moving some park functions out of historic buildings and converting those structures to visitor contact, education, and interpretation. Improvements to existing facilities also would be made.



ALTERNATIVE D
Mid-Weekday Recreation Enhancement
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ALTERNATIVES

Alternative D would improve the protection of the park's natural resources. For example, poorly designed sections of foot and horse trails would be rerouted and abandoned trail sections would be restored to natural conditions. During these activities, each trail site would be evaluated to determine effects on safety and on cultural and natural resource values. Improvements would be designed to maximize the former while protecting the latter. To improve protection of terrestrial wildlife, the National Park Service would identify the most frequent locations of roadkill and would implement measures to reduce mortality to wildlife from collisions with vehicles.

Measures that could be taken to achieve the Alternative D goals and concept are embodied in the management prescriptions presented below. These are shown on the Alternative D map and summarized in table 4.

MANAGEMENT PRESCRIPTIONS

Management prescription zoning under Alternative D is shown in the Alternative D map. The management prescriptions were described previously.

Forest Zone

Under Alternative D, as with all of the other alternatives, the Forest Zone would be applied to 79 percent of the park (2,331 acres). This zone's features and management would be similar to those described for Alternative A. An estimated 2.5 miles of paved trail would be rehabilitated under Alternative D. Military Field and other meadows would be managed in a manner similar to that described in Alternative A, including protection of archeological resources.

Cultural Resource Zone

Alternative D would increase the area of the park primarily managed for protection of historic resources to about 6 acres (0.2 percent of the park). The types of actions that could be implemented at the various historic sites in the park would be identical to those described in Alternative A and could include the following.

The mill would be managed consistent with the recommendations of a historic structure report, currently nearing completion. The mill would provide demonstrations of the historic milling industry in the valley.

The Peirce Mill Barn would be rehabilitated and converted for use as an interpretive and education facility to support visitor programs at the mill.

The park administrative offices would be moved out of the Peirce-Klingel Mansion at the Linnaean Hill building complex and adaptive use of the buildings would be provided.

The landscapes of the Peirce Mill complex and the Linnaean Hill complex would be rehabilitated to retain their historic characters while allowing continued park use.

Other cultural features, including but not limited to Fort DeRussy, the Godey Lime Kiln, and the Miller cabin, would be maintained according to accepted NPS practices. Interpretive enhancements would be guided by future interpretive plans.

Valley Floor Controlled Automobile Access Zone

The Valley Floor Controlled Automobile Access Zone (134 acres, 5 percent of the park) would continue to be managed to preserve the valley's characteristic mix of forest, grassy openings, and floodplain terraces interspersed with rustic facilities. Types of actions that could be taken within this zone include the following.

Beach Drive. In the northern portions of the park, sections of Beach Drive from West Beach Drive to Wise Road and from picnic grove 10 to Joyce Road would remain open to automobile traffic at all times. They would be managed to provide access to the recreational opportunities of the park and would accommodate cross-park traffic.

Except during weekend and mid-weekday closure periods, the tradition of auto touring the length of Beach Drive would be maintained. Whenever Beach Drive was open to motorized vehicles, it would be managed for improved control of through-traffic volumes and speeds. The National Park Service would work with surrounding jurisdictions to reduce the volume of nonrecreational traffic through the park and to help mitigate traffic impacts on adjoining neighborhoods.

Alternative D would not include the use of high-occupancy vehicle (HOV) restrictions during rush-hours. Otherwise, it would incorporate the same types of traffic management actions that were described for Alternative A. These could include

- improved speed limit enforcement on Beach Drive, which could involve technologies such as automated photography to more effectively ticket violators

- traffic-calming measures, such as rumble strips, speed humps, and intersection modifications such as all-way stops, traffic circles, reduced turning radii, and raised intersections, to slow vehicle speeds

Adjustments over time may be required to determine the best methods of controlling nonrecreational traffic volume and vehicle speeds. To support modeling and environmental assessment in the "Environmental Consequences" section, the following conditions were used as a reasonable scenario to characterize management of traffic on Beach Drive south of Broad Branch Road under Alternative D.

- Traffic-calming measures and improved enforcement would hold traffic speeds to the posted speed limit (25 miles per hour)

- Two-way traffic would be maintained.

Paved Recreational Trail. An estimated 5.3 miles of trail within the Valley Floor Controlled Automobile Access Zone would be rehabilitated for visitor safety. This could include improving and realigning some sections of the existing recreational trail paralleling Beach Drive south of Broad Branch Road. The park would work with the National Zoological Park to keep the tunnel bypass trail open 24 hours a day.

Reduction of Roadkill. Within this zone, the National Park Service would improve monitoring of the frequencies and locations of animals killed or injured by collisions with vehicles. The map-

ping of roadkill sites would indicate locations where methods to reduce road mortality would be most effective. Techniques that could be implemented to reduce roadkill under Alternative D, either singly or in combination, may include public education about vehicle hazards to wildlife; warning signs, road striping, and speed humps to reduce speeds and enhance driver alertness; and strategically placed underpasses (culverts) for small animals such as reptiles and amphibians.

Valley Floor Mid-Weekday Recreation Zone

The Valley Floor Mid-Weekday Recreation Zone would be applied to 2 percent of the park (50 acres). On weekdays, the portions of Beach Drive within this zone would be closed to motorized vehicles from 9:30 A.M. to 3:30 P.M. During this period, lands within this zone would be managed as a corridor providing nonmotorized recreation, such as walking, bicycling, in-line skating, and quiet contemplation. At all other times, its management would be identical to that of the Valley Floor Controlled Automobile Access Zone.

Rock Creek and Potomac Parkway Zone

Rock Creek and Potomac Parkway Zone, which covers 161 acres (5 percent of the park) would continue to be managed for a landscape mix of fields and forest. This would provide both a pleasant esthetic experience, and visual and sound buffers.

The recreational trail paralleling the parkway would be widened, improved, and realigned in segments. The goal would be to provide a safe pathway separated from the roadway. An estimated 2 miles of trails would be upgraded within the Rock Creek and Potomac Parkway Zone.

Rush-hour lane reversals (one-way traffic) would continue on the parkway.

The intersection of the parkway with Beach Drive near Connecticut Avenue would be improved to increase safety for pedestrians, cyclists, and motorists. The intersection redesign would not increase traffic capacity or encourage increased speeds through the intersection. Improvements may require reconfiguration of existing roads, potentially including closure of Cathedral Avenue access.

Speed limit enforcement on the parkway would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. This could include the use of automated photographic equipment. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Park Road Zone

Other park roads (74 acres, 2 percent of the park) would continue to be managed to provide vehicular routes into and through the park. However, park roads would not be widened to increase capacity for nonrecreational traffic. The management emphasis would be on improving linkages between the park and the surrounding neighborhoods, and ensuring that park road management would provide for cross-park traffic.

Improvements could include rehabilitating or constructing recreational trails adjacent to roads to minimize pedestrian and vehicular conflicts and incorporating better directional and information

signs for visitor orientation. About 0.5 miles of trail along Bingham Drive would be upgraded within the Park Road Zone. Up to a mile of new trail also may be provided. A feasibility study would be conducted to determine the optimal locations for new pedestrian trails.

Bingham Drive and Sherrill Drive would continue to be closed on weekends and holidays for nonmotorized recreation. However, they would remain open throughout weekdays and would not be subject to the mid-weekday closures that would characterize roads in the Valley Floor Mid-Weekday Recreation Zone.

Following snow storms, several roads in this zone could be closed to provide winter recreational opportunities such as sledding and skiing. These could include, but may not be limited to, Glover Road, Ross Drive, Bingham Drive, Sherrill Drive, and Morrow Drive.

Speed limit enforcement on park roads would be strengthened as described above for the Valley Floor Controlled Automobile Access Zone. Actions to reduce wildlife roadkill also would be the same as those described for the Valley Floor Controlled Automobile Access Zone.

Visitor Facility Zone

Alternative D would improve park interpretive, educational, and information services. Under this alternative, the Visitor Facility Zone would occupy about 1 acre (less than 0.1 percent of the park). Potential actions that could be implemented to improve visitor services would be identical to those described for Alternative A and could include

- converting the Lodge House to a visitor contact station

- upgrading the Rock Creek Nature Center and Planetarium

Urban Recreation Zone

Most facilities and activities in the Urban Recreation Zone (200 acres, 7 percent of the park) would be retained at their current levels. These include the community gardens off Oregon Avenue and at Melvin Hazen Park, the Rock Creek Horse Center and equitation field, the Rock Creek Golf Course, the clay tennis courts near Peirce Mill, and the reserve picnic areas. The Brightwood Recreation Area and Rock Creek Tennis Stadium, which are outside of the area covered by this general management plan, would continue to be managed as specified in the *Final Environmental Impact Statement, Tennis Stadium, Rock Creek Park, Washington, D.C.* (NPS 1995). The Carter Barron Amphitheater would be repaired and rehabilitated as described in Alternative A.

Administration/Operations Zone

Alternative D would address the problems associated with park administrative facilities in a manner similar to that described in Alternative A. This could include

- relocating the park's administrative offices to commercial space outside the park, or to a new facility at the park maintenance area

relocating the D-3 U.S. Park Police substation to commercial space outside the park, or to a new facility at the H-3 site

improving the use of the park maintenance area

implementing measures to prevent water pollution from runoff at Edgewater

The area within the Administration/Operations Zone would occupy approximately 5 acres (0.1 percent of the park).

Urban Transit Zone

Existing rights-of-way in the park for non-NPS roads would be classified under the Urban Transit Zone (8 acres, 0.2 percent of the park). The National Park Service would continue to work with the district government to provide linkages to the surrounding city and to protect the historic character of road structures and scenic views in this zone.

COSTS

Cost estimates for implementing Alternative D, including both one-time capital costs and annual costs for operations and maintenance, are presented in table 5. Capital costs would total more than \$13.4 million.

More than 60 percent of the capital costs (\$8.4 million) would be used to rehabilitate and improve the Rock Creek Nature Center and Planetarium, convert the Lodge House to a visitor contact station, and restore the historic Peirce Mill area.

Approximately \$2 million of the capital costs (15 percent) would be required to bring existing park features up to existing NPS policy and regulatory requirements.

Another \$2 million in capital costs would fund proposed trail improvements.

About \$1 million would pay for safety improvements at the intersection of the parkway and Beach Drive, and for traffic-calming devices on Beach Drive.

An estimated \$54,000 would be required to install gates to implement mid-day closures at six locations on Beach Drive to implement the road closures.

Annual costs would be more than \$8.2 million, about \$900,000 more than the annual costs for Alternative B.

The largest part of the new costs (42 percent) would be used to lease commercial space outside of the park for the new D-3 substation.

Almost a quarter of the increased operations costs would fund eight new full-time-equivalent staff positions, including two staff positions for HOV and speed enforcement, and six positions to improve visitor contact, education, and interpretation, primarily at the Lodge House, Peirce Mill complex, and nature center and planetarium.

ALTERNATIVES

About 15 percent would be used to lease administrative space for park headquarters outside of the park.

Ten percent would be used annually to lease mobile photo speed detection devices.

Mid-day closures of the three segments of Beach Drive would cost about \$30,000 (3.3 percent of the cost difference from Alternative B) annually to implement.

SUMMARY OF ALTERNATIVES

All of the action alternatives meet the overall objective of the National Park Service of preserving unimpaired the natural and cultural resources and values of Rock Creek Park and the Rock Creek and Potomac Parkway for future generations. In addition, all three action alternatives satisfy all of the purposes of the general management plan that were defined at the beginning of this document. The alternative of continue current management/no action does not fulfill any of these goals.

Table 4 summarized the area within each management prescription under each alternative. As shown in the table, five of the zones would be the same size in all of the alternatives. These include the Forest Zone, Rock Creek and Potomac Parkway Zone, Park Road Zone, Urban Recreation Zone, and Urban Transit Zone.

Table 6 summarizes the key differences among the alternatives for the management of Rock Creek Park and the Rock Creek and Potomac Parkway. In all areas, Alternative B, the no action alternative, would continue current management practices. Differences of the other three alternatives with current management practices are highlighted below.

Alternative A would continue weekday auto touring throughout the park, but would implement measures to encourage slower speeds and reduce the number of nonrecreational vehicles. This alternative would implement HOV restrictions on Beach Drive during rush-hour periods in the primary travel direction of the traffic.

Alternative C would permanently close selected segments of Beach Drive north of Broad Branch Road to automobiles and would promote nonmotorized recreation in this area. Other park roads would be managed to encourage slower speeds and reduce the number of nonrecreational vehicles.

On the Rock Creek and Potomac Parkway, Alternative C would end lane reversals and allow two-way traffic at all times. This alternative would implement HOV restrictions during rush-hours in the primary travel direction of the traffic.

During the middle part of each weekday, Alternative D would close portions of Beach Drive north of Broad Branch Road to motorized vehicles. It would continue auto touring throughout the park at all other times on weekdays. Traffic-calming measures would reduce speeds, but Alternative D would not include and HOV restrictions.

Recreation trails would be upgraded under Alternatives A, C, and D.

Alternatives A, C, and D would increase the use of park historic resources for interpretive and educational purposes. These alternatives would end the current use of the Peirce Mill Barn as an art gallery and use it as an interpretive and education facility to support visitor programs at the mill. They also would move the park administrative offices out of the Peirce-Klingel Mansion at the Linnaean Hill building complex and provide adaptive use of the buildings.

Alternatives A, C, and D would improve park introduction and information services by such measures as converting the Lodge House to a visitor contact station and upgrading the nature center and planetarium.

ALTERNATIVES

Alternatives A, C, and D would address the problems associated with park administrative facilities by finding a new location, preferably in commercial space outside the park, for the park's administrative offices; relocating the D-3 U.S. Park Police substation to commercial space outside of the park or a new facility at the H-3 site; and improving the use of the park maintenance area.

Table 7 summarizes the impacts of the alternatives. Detailed information on the impacts evaluation is provided in the "Environmental Consequences" section.

TABLE 6: SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES

Park Feature	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Traffic Management				
Beach Drive	Include in the Valley Floor Controlled Automobile Access Zone. Continue weekend closures of sections of this road. Allow auto touring along the length of Beach Drive on weekdays, but encourage slower speeds and fewer non-recreational vehicles. Implement HOV-2 in the primary direction of travel during rush hours.	Include in the Valley Floor Automobile Access Zone. Continue weekend closures of sections of this road. Allow auto touring along the length of Beach Drive on weekdays using current management techniques.	Include northern portions in the Valley Floor Nonmotorized Recreation Zone. Permanently close this zone to motorized vehicles and manage for nonmotorized recreation. Include the remainder in the Valley Floor Controlled Automobile Access Zone. Allow auto touring, but encourage slower speeds and fewer nonrecreational vehicles.	Include northern portions in the Valley Floor Mid-Weekday Recreation Zone. Between rush-hours on weekdays, close this zone to motorized vehicles and manage for nonmotorized recreation. Except during mid-weekday closures, allow auto touring along the length of Beach Drive on weekdays, but encourage slower speeds. Continue weekend closures of sections of this road.
Rock Creek and Potomac Parkway	Continue rush-hour lane reversals. Upgrade the recreational trail. Improve the intersection of the parkway with Beach Drive near Connecticut Avenue.	Continue current traffic management policies. Provide maintenance as needed.	End lane reversals and allow two-way traffic at all times. Implement HOV restrictions in the primary direction of travel during rush-hours. Upgrade the recreational trail. Improve the intersection of the parkway with Beach Drive near Connecticut Avenue.	Same as Alternative A.

TABLE 6: SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES (Continued)

Park Feature	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Other park roads	Rehabilitate or construct recreational trails adjacent to roads.	Continue current management practices.	Same as Alternative A.	Same as Alternative A.
Recreational trails	Upgrade 9.8 miles of trails.	Maintain trails and provide rehabilitation of deteriorated trail segments.	Same as Alternative A.	Same as Alternative A.
Interpretation and Education				
Peirce Mill complex	Include in the Cultural Resource Zone. Rehabilitate the mill to focus on history of milling and land use in the Rock Creek area.	Include in the Visitor Facility Zone. Rehabilitate the mill to focus on history of milling and land use in the Rock Creek area.	Same as Alternative A.	Same as Alternative A.
Peirce-Klingel Mansion and the Linnaean Hill building complex	Rehabilitate the Peirce Mill Barn and use it as an interpretive and education facility. Include in the Cultural Resource Zone. Rehabilitate the buildings for adaptive use compatible with park resource values.	Continue to lease the Peirce Mill Barn to a non-profit organization Include in the Administration/Operations Zone. Continue to use for park administrative offices.	Same as Alternative A.	Same as Alternative A.
Lodge House	Move the U.S. Park Police D-3 substation out of the structure. Include in the Visitor Facility Zone. Convert to a visitor contact station to provide park orientation, information, and interpretation.	Include in the Administration/Operations Zone. Continue to use for U.S. Park Police D-3 substation.	Same as Alternative A.	Same as Alternative A.

TABLE 6: SUMMARY OF KEY DIFFERENCES AMONG THE ALTERNATIVES (Continued)

Park Feature	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Rock Creek Nature Center and Planetarium	Rehabilitate the nature center and expand to improve effectiveness of public programs. Upgrade the planetarium.	Maintain current configuration.	Same as Alternative A.	Same as Alternative A.
Administration and Operations				
Administrative offices	Move out of the Peirce-Klingler Mansion. Relocate preferably to commercial office space outside the park, or to a new office facility constructed at the park maintenance yard.	Continue to use current space in the Peirce-Klingler Mansion.	Same as Alternative A.	Same as Alternative A.
U.S. Park Police D-3 substation	Move out of the Lodge House. Relocate preferably to commercial space outside the park, or to a new substation constructed at the H-3 area.	Continue to use current space in the Lodge House.	Same as Alternative A.	Same as Alternative A.
H-3 area	Construct a new park police substation only if suitable commercial space cannot be obtained outside of the park.	Continue current uses.	Same as Alternative A.	Same as Alternative A.
Maintenance yard	Rehabilitate the area. Construct new office facilities only if suitable commercial space cannot be obtained outside of the park.	Continue current uses. Relocate some administrative staff to existing facilities at this site.	Same as Alternative A.	Same as Alternative A.
Approximate cost				
Capital costs (one time)	\$13,375,000	\$1,920,000	\$13,429,000	\$13,429,000
Operating cost	\$8,178,000 per year	\$7,300,000 per year	\$8,178,000 per year	\$8,208,000 per year

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Air quality	Little effect on air quality because rerouted traffic would remain in the airshed. Carbon monoxide levels would be below NAAQS. The airshed's ozone status would not be affected. Best management practices would ensure that effects from construction would be negligible. No impairment, or irretrievable or irreversible commitment of resources.	Effects would be similar to Alternative A because the same traffic volume would remain within the airshed.	Effects would be the same as Alternative A. Although Alternative C would reroute traffic that currently uses Beach Drive, no traffic would be diverted to outside of the airshed.	Effects would be similar to Alternative A because the same traffic volume would remain within the airshed.
Rock Creek and its tributaries	Application of best management practices (BMPs) to park areas known to be contributing pollutants would produce beneficial, long-term, measurable effects on water quality. Construction at several sites would produce negligible, adverse, short-term effects on water quality and hydrology. Reduced automobile traffic on roads adjacent to Rock Creek could have a beneficial, long-term, negligible to measurable effects on water quality. Better education of the public could help reduce upstream pollutant loadings and storm water flows.	The application of BMPs to park areas known to be contributing pollutants would produce beneficial, long-term measurable effects on water quality. Continued inter-agency measures to maintain and improve sanitary and combined sewer systems would produce beneficial, long-term, major effects on water quality. Coordination could also produce beneficial, long-term, major reductions in streambed alterations such as scour and sedimentation.	Elimination of automobile traffic on portions of Beach Drive, and reduced traffic on other park roads would slightly reduce pollutant loadings in Rock Creek. Other effects would be the same as Alternative A.	Elimination of automobile traffic on portions of Beach Drive during mid-weekdays would slightly reduce pollutant loadings in Rock Creek. Other effects would be the same as Alternative A.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Rock Creek and its tributaries (continued)	Continued inter-agency measures to maintain and improve sanitary and combined sewer systems would produce beneficial, long-term, major effects on water quality. Coordination could also produce beneficial, long-term, major reductions in streambed alterations such as scour and sedimentation. No impairment, or irretrievable or irreversible commitment of resources.	No impairment, or irretrievable or irreversible commitment of resources.		
Wetlands and floodplains	No temporary or permanent adverse effects would occur to wetlands. Better education of the public on the need to control upstream storm water runoff could benefit wetlands. Minor, temporary adverse effects on floodplains would result from widening of some trails along Rock Creek. Effects would be controlled using BMPs. No impairment, or irretrievable or irreversible commitment of resources.	No effects would occur. Wetlands and floodplains would continue to be protected in conformance with Executive Orders 11990 and 11988, respectively. No impairment, or irretrievable or irreversible commitment of resources.	Effects would be the same as Alternative A.	Effects would be the same as Alternative A.
Deciduous forests	Current management practices would continue to protect the deciduous forest. Conversion of about a half acre of forested land to new paved trail area would be a long-term minor adverse effect on the deciduous forest.	Current management practices would continue to protect deciduous forests. Erosion problems along heavily used or improperly designed trails would continue and probably worsen.	Effects would be the same as Alternative A.	Effects would be the same as Alternative A.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Deciduous forests (continued)	Disturbance of 4 to 5 acres of forest for a trail construction zone would be a minor short-term, adverse effect. Rerouting trails currently on steep slopes, erosion-prone areas, riparian zones, or rare biotic communities would be a major, long-term, beneficial effect. No impairment, or irretrievable or irreversible commitment of resources.	No impairment, or irretrievable or irreversible commitment of resources.		
Protected and rare species	Long-term protection of endangered amphipods could be enhanced by implementing more active protection. Improved education and interpretation may increase the public's appreciation for these species and lead to better protection outside of the park. No impairment, or irretrievable or irreversible commitment of resources.	The National Park Service would continue to protect rare species and their supporting habitats. No impairment, or irretrievable or irreversible commitment of resources.	Effects would be the same as Alternative A.	Effects would be the same as Alternative A.
Other native wildlife	Current management practices would continue to protect native wildlife. Minor, short-term, adverse effects from trail widening and realignments would be controlled using BMPs. Reduced traffic speeds and volumes would reduce wildlife roadkill, a beneficial effect. For most species, the effect would be negligible. Effects on box turtles would be moderate. Effects on gray fox would be major.	Current management practices would continue to protect native wildlife in the park. No impairment, or irretrievable or irreversible commitment of resources.	Closure of portions of Beach Drive to motorized traffic would further reduce the number of terrestrial wildlife roadkills compared to Alternative A. The effect would be beneficial but negligible for all wildlife species. Other effects would be the same as Alternative A.	Closure of portions of Beach Drive to motorized traffic during mid-weekdays would reduce the number of terrestrial wildlife roadkills, especially for species that are active during the day. The effect would be beneficial but negligible for all wildlife species. Other effects would be the same as Alternative A.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Other native wildlife (continued)	Better education of the public on the adverse effects of moving box turtles or removing them from the park would provide a moderate, long-term, beneficial effect on box turtles. No impairment, or irretrievable or irreversible commitment of resources.			
Archeological resources	No significant adverse effect would occur because the National Park Service would relocate any facilities that would disturb potentially NRHP-eligible sites. Increased monitoring and improved visitor education would reduce the potential for non-construction-related significant adverse effects. The disturbance of sites could result in some irretrievable and irreversible loss of archeological resources.	Current incremental degradation of sites and features would continue.	Effects would be the same as Alternative A.	Effects would be the same as Alternative A.
Historic structures and cultural landscapes	A significant beneficial impact would occur to the Peirce Mill Barn, Peirce-Klingler Mansion, and Lodge House, which would be rehabilitated to preserve their architecturally significant features and would be used in accordance with park resource values. A significant beneficial impact would occur to historic trails where improvements or rehabilitation would enhance their integrity and preservation.	Historic structures and cultural landscapes would be protected, preserved, and interpreted in a manner consistent with NPS policies.	Effects would be the same as Alternative A.	Effects would be the same as Alternative A.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Historic structures and cultural landscapes (continued)	Rehabilitation of the significant cultural landscape features and attributes of the Linnaean Hill and Peirce Mill areas would enhance park preservation and visitor understanding of park's historic settings. The disturbance of sites during new construction could result in some irretrievable and irreversible loss of resources.			
Traditional park character and visitor experience	The traditional character and appearance of the park would not change. Nonmotorized recreation and transportation would be better accommodated. HOV restrictions during rush-hours would inconvenience nonrecreational visitors who do not carpool. A major improvement in visitor safety would occur because of lower traffic volumes and slower traffic speeds. Improved education and interpretation facilities would provide greater opportunities to learn about and experience the park's natural and cultural resources. Visitor experience would be enhanced by increased efficiency of park administration and improved police services. No impairment, or irretrievable or irreversible commitment of resources.	The traditional character and appearance of the park would not change. Park visitors would be adversely affected by escalating nonrecreational traffic in the park and on the parkway. Visitor safety would likely decrease as traffic increased. Some exhibits would continue to be inaccurate, worn, and dated. No impairment, or irretrievable or irreversible commitment of resources.	The elimination of the traditional visitor experience of automobile touring along the length of the park, including the gorge area, would be a major adverse impact. Alternative C would provide the greatest benefits to non-motorized recreation and transit by providing a bike trail through the valley with little interference from motorized traffic. A major improvement in visitor safety would occur because of lower traffic volumes and slower traffic speeds.	The traditional character and appearance of the park would not change. Automobile touring along the length of the park would be maintained during weekday rush-hours, evenings, and nights. Nonmotorized recreation and transit would be enhanced by providing a bike trail with little interference from motorized traffic through the valley during mid-weekday closure periods. A major improvement in visitor safety would occur because of slower traffic speeds.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Traditional park character and visitor experience (continued)			Alternative C would provide the greatest increase in safety through its traffic-calming and traffic-reducing measures, and by providing permanent trails to separate visitors participating in nonmotorized recreation from automobiles throughout the length of the valley. Other effects would be the same as Alternative A.	Safety would be improved by traffic-calming measures and during mid-day closures, when visitors participating in nonmotorized recreation could be separated from automobiles throughout the length of the valley. Time demands for erecting or removing barriers would limit the availability of park police for other activities. Other effects would be the same as Alternative A.
Regional and local transportation	Nonrecreational traffic would be substantially reduced in the park south of Bingham Drive. Nonmotorized travel would be enhanced. Traffic volumes and speeds would be reduced in the park and on the parkway, increasing visitor safety. Single-occupancy vehicles would have to use alternate routes during HOV restrictions.	During peak morning and evening hours, traffic would be very heavy or worse on 57 percent of modeled road segments. Only 44 percent of these segments had these conditions in 1990. Continued conflicts would occur between recreational and nonrecreational users of park roads.	Nonrecreational traffic would be eliminated or substantially reduced in the park. Nonmotorized travel would be enhanced. During the morning peak-hour, 15 road segments would have noticeable to considerable improvements in LOS. Five road segments would have noticeable to considerable declines.	During rush-hours, traffic speeds would be reduced in the park and on the parkway by traffic-calming measures. Other rush-hour conditions would be similar to those in Alternative B. During mid-weekday closures, Nonrecreational traffic would be eliminated or substantially reduced in the park. Nonmotorized travel would be enhanced.

TABLE 7: SUMMARY OF IMPACTS OF THE ALTERNATIVES (Continued)

Impact Topic	Alternative A: Improved Management of Established Park Uses	Alternative B: Continue Current Management/No Action	Alternative C: Nonmotorized Recreation Emphasis	Alternative D: Mid-Weekday Recreation Enhancement
Regional and local transportation (continued)	During morning peak-hour, 13 segments would have noticeable to major improvements in level of service. Two segments would have noticeable LOS declines. During the evening peak-hour, nine segments would have noticeable to considerable improvements in LOS. Two segments would have noticeable LOS declines.		During the evening peak-hour, 11 segments would have noticeable to considerable improvements. Nine segments would have noticeable to considerable declines. Other effects would be the same as Alternative A.	
Community character	Changes in community character resulting from park traffic management would be minor compared to changes that would result from increased traffic associated with regional population growth. Five road segments outside of the park would have observable changes in community character, ranging from major improvements to noticeable adverse effects. Trail improvements and traffic control would improve nonmotorized recreation, benefiting citizens who use the park and park vicinity for these purposes. Environmental justice: No disproportionate routing of traffic to disadvantaged areas or ethnic neighborhoods.	Changes in community character from park traffic management would be minor compared to changes from increased traffic associated with regional population growth. Recreational opportunities and access to the park would continue to be compromised by traffic congestion.	Eight segments would experience noticeably improved community characteristics associated with lower traffic levels during one or both of the peak-hours on weekdays. Nine road segments would experience a noticeable to considerable decline during one or both of the peak-hours on weekdays. Opportunities for nonmotorized recreation would be enhanced, benefiting citizens who use the park and nearby trails for these purposes. Environmental justice: No disproportionate routing of traffic to disadvantaged areas or ethnic neighborhoods. Other effects would be the same as Alternative A.	Except during mid-day closures on weekdays, effects would be the same as Alternative B. During the middle portion of weekdays, opportunities for nonmotorized recreation would be enhanced, benefiting citizens who use the park and nearby trails for these purposes. Environmental justice: No disproportionate routing of traffic to disadvantaged areas or ethnic neighborhoods. Other effects would be the same as Alternative A.

AFFECTED ENVIRONMENT

This section describes the physical resources of Rock Creek Park and the Rock Creek and Potomac Parkway, including both natural and cultural resources. It also describes visitor and community conditions, such as visitor profile, visitation trends, automobile traffic and other transportation within and near the park, and the characteristics of the communities around the park and parkway.

NATURAL RESOURCES

AIR QUALITY

Air quality is included as an impact topic based on the criteria presented in the “Impact Topics - Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

National Ambient Air Quality Standards (NAAQS) were established in the 1970 Clean Air Act amendments. The standards are concentrations of contaminants in the air that will protect public health and prevent degradation or harm to the environment.

The District of Columbia operates an ambient air monitoring network. The Air Resources Management Division of the District of Columbia Department of Consumer and Regulatory Affairs is the responsible agency for monitoring and enforcing the applicable standards. A complete table of the NAAQS is available on the internet site of the District of Columbia Air Resources Management Division at <http://mail.envIRON.state.dc.us/dcairqua.htm>. The web site also contains monitoring data, and a printed ambient air monitoring data report can be obtained.

The Metropolitan Washington Council of Governments (MWCOC) is a partner in the program and analyzes the air quality data. MWCOC provides an area air quality index and notifies the public of the region’s air quality status. Up-to-date information on the index can be obtained by calling (202) 962-3299. In addition, MWCOC has information available about its environmental programs and publications at <http://www.mwcog.org/>.

Most air pollutants in the District of Columbia region are from vehicle emissions. Air quality has been improving in the region over the past 10 years for all measured contaminants because of improvements in vehicle emission controls (Metropolitan Washington Air Quality Committee 1997). Despite improvements, the entire Washington, D.C. metropolitan area, including Rock Creek Park and the adjacent counties in Virginia and Maryland, is classified as being in non-attainment with the ozone NAAQS by the U.S. Environmental Protection Agency (EPA).

The park and parkway are within a class II air quality area. The air quality is generally good with the exception of ozone. Ozone cannot be measured as a tailpipe emission. Instead, it is a secondary pollutant that is formed in the atmosphere by the combination of volatile organic hydrocarbons and nitrogen oxides with sunlight as a catalyst. Ozone exceedences generally occur in the summer and are region-wide, rather than localized. The occurrence of high levels of ozone is almost always associated with hot stagnant air masses over the region in combination with strong sunlight. High concentrations of ozone can result from the long-range transport of high ozone concentrations that are generated in other regions and drift into the area.

The regional airshed and the study area are in compliance for all other NAAQS pollutants. However, the region only recently became an attainment area for carbon monoxide and now implements a maintenance plan to prevent violations of the carbon monoxide standard. Carbon monoxide is a tailpipe emission, and local monitoring can indicate problem areas.

The National Park Service conducted a short-term air pollution monitoring study in the park and along the parkway from December 7 to 20, 1996 (Robert Peccia and Associates *et al.* 1997). The goal was to assess carbon monoxide concentrations at three locations during peak morning and afternoon rush-hours. Winter sampling was performed, because winter is the worst season for high carbon monoxide emissions. This occurs because vehicles emit more carbon monoxide during cold weather, especially during the cold-startup period, and temperature inversions can trap carbon monoxide emissions close to the ground.

Monitoring sites were located at the intersection of 16th Street and Colorado Avenue, near Military Road; at the intersection of the Rock Creek and Potomac Parkway and Calvert Street; and at the golf course, away from roads. The golf course location was chosen in an effort to establish background (unaffected by local traffic) levels.

Considerable variations were seen in the data as a result of wind direction, precipitation, and atmospheric mixing. On three occasions, wind direction caused the “background” golf course concentrations to be higher than the other sites.

The study did not indicate that there were any “valley effects” that would tend to concentrate pollutants within the narrow valley bottom. In general, the measured levels showed agreement with measurements taken during the same period at other local air monitoring stations around the Washington, D.C. metropolitan area. The data generally confirmed that carbon monoxide is an area-wide air pollutant that is largely derived from vehicle emissions. The sampling results suggested that some of the carbon monoxide detected in the park drifts in from the city.

As shown below, the highest concentration of carbon monoxide was 3.38 parts per million, measured over a 3-hour period at the intersection of 16th Street and Colorado Avenue. This and all other measured concentrations from the park and parkway were well below both the 1-hour and 8-hour NAAQS for carbon monoxide. Based on these limited sampling results, the carbon monoxide levels in the park and along the parkway meet the NAAQSs for carbon monoxide.

1-hour NAAQS for carbon monoxide	35 parts per million
8-hour NAAQS for carbon monoxide	9 parts per million
Maximum carbon monoxide level measured during the December 1996 monitoring	3.38 parts per million

ROCK CREEK AND ITS TRIBUTARIES

Rock Creek and its tributaries are included as an impact topic based on the criteria presented in the “Impact Topics – Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

The Rock Creek Watershed map was included previously in the “Servicewide Mandates and Policies” section. Rock Creek flows generally south for 33 miles from its headwaters near Laytonsville, Maryland, to its confluence with the Potomac River at Georgetown. Land uses within the 77-square-mile Rock Creek watershed include urban, suburban residential, agricultural, and parkland.

An estimated 500,000 people reside in the watershed. Approximately 70 percent of the watershed, mostly upstream from Rock Creek Park, is developed. Much of the developed area consists of impervious surfaces, such as buildings, roads, and driveways. Problems within the park that have been produced by upstream development include increased flooding from rapid runoff, abnormal stream bed scouring in some places and sedimentation in others, bank erosion, organic and chemical pollution, and accumulation of litter and other solid waste.

Rock Creek is the primary water feature in the park, and within the area it has two major tributaries.

Broad Branch enters from the northwest, just opposite the intersection of Blagden Avenue and Beach Drive.

Piney Branch enters Rock Creek from the northeast at Piney Branch Parkway, approximately a half mile south of Broad Branch.

Sixteen smaller tributaries enter the creek in Rock Creek Park, primarily from the west. Most Rock Creek tributaries to the east were canalized, covered, and converted into storm drains during the early development of Washington, D.C. (Banta 1993). There also are numerous minor tributaries and many groundwater springs that drain to Rock Creek within the park.

A recent study entitled *Best Management Practices for Water Quality, Rock Creek Park* (URS Greiner Woodward Clyde 1999) identified several facilities as actual or potential sources of water pollution in Rock Creek Park. These include the maintenance yard, public stables, H-3 park police stables, Edgewater park police stables, golf course, roads, and parking lots. For each of these areas, the report provided best management practices (BMPs) to remediate or prevent pollution. The National Park Service has begun implementing the recommended BMPs and will continue to do so, regardless of the alternative selected from this draft general management plan.

As shown in the Sewerlines and Outfalls map, numerous municipal storm sewers converge in the Rock Creek valley and discharge surface water from city streets directly into park waters. The pollutants that surface waters transport from roadways and parking lots are a major source of contamination of Rock Creek and its tributaries during and after precipitation events.

The Sewerlines and Outfalls map also shows that numerous municipal sanitary sewers are located within the park, including pipelines that run under road beds and under the creek channel. Sanitary sewers carry raw sewage, and can pollute park waters when leaks develop. In upper Rock

Creek, high bacterial concentrations are suspected to originate from sanitary sewer leaks, and from failed septic systems in the Maryland portion of the watershed.

A serious source of pollution exists in the southeastern portion of the park where there is an antiquated system of combined sanitary and storm sewers (see the Sewerlines and Outfalls map). Under normal conditions, the flow in these combined sewers is routed to the Blue Plains municipal wastewater treatment plant. However, during storms when rainfall exceeds 0.3 inches per hour, these sewers overflow and discharge raw, untreated sewage directly into Piney Branch and Rock Creek. There are 29 combined sanitary/storm sewer overflow structures on Rock Creek. Together, they can contribute as much as 42.5 million gallons of combined storm water and sewage to the creek during a 1-hour storm (URS Greiner Woodward Clyde 1999).

The Washington, D.C. Water and Sewer Authority (WASA) estimates that 60 to 70 overflow events occur each year (*Engineering News-Record* 2001). In July 2001, the WASA proposed a \$1 billion plan that would reduce overflow discharges throughout its service area by more than 90 percent. It would involve constructing three 20-foot-diameter, concrete-lined tunnels that together could hold approximately 115 million gallons of mixed storm runoff and sewage. Runoff from all but the largest 5 to 10 storms annually would be stored temporarily in the tunnels and then routed to the Blue Plains Wastewater Treatment Plant. One of these tunnels, which would be a half-mile long and have a capacity of 5 million gallons, would be constructed along Rock Creek. The WASA is currently preparing a final plan for submittal to the U.S. Environmental Protection Agency and identifying sources of funding (*Engineering News-Record* 2001).

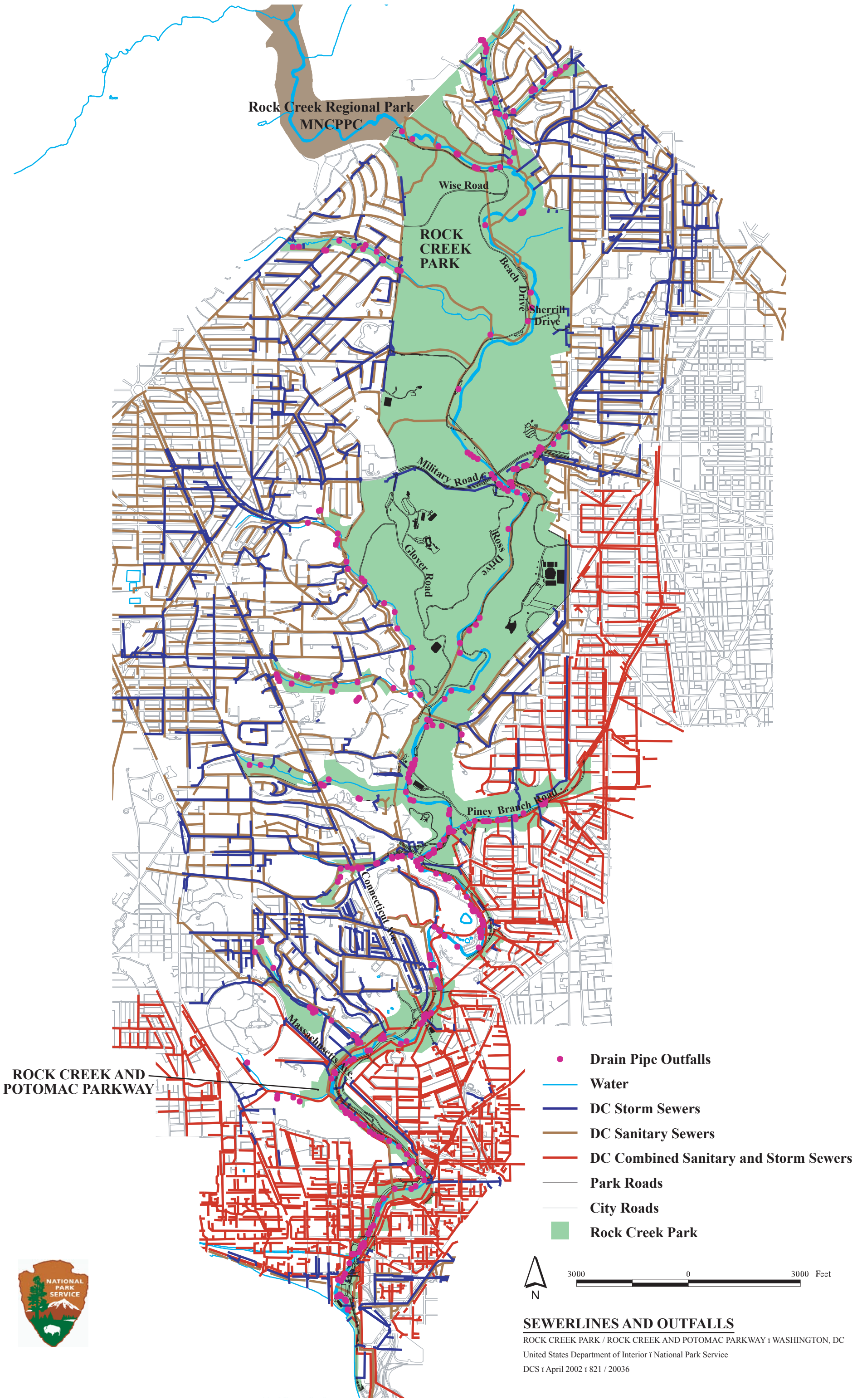
For the purposes of water quality standards, the surface waters of the District of Columbia are classified based both on their current uses and the future uses to which the waters could be restored. Each designation category has applicable water quality standards that are the principal water quality management objectives for the park. The district works to support the designations and meet the applicable standards by granting permits and reviewing permit applications and environmental impact statements. The standards and classification of the district's waters are published in the District of Columbia Register, Chapter 11 of Title 21 DCMR.

The District of Columbia Water Resources Management Division has designated Rock Creek and its tributaries for restoration to meet all five beneficial use classes. The classes and the status of surface waters in the park in meeting the standards associated with the classes are as follows:

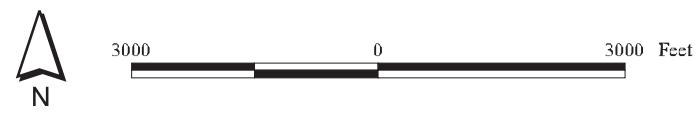
Class A is for primary contact recreation. These standards are not being met in Rock Creek and its tributaries.

Class B is for secondary contact recreation and esthetic enjoyment. These standards are not being met in Rock Creek and its tributaries.

Class C is for propagation of fish, shellfish, and wildlife. The water quality in some of the tributaries partially supports the Class C designation, but the water quality of Rock Creek does not currently support this designation.



ROCK CREEK AND
POTOMAC PARKWAY



SEWERLINES AND OUTFALLS
ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY / WASHINGTON, DC
United States Department of Interior / National Park Service
DCS / April 2002 / 821 / 20036

Class D is for protection of human health related to consumption of fish and shellfish. The Class D standards are partially supported below the Peirce Mill dam. However, the creek above the dam was not assessed for support of the Class D standards, because the dam will continue to be a barrier to the migration of fish until a fish bypass is completed in 2003 as part of the mitigation program for the Woodrow Wilson Bridge.

Class E is for navigation. The Class E designation is supported in Rock Creek.

Rock Creek and its tributaries have also been designated “Special Waters of the District of Columbia” for their scenic and esthetic importance. It is intended that the water quality of such designated waters be maintained and not allowed to degrade.

Some point and non-point sources of water pollutants in Rock Creek Park were identified previously. The types of contaminants contributed to surface waters in Rock Creek Park include the following.

Sediment is transported from unvegetated soils, such as construction sites and agricultural fields.

Storm water runoff from transportation corridors and parking lots within the watershed carries sediments, oil and grease, and metals, such as cadmium, iron, lead, and zinc.

Runoff from lawns and leaking sewerlines are sources of nutrients, including nitrogen and phosphorus, and contributes to high coliform bacteria counts.

Pollution has adversely affected the ability of Rock Creek Park and its tributaries to support aquatic life. Banta (1993) determined that 58 percent of the tributaries of Rock Creek were classified as severely impaired for habitat quality and biological water quality using U.S. Environmental Protection Agency (EPA) biological assessment standards, and that the remaining 42 percent of the creek’s tributaries were moderately impaired.

The *Baseline Water Quality Data/Inventory and Analysis – Rock Creek Park* (NPS 1994) reported that criteria for nitrite, pH, dissolved oxygen, copper, zinc, total and fecal coliform bacteria, and turbidity were exceeded multiple times throughout the study area. A summary of water quality sampling results for these parameters is provided in table 8. The criteria included drinking water standards and EPA freshwater acute toxicity standards. The baseline water quality report concluded that surface water quality in the park was typical of that encountered in streams in metropolitan areas.

A 1996 water quality assessment report was prepared by the District of Columbia for the U.S. Environmental Protection Agency and U.S. Congress pursuant to Section 305(B) of the Clean Water Act (P.L. 97-117) (District of Columbia 1996a). This report documented violations of fecal coliform bacteria and pH standards.

Water quality concerns in Rock Creek appear to have stabilized, both because upstream urbanization has reached a maximum and because of the diligence of government agencies in Maryland in controlling of pollutant discharges and storm water runoff. This particularly includes requiring new development to implement best management practices to control storm water runoff. In addition, there has been a decrease in upstream agriculture, and natural vegetation has been allowed to revegetate abandoned farmlands. This land use change reduces sediment,

TABLE 8: ROCK CREEK WATER QUALITY, 1959 TO 1990^{a/}

Water Quality Parameter	Total Number of Samples	Number Exceeding EPA Standard^{a/}	Percent Exceeding EPA Standard^{a/}
Total nitrite, as N	291	73	25
pH ^{c/}	642	27	4
Dissolved oxygen	342	28	8
Copper	57	6	11
Zinc	58	16	28
Total coliform	419	408	97
Fecal coliform	204	163	80
Turbidity	254	40	16

a/ Source: NPS 1994.

b/ EPA criteria included drinking water and freshwater acute toxicity standards.

c/ pH exceedence defined as greater than 9.0 or less than 6.5.

pesticides, and fertilizers entering the waterway. The *Rock Creek Watershed Conservation Study* (CH2M Hill 1979) led to improvements to Rock Creek and its tributaries within the park.

Park resources management staff members monitor sanitary sewers and facilitate their repair to correct leaks.

The District of Columbia has been given assistance in tracing illegal pollutant discharges connected to storm drains.

Combined sanitary/storm sewer outlets have been identified for retrofitting to reduce discharges.

Dry-weather outfall surveys have led to the cleaning of blocked combined sanitary/storm sewers to halt continual overflowing.

Because the majority of the Rock Creek watershed lies outside of Rock Creek Park and the jurisdiction of the National Park Service, park personnel must work with other federal, local, state, district, and regional agencies and organizations to implement steps that would improve existing water quality in the park. The Chesapeake Bay Program is the most comprehensive interagency effort to improve water resource values in the region.

WETLANDS AND FLOODPLAINS

Wetland and floodplains are included as an impact topic based on the criteria presented in the “Impact Topics - Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

The Clean Water Act and Executive Orders 11990 and 11988 identify wetlands and floodplains as national natural assets. They direct all federal agencies to avoid the occupation, adverse modification, or degradation of wetlands and floodplains.

Wetlands. Three temporarily flooded, forested National Wetland Inventory (NWI) -designated wetlands (NWI designation of PFO1A) are found along Rock Creek in the northern portion of the park. Rock Creek is identified as an open water, tidally influenced riverine system (NWI designation of R1OWV) (U.S. Fish and Wildlife Service 1999).

An additional wetland inventory was performed in 1997 (District of Columbia Government 1997a). Its results differ from the NWI only by defining the northernmost forest wetland as being about twice the size of the wetland identified by the NWI.

The most common wetlands in the park are located within the primary floodplain of Rock Creek where the creek it is underlain by Codorus silt loam (Soil Conservation Service 1976). These riparian wetlands are typically covered by sycamore-green ash forest. Other riparian wetlands, not identified by the NWI, are in the narrow alluvial deposits of the Pinehurst Branch, Fenwick Branch, and Joyce Branch drainages.

Vernal pools, also not identified on the NWI, are widely scattered wetland features in the park. These are small, temporary puddles or ponds that appear during wet periods and are dry at other times. If they persist for 4 months or more, including the spring, these limited habitats can be breeding places for frogs, toads, and salamanders. The number of vernal pools in the park today may be reduced from the pre-urbanization era due to past draining or filling activities, stream bed scouring from increased runoff that has resulted from development in the watershed upstream from the park, and lowered water tables from urban groundwater usage.

Other important wetland-related features in the park include groundwater springs and seeps. These small, wet areas are fed by relatively dependable flows of pollutant-free water. Several of these wetlands support endemic, aquatic animal species such as amphipods and other macroscopic invertebrates.

Floodplains. Floodplains in the park were mapped as part of the *Rock Creek Watershed Conservation Study* (CH2M Hill 1979). Flood levels in the park have been substantially affected by urbanization and associated increases in impervious surfaces in the Rock Creek watershed. Stream flows in the main stem of Rock Creek during storm events are estimated to be more than double the predevelopment discharge (CH2M Hill 1979).

Four major park buildings are in the 100-year floodplain. Peirce Mill and the Miller cabin are completely within the 100-year floodplain. Portions of the Lodge House and the Edgewater Stables building are on the fringe of the floodplain, but would not be subject to high velocities or deep water during flooding (CH2M 1979).

Sections of Beach Drive and the Rock Creek and Potomac Parkway are within the 100-year floodplain, as are a number of picnic groves and associated parking areas, picnic shelters, and restrooms. Under NPS floodplain management guidelines, historic structures, picnic facilities, daytime parking facilities, roads, and trails are acceptable within the 100-year floodplain.

A network of storm sewer, sanitary sewer, and combined sanitary/storm sewerlines underlies the park (see the Sewerlines and Outfalls map). Some of these pipelines are within the 100-year floodplain. The storm sewers discharge into drainages that may lead to riparian wetlands, and the combined sanitary/storm sewers experience overflows that may discharge raw sewage into floodplains and wetlands whenever rainfall exceeds 0.3 inches per hour.

DECIDUOUS FORESTS

Deciduous forests are included as an impact topic based on the criteria presented in the “Impact Topics - Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

The establishing legislation for the park identifies “timber” as an essential resource to the park. The National Park Service interprets this in an ecological context to mean not individual trees, but the interrelated plant and animal populations that form the forest community. The ecosystem processes provided by forests are a part of this essential resource. In addition, forest stands are an integral component of the scenic quality of the park cited in the establishing legislation. Therefore, regardless of the management alternative selected from this draft general management plan, the National Park Service will maintain the forests consistent with its charge in the 1916 Organic Act to preserve unimpaired the natural resources and values of the park for this and future generations.

Approximately 80 percent (1,662 acres) of the park land area is covered with mature second growth forest. Activities prior to the park’s establishment in 1890, such as timber cutting, farming, and Civil War clearing, removed virtually all of the original forest. A few large oaks still living in the park are estimated to be more than 275 years old and may be remnants of virgin growth. Today’s woodlands are primarily a mixture of deciduous species typical of the eastern deciduous forest in the later stages of succession.

Rock Creek Park runs along the topographic break separating the Piedmont Plateau and the Atlantic Coastal Plain provinces. The vegetation reflects affinities to both of these provinces. The following five forest associations have been identified and mapped in Rock Creek Park using the National Vegetation Classification System developed by The Nature Conservancy (1998).

The beech-white oak/mayapple forest association occurs on moist to somewhat drier slopes. It is the most common of all associations found in the park. Two variants include the mixed oak/beech variant and the beech-tulip poplar variant.

The tulip poplar forest association is uncommon and occurs on moist, mid-slope to low-slope sites that were cleared in the past. The sites are exclusively dominated by tulip poplar.

The chestnut oak-black oak/huckleberry forest association is uncommon and occurs on ridge tops, convex upper slopes, and south-facing slopes on rocky, well-drained soils.

The sycamore-green ash forest association is uncommon and occurs along stream banks, floodplains, and other low-lying areas subject to temporary or irregular flooding.

The Virginia pine-oak forest association is rare because it is an early to mid-successional forest that is being replaced by hardwood forests. Remnants of this association occur on dry soils of hilltops in limited areas where forest succession has not yet replaced it.

An inventory of park vegetation, conducted by park and volunteer staff between 1986 and 1994, documented 656 species of vascular plants in Rock Creek Park between the National Zoo and the Maryland boundary. Five plant species that had been found in the park during a 1919 vegetation

inventory were not found during the 1986 – 1994 inventory. They included swamp shadbush (*Amelanchier canadensis*), shooting star (*Dodecatheon meadia*), dwarf chinkapin oak (*Quercus prinoides*), Allegheny chinkapin (*Castanea pumila*), and a wild rose (*Rosa setigera*). The reasons for their absence in the second inventory are unknown.

Small natural areas such as the park and parkway have been shown to be very important contributors to regional biodiversity (Falkner and Stohlgren 1997). Based on the vegetation inventory, Rock Creek Park continues to serve as a major reservoir of native flora for the region and is important in protecting the natural heritage of this area.

The recent inventory of park vegetation also determined that 238 of the plant species were introduced species, not native to the area. Of this number, 42 species have been judged to be invasive exotic species that, unless controlled, are likely to spread and adversely affect native plant populations. Control of these invasive exotic plants is a serious problem in the park. A program now underway is selectively applying approved herbicides to invasive species in a limited portion of the park. However, control efforts are not able to keep pace with the rate of invasive plant introduction and spread. Management of invasive species will be a continuous need in the park and operational plans will be updated as control strategies and funding evolve.

Soil properties are integral components of determining the species diversity, productivity, and regenerative potential of the deciduous forest system. Therefore, soil characteristics important to these processes are included in this impact topic characterization.

The park's soil resources are adversely affected by accelerated erosion, compaction, and deposition caused by human activities inside and outside the park boundaries. Some areas that receive heavy visitor use are subject to soil compaction, removal of vegetation cover, and erosion. This is particularly evident along streambanks, at picnic groves and other popular recreation areas, and along heavily used or improperly designed and maintained trails. Accelerated erosion caused by increased runoff from the upstream watershed is occurring along the Rock Creek channel in the northern portion of the park. Associated deposition of some of the eroded soils is occurring in the floodplains in the central and southern portions of the park and parkway. The National Park Service will implement measures to protect soils from erosion, compaction, and deposition caused by human activities and to restore areas of soils degradation, as required in *Management Policies* (NPS 2001b).

As described previously in "Servicewide Mandates and Policies," a 1980 memorandum from the Council on Environmental Quality requires the protection of soils that are classified as prime and unique farmlands. In a letter to the National Park Service, the Natural Resources Conservation Service (1998) identified two soil types within the park that are classified as prime farmlands. However, as discussed in "Impact Topics Dismissed from Further Consideration," neither of the prime farmland soil types in the park would be disturbed by management action proposed in any of the alternatives. They will continue to be protected as part of the park's forest resource.

Woodland fires in the park were described in the section entitled "Servicewide Mandates and Policies." An average of two fires occur in park each year. All wildfires are suppressed promptly by the District of Columbia Fire Department or park firefighters.

PROTECTED AND RARE SPECIES

Protected and rare species are included as an impact topic based on the criteria presented in the “Impact Topics - Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

The National Park Service is required under the Endangered Species Act to ensure that federally listed species and their habitats are protected on lands within the agency’s jurisdiction. Only one federally listed species, the endangered Hays spring amphipod (*Stygobromus hayi*), is known to inhabit the park.

Lists of the rare and protected species that are documented as occurring in Rock Creek Park are provided in appendix E. Complete lists of federally listed species and the species identified as protected or rare by the states of Maryland and Virginia can be found on the internet. Internet addresses for the lists are presented in the bibliography under these citations:

U.S. Fish and Wildlife Service 1999

Maryland Department of Natural Resources 1994

Maryland Department of Natural Resources 1995

Virginia Department of Conservation and Recreation 1998

Federal- and State-Listed Amphipods. The Hays spring amphipod was discovered in Rock Creek Park in 1998. Earlier, another rare species, Kenk’s amphipod, also known as the Rock Creek groundwater amphipod, (*Stygobromus kenki*), was identified in park springs. Kenk’s amphipod is not currently listed under the Endangered Species Act, but it is under consideration by the U.S. Fish and Wildlife Service (USFWS) for future listing. In addition, three other *Stygobromus* species of amphipods that are listed by the state of Maryland as rare or uncommon have been located in or near the park (Maryland Department of Natural Resources 1995).

Groundwater amphipods are sensitive to environmental pollution, making the present concentration of these species an extremely rare occurrence in the Piedmont region. The relative abundance of rare amphipods in the park has been attributed to the long-term protection of groundwater quality afforded by the park.

The Hays spring amphipod ranges from one-half to one inch long. It is colorless, eyeless, and has adaptive hairs for sensing currents and food. They have life spans of 8 years or more and a low reproductive rate. *Stygobromus* amphipods spend the majority of their lives in groundwater below the surface, feeding on detritus. Amphipods are subject to a number of predators when they are at surface springs, such as stonefly larvae and salamanders, but probably have few if any predators below the surface.

Threats to groundwater amphipods include alterations of groundwater flows, groundwater pollution, loss of detritus as a food source, and disturbance of spring sites. Common pollution problems for amphipods are nitrates in fertilizers (which can result in groundwater oxygen depletion), pesticides, and petroleum leaking from underground storage tanks.

Other State-Listed Species. Washington, D.C. does not currently provide special protection status for rare plant or animal species. As shown in appendix E, the adjoining states of Maryland and Virginia (Maryland Department of Natural Resources 1994; Virginia Department of Conservation and Recreation 1998) list

seven plant species that are documented as occurring in Rock Creek Park as “highly state rare – critically imperiled” (E, S1, or S2)

21 species that are documented as occurring in Rock Creek Park as “watch list – rare or uncommon” (S3)

Although five of these species are trees, most are non-woody, herbaceous species that typically occur in a single population within the park.

Three animal species with known occurrences in Rock Creek Park are listed as rare or uncommon by the adjoining state of Maryland (Maryland Department of Natural Resources 1995). Wetlands, including freshwater springs and outflow channels, provide habitat for each of these species. They include the

yellow-crowned night-heron (*Nyctanassa violacea*), which is considered highly rare

Appalachian spring snail (*Fontigens bottimeri*), which is considered rare

gray petaltail dragonfly (*Tachopteryx thoreyi*), which is considered possibly rare, but of uncertain status

The National Park Service is not under any legal obligation to protect these plant or animal species. However, park policy and management actions include maintaining these uncommon native species as part of the park’s natural heritage.

OTHER NATIVE WILDLIFE

Terrestrial Wildlife. Native wildlife species are included as an impact topic based on the criteria presented in the “Impact Topics - Resources and Values at Stake in the Planning Process” section. The specific concerns related to this impact topic are summarized as part of the “Environmental Consequences” discussion.

The woodlands in Rock Creek Park provide suitable habitat for a variety of wildlife mammal species, despite their location within the city limits of the District of Columbia. Approximately 30 species of mammals have been inventoried in the park. Species of particular interest because of their size or their public attention include the raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), and white-tailed deer (*Odocoileus virginianus*).

White-tailed deer have been recorded for many years, but since the late 1980s their numbers have substantially increased. Aerial infrared photography taken in March 1997 indicated a population of 87 deer, and a repeat survey in March 1998 estimated the number had increased to 155. The deer population is monitored to avoid adverse impacts park resources.

Approximately 160 species of nesting or visiting birds have been found in the park, including the great-horned owl (*Bubo virginianus*), barred owl (*Strix varia*), red-tailed hawk (*Buteo jamaicensis*), broad-winged hawk (*Buteo platypterus*), belted kingfisher (*Megasceryle alcyon*), and numerous songbirds. Most of these are migrants or seasonal visitors. Typically, 22 to 24 species nest in the breeding bird census area in Rock Creek Park (unpublished data from the Rock Creek Park breeding bird census, 1997 through 1999).

In recent years, volunteers evaluating bird populations have noticed pronounced declines in neotropical migrant species. Similarly declining populations of neotropical migrants are evident throughout the United States. These declines are thought to be caused by receding or fragmented habitats both in tropical wintering grounds and in northerly breeding grounds in temperate areas (Friesen *et al.* 1995). Nest parasitism of some species by the brown-headed cowbird (*Molothrus ater*) and predation by crows (*Corvus brachyrhynchos*) also appear to reduce breeding success in many areas, including Rock Creek Park. Consistent with the NPS' preservation mandate, the park staff is exploring options for reducing the declines of migrant species locally, such as cowbird control, improved snag management, and trail rerouting or closure to avoid sensitive habitats.

The variety and numbers of amphibians and reptiles found in the park are markedly reduced compared to inventories from the early and middle parts of the 20th century. Of species historically recorded for Rock Creek Park, only 9 of 17 amphibians and 11 of 24 reptiles have been recorded in recent years. The amphibian observations are consistent with the recent world-wide decline in amphibian numbers and diversity.

Some amphibians such as the gray treefrog (*Hyla versicolor*) and chorus frog (*Pseudacris triseriata*) have disappeared altogether from Rock Creek Park.

Others amphibians, such as the spring peeper (*Hyla crucifer*), wood frog (*Rana sylvatica*), and spotted salamander (*Ambystoma maculatum*) can be found in modest numbers in wetland areas.

Red-backed salamanders (*Plethodon cinereus*), which do not depend on wetlands, are relatively common in moist uplands where they inhabit moist niches under logs and leaf litter.

Factors responsible for the declines in reptile diversity in Rock Creek Park are unknown. Relatively protected and abundant moist upland sites provide habitat for small snakes, such as the northern ringneck snake (*Diadophis punctatus*), which are common. Eastern box turtles (*Terrapene carolina*) and larger snakes such as the black rat snake (*Elaphe obsoleta*) are much less common.

Aquatic Wildlife. Recent surveys have found approximately 35 species of fish in Rock Creek.

Resident native species include five shiners (*Notropis* spp.), two bullheads (*Ictalurus* spp.), and three sunfish (*Lepomis* spp.). Blacknose dace (*Rhinichthys atratulus*) are relatively common and can be found in the main stream and many tributaries.

Other resident species are introduced, including carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*).

At least two native species, the blueback herring (*Alosa aestivalis*) and the alewife (*Alosa pseudoharengus*), migrate from salt water up Rock Creek to spawn each spring (anadromous). An abandoned sewerline and an abandoned gauging station near Q Street that interrupted their migrations have been removed from Rock Creek (Madaras 2001). The removal of eight other barriers in Rock Creek and the installation of a fish bypass at the Peirce Mill Dam as part of the Woodrow Wilson Bridge mitigation are expected to allow these species to migrate from the mouth of the creek upstream to Needwood Lake in Montgomery County, Maryland (Madaras 2001).

The American eel (*Anguilla rostrata*) is the only species found locally that lives in either fresh or brackish water. Eels migrate to the Sargasso Sea to spawn (catadromous). The removal of barriers in Rock Creek as part of the Woodrow Wilson Bridge mitigation is expected to enhance the habitat for this species.

The urban pollution and storm water runoff problems that were described previously in the section entitled “Rock Creek and Its Tributaries” have adversely affected fish numbers and diversity in the park. Generally, the 16 tributaries of Rock Creek are more severely affected than the main channel. In a 1993 study by NPS staff, no fish were found in nearly half of the tributaries, and only one had more than a single species present. Flooding and scouring during storms, pollution from runoff, and periodic low flows are likely contributing factors.

Non-Native Terrestrial Animals. Several non-native species of wildlife that occur in Rock Creek Park are adversely affecting the park’s natural resources.

Free-roaming domestic cats (*Felis catus*), particularly near the park borders, prey on local populations of songbirds, squirrels, and other small mammals and may reduce their numbers (Mitchell and Beck 1992).

Starlings (*Sturnus vulgaris*) compete with some cavity-nesting birds for nest sites.

The gypsy moth (*Lymantria dispar*) has been present in the park for many years and, at times, has become sufficiently abundant to require aerial spraying to prevent forest defoliation and related impacts.

The effects of these and other exotic animals on native species are not fully known. They could be substantial, considering the small size of the natural areas of Rock Creek Park and the park’s location within an urban setting. However, except for treatments of insect pests, no control efforts are presently contemplated for these species.

Roadkill. Collisions with vehicles kill or injure terrestrial and semi-aquatic animals on roads in Rock Creek Park, along the Rock Creek and Potomac Parkway, and on adjoining city streets. Since 1980, the park staff has kept informal counts of carcasses along roads and streets within and adjacent to the park and parkway. The data include species, date, and location where each carcass was found. The counts are non-systematic and were collected incidental to other activities. Because of the informal nature of the data collection and the frequent removal of roadkill carcasses by scavengers such as crows and raccoons, the park roadkill counts probably are lower than actual animal deaths. Larger, more conspicuous animals, particularly mammals, tend to be

more represented in the count, as opposed to smaller animals such as songbirds, amphibians, and reptiles that are more easily overlooked or scavenged.

For the 10 years between 1991 and 2000, park staff recorded 1,223 roadkilled carcasses. Table 9 summarizes these data by class and by selected species.

Between a quarter and a third of the annual recorded roadkill in the park and vicinity occurs on Beach Drive. For example, in the year 2000, 104 carcasses were recorded, including 28 from Beach Drive. Table 10 shows all roadkilled species recorded from Beach Drive in 2000 and sub-totals for sections of the road under different traffic management strategies.

TABLE 9: RECORDED ROADKILLS IN AND ADJACENT TO ROCK CREEK PARK AND THE ROCK CREEK AND POTOMAC PARKWAY, 1991 THROUGH 2000

Type	Number	Percent of Total Roadkills Recorded
Total recorded roadkills, 1991 through 2000	1,223	100
Mammals	1,088	89
Squirrel	455	37
Raccoon	303	25
Deer	135	11
Opossum	96	8
Other	96	8
Gray fox	3	0.25
Birds	90	7
Reptiles	45	4
Box turtle	22	2
Black rat snake	15	1

TABLE 10: ROADKILLS RECORDED ON BEACH DRIVE IN 2000

Species	Total for Beach Drive	South of Broad Branch Road	Sections Closed to Traffic on Weekends and Holidays	Sections Open to Traffic North of Broad Branch
Raccoon	8	5	3	0
Squirrel	7	3	3	1
Deer	4	1	0	3
Water snake	2	0	1	1
Unidentified bird	2	2	0	0
Red-eyed vireo	1	0	0	1
Snapping turtle	1	0	1	0
Box turtle	1	0	0	1
Opossum	1	1	0	0
Domestic cat	1	0	1	0
Total	28 (100%)	12 (43%)	9 (32%)	7 (25%)
Percent of road length	100%	13%	46%	41%
Average annual road-kill per mile	28/5.8 = 4.8	12/0.70 = 17.1	9/2.7 = 3.3	7/2.4 = 2.9

As shown in the table, the highest incidence of roadkill on Beach Drive occurs south of Broad Branch Road. The roadkill rate on this stretch is five times higher than on more northern portions of Beach Drive, indicating that this area might be an appropriate site for the installation of mitigating measures such as traffic controls or protected wildlife crossings such as culverts.

As shown in table 11, 16 animal carcasses were recorded from the 2-mile-long Rock Creek and Potomac Parkway in the year 2000. This produces an average annual roadkill of eight animals per mile. Contributing factors to this relatively high value probably include the higher traffic speeds on the parkway and heavier traffic level than on most park roads.

TABLE 11: ROADKILLS RECORDED ON THE ROCK CREEK AND POTOMAC PARKWAY IN 2000

Species	Number
Squirrel	5
Raccoon	5
Mallard duck	2
Unidentified bird	2
Crow	1
Deer	1
Total	16

The importance of roadkill to populations of wildlife is difficult to determine. Squirrels, raccoons, and deer sustain the heaviest toll from vehicle collisions. However, these species are common in the region and have high reproduction potentials. Their populations do not appear to be substantially influenced by roadkill. For less common species with more limited reproduction potential, roadkill could be a contributing factor to population reductions or local extirpation (Foreman and Alexander 1998).

Based on casual, undocumented sightings, four species of wildlife may have declined in the park over the past decade or more. These species are the opossum, gray fox, eastern box turtle, and black rat snake. Concern has been expressed that roadkill could be a contributing factor. Recorded roadkill numbers and locations for these species between 1991 and 2000 are shown in table 12. For all four species, approximately a third of the roadkills were recorded *outside* of the park and parkway.

Opossum – The number of road-killed opossum carcasses recorded in and around Rock Creek Park and the parkway has declined over the past 10 years. Numbers have dropped from a high of 16 animals in 1992 to one specimen in 2000.

Although the reason for the decrease is unknown, it is unlikely that roadkill is causing a population decline. Opossums are common in the region and much of the United States. They have a high reproduction potential (2 litters per year with 5 to 13 young per litter) and are highly adapted to living in close proximity to humans, even in densely developed metropolitan areas (Hossler *et al.* 1994; Pennsylvania Game Commission 2001). The decline in roadkill in Rock Creek Park probably reflects population reductions caused by another factor such as a disease outbreak. It is unlikely that roadkill would seriously threaten or cause the extirpation of opossums in the park.

TABLE 12: LOCATIONS OF RECORDED ROADKILLS FOR FOUR SPECIES, 1991 THROUGH 2000

Location	Opossum	Grey Fox	Box Turtle	Black Rat Snake
Park roads				
Rock Creek and Potomac Parkway	18	1		
Beach Drive south of Broad Branch Road	14	1		1
Beach Drive north of Broad Branch Road	8		2	3
Wise Road	4		1	1
Glover Road	3		3	2
Ross Drive	1		1	
Bingham Drive			4	
Joyce Road				1
Nature center/maintenance area	1		1	1
Other park roads	7			
Adjacent non-park roads				
Military Road (though park and nearby)	17	1	2	
Oregon Avenue	14		8	5
Broad Branch Road	4			1
Other non-park roads	5			
Total roadkills recorded 1991-2000	96	3	22	15

Gray Fox – In the past 10 years, three gray foxes have been found dead on roads in and around the park, including one each in 1991, 1994, and 1999. Gray foxes are relatively common in the eastern United States. They have been described as habitat generalists that prefer wooded areas with dense cover for daytime dens and mixed fields and forests for nighttime hunting (Greenburg and Pelton 1994).

A study in Tennessee found that gray foxes had overlapping home ranges of about 1,000 acres, and that a 5,000-acre area supported 12 adult and young foxes (Greenburg and Pelton 1994). New Mexico studies showed that gray foxes were tolerant of low to moderate residential development, but avoided high-density development (Harrison 1993 and 1997). At 1,700 acres, Rock Creek Park may provide sufficient habitat for only a few individuals. Additional habitat on adjoining lands would be necessary to support a larger, more sustainable gray fox population.

Gray foxes, such as young animals dispersing from the den, will travel distances of 50 miles or more (Trippensee 1953). The Rock Creek corridor probably served as a travel route between foxes in the park and populations in woodlands to the north. However, as more of the forested areas in the upper drainage are developed, the interaction of animals in the park with those in other areas probably has been reduced. This would include the recruitment of foxes into the park population.

Gray foxes are very susceptible to canine diseases such as distemper and hepatitis (Nicholson and Hill 1984). The potential for these diseases to be introduced into the gray fox population from the large number of dogs using the park is a threat to gray foxes in the park.

Gray fox populations in and around the park are probably small and are likely stressed by habitat destruction, habitat fragmentation, low recruitment, and periodic disease outbreaks. Roadkills, even infrequent ones, could contribute to an overall reduction of a resident population or even local extirpation.

Box Turtle – There is no clear trend in recorded roadkills of box turtles in and around the park and parkway. Throughout the past 10 years, 22 box turtle roadkills have been recorded, for an average rate between two and three turtles per year.

Prime habitat for box turtles includes wooded uplands and bottomlands. In the wild, box turtles are known to live at least 40 years and there are claims of some turtles living more than 100 years. They do not reach sexual maturity until 4 or 5 years of age. The average clutch size is only four or five eggs, although a female may lay several clutches per year. The female does not protect the nest or hatchlings, and mortality of hatchlings is high, primarily because of predation (Dawson 1999).

Populations of box turtles have declined throughout their range in the eastern United States because of a variety of human-induced factors. Roadkill is believed to be a contributing factor to the declining numbers, along with habitat loss and fragmentation, commercial and personal collecting, predation by animals such as dogs and raccoons that are associated with human development, and disease (Hutchinson 2000; Mitchel, 2000). Because box turtles are long-lived and have a low reproduction potential, losses of individuals can have long-lasting effects on local populations.

A study in the 1950s of mixed forests and agricultural lands in Maryland reported turtle densities at 10 per acre (Hall *et al.* 2000). Other studies in Missouri summarized by Dawson (1999) indicated a lower density, identifying home range size as varying from about 5 acres to about 13 acres and stating that “the home ranges of several individuals will often overlap.”

There is little information on box turtle populations in Rock Creek Park. The riparian wetlands along Rock Creek and its tributaries provide excellent habitat, and sightings of box turtles by park visitors and park staff are relatively common. However, studies of box turtle numbers or densities have never been conducted. Removing box turtles from the park for any purpose, including use as pets, is illegal, but anecdotal evidence suggests that such illegal collecting occurs at a rate far greater than the annual roadkill rate of two or three box turtles. However, the additive effect of roadkill may be a contributing factor in an apparent decline in box turtles in and near the park.

Black Rat Snake – There is no clear trend in the pattern of roadkills of black rat snakes in Rock Creek Park over the past 10 years. Fifteen roadkills were recorded, including five on Oregon Avenue outside of the park.

Black rat snakes are fairly common in the region. They are active during daylight hours and hibernate during the winter months. They prefer dense cover along forest edges, meadows, and hedgerows and tend to avoid open areas such as closely mowed roadsides, road surfaces, and open fields. Black rat snakes use the interior of forests and, often, structures for periodic refuges (Durner 1991; Durner and Gates 1993).

Habitat for the black rat snake has declined in the Washington D.C. metropolitan area over the decades as land has been converted from woodlots and agriculture to high-density development. Within Rock Creek Park, black rat snake populations also may have declined because of continued maturation of forest, as opposed to the mix of woodlands and meadows that existed historically. Roadkill may be a contributing factor affecting local populations, but the degree of effect is unknown.

CULTURAL RESOURCES

ARCHEOLOGICAL RESOURCES

Several studies provide information on Rock Creek Park's archeological resources, previous archeological work in the park, and the status of archeological research. These studies include

Ancient Washington: American Indian Cultures of the Potomac Valley (Humphrey and Chambers 1985)

Archeological Survey Report: An Archeological Investigation of Thirty-One Erosion Control and Bank Stabilization Sites along Rock Creek and Its Tributaries, Rock Creek Park and Rock Creek and Potomac Parkway (NPS, Inashima 1985a)

National Capital Area Archeological Overview and Survey Plan for the Systemwide Archeological Inventory Program, National Park Service, National Capital Area (NPS, Little 1995c)

Rediscovering Archeological Resources at Rock Creek Park (Moran 1997)

Some of the prehistoric and historic objects recovered from Rock Creek Park have been cataloged and are kept in storage at the NPS' Museum Resource Center in Landover, Maryland.

There are at least 10 archeological sites in the Rock Creek valley with known prehistoric occupations. Three are quartzite quarries, three are soapstone quarries, three are short-term campsites, and one is a cremation burial. The latter was excavated prior to construction of a pier for one of the Whitehurst Freeway ramps. Data from that excavation are still being analyzed.

Historic archeological sites in the park are largely associated with historic agricultural and industrial uses during the 18th and 19th centuries, Civil War-era operations, and development of the park under the administration of the U.S. Army Corps of Engineers (1890 to 1933) and the National Park Service (1933 to present).

There is a high probability that there are additional undisturbed prehistoric and historic archeological resources in Rock Creek Park. Archeological sites in the park have not been systematically surveyed or inventoried, and precise information about locations, characteristics, and the significance of the majority of known archeological resources in the park is incomplete. Because the condition of archeological resources, especially those underground, is generally unknown, the impacts of development projects on archeological sites in the park are uncertain.

As described in the "Servicewide Mandates and Policies" section, an archeological identification and evaluation study of the park is required by law. Such a study has been scheduled to begin in fiscal year 2003. In addition, individual surveys will be needed prior to the initiation of ground-disturbing activities. Areas identified as having a high potential for archeological resources must be treated with special sensitivity.

NPS policy at Rock Creek Park is to work with the District of Columbia State Historic Preservation Officer (DCSHPO) to nominate all archeological and historical resources within the park and

parkway that appear to meet the National Register of Historic Places (NRHP) criteria. Although Rock Creek Park is listed on the NRHP, its archeological resources have yet to be individually listed. Currently, 23 archeological sites associated with the earliest occupation of the region and one site associated with an early 19th century industrial complex (Blagden Mill) have been investigated.

HISTORIC RESOURCES AND CULTURAL LANDSCAPES

Several NPS documentary studies provide an understanding of the historic development of the Rock Creek Park area and the Rock Creek and Potomac Parkway. These include:

Rock Creek Park: An Administrative History (NPS, Mackintosh 1985b)

Historic Resource Study: Rock Creek and Potomac Parkway, George Washington Memorial Parkway, Suitland Parkway, Baltimore-Washington Parkway (NPS, Krakow 1990a)

Historic Resource Study: Rock Creek Park, District of Columbia (NPS, Bushong 1990b)

Rock Creek and Potomac Parkway (Historic American Buildings Survey, HABS No. D.C.-697, 1991-2) (NPS, Davis 1992)

Linnaean Hill Cultural Landscape Inventory (NPS, Wheelock *et al.* 1998b)

Peirce Mill Cultural Landscape Inventory (NPS Wheelock *et al.* 1998d)

Europeans began to acquire private rights to land in the Rock Creek valley during the 17th century. However, the Rock Creek valley remained largely untouched by settlement until a trading post was established in 1703 at what was then the navigable mouth of Rock Creek.

Commercial and industrial use of Rock Creek increased steadily in the early decades of the 19th century. The gradient of the streambed and the water flow were sufficient to support a number of mills above and below the district line. The milling industry flourished along the creek in the first half of the 19th century, growing in direct proportion to the development of Georgetown and Washington City. More than a half-dozen water mills operated along its course within the district.

Today only the Peirce Mill stands on the creek near Tilden Street as a reminder of this once-common building type. Peirce Mill functioned as an integral part of a diversified farm complex. After 1890, stone grinding became obsolete and few water-powered flour millers operated in the eastern United States. However, Peirce Mill continued grinding corn, rye, and wheat into flour and meal until 1897 when its main shaft broke.

The Peirce family erected two substantial enclaves of buildings, several of which remain today. They represent the only examples of 19th century structures erected in the park prior to its establishment. The original Peirce family dwelling and its immediate dependencies were located about a quarter mile west of Peirce Mill, just south of present-day Tilden Street. The Peirce estate eventually numbered 11 buildings, many of which were built of solid granite. The Peirce-Klingling Mansion, which houses the park headquarters, was the core of the second major complex of buildings erected by the Peirce family in what would become Rock Creek Park.

Joshua Peirce became a prosperous nurseryman and landscape gardener who specialized in the cultivation of camellias and other exotic plants. His arboretum at Linnaean Hill provided botanical specimens for the grounds of the White House, U.S. Capitol, and many of the national capital's other federal reservations. The expansive landscape surrounding his mansion also included fruit trees and ornamental plants. Today, the Peirce structures stand as rare examples of early 19th century vernacular stone construction in the District of Columbia.

The mills and estates in the Rock Creek valley were served by a network of roads. The courses of five of these pre-Civil War roads exist roughly today in the form of

Tilden Street and Park Road (formerly Peirce's Mill Road)

Klinge Road (formerly Joshua Peirce's Road, laid out in 1831)

Broad Branch Road (surveyed and built in 1839)

Blagden's Mill Road (1847), a road trace on the landscape and a portion of Colorado Avenue

Milkhouse Ford Road, now Rock Creek Ford Road

Most of these early, narrow, unpaved roads were privately built, but they later evolved into public thoroughfares and were eventually acquired by the local government. Further road development was stimulated by the Civil War.

In 1862, army engineers constructed Fort DeRussy as part of a circle of fortifications around the city. They also established Military Road to connect the defenses of the city. Located northeast of the intersection of Military Road and Oregon Avenue, Fort DeRussy was strategically placed to provide formidable resistance to enemy advancement down the valley. The fort saw action during the only Confederate assault on the city in July 1864. Although the fort's structures were removed after the war, Fort DeRussy remains the most pronounced Civil War earthworks site in the national capital area.

Operation of the Godey Lime Kilns began in 1864. The manufacture and sale of lime at this site continued until 1907. The kilns represent an important aspect of the thriving late 19th century commercial activities in Georgetown. The kilns were partially restored by the National Park Service in 1967.

Urban development in the area surrounding the valley began with a building boom in the 1880s. By the late 1880s, tracts north of the old Washington city limits and near the future park had been subdivided into suburban lots, with development potential reaching to the banks of Rock Creek.

The rapid pace of suburban development threatened to destroy the rural character and natural scenery of the Rock Creek valley. In response, a bill establishing Rock Creek Park (Public Reservation 339) was approved by both houses of Congress and signed into law (26 Stat. 492) by President Benjamin Harrison on September 27, 1890. A copy of this legislation is provided in appendix A.

The first park improvements included a road system. The new park drive along the creek, named for Capt. Lansing Beach, incorporated existing road segments and a dirt road created by the con-

struction of a sewerline below Piney Branch in 1896. Walking trails and bridle paths also provided public access.

Boulder Bridge was constructed in 1902. It has become a quintessential symbol of the rustic character and picturesque design of the first park structures. It is Washington's finest example of rustic bridge architecture, and one of the earliest Melan reinforced concrete arch structures of its type built in the district.

In 1901-02, a Senate Park Commission comprehensive plan for the nation's capital included a proposal for a regional park system that extended beyond the boundaries of the district to include such scenic areas as Great Falls. One aspect of their proposal was the development of a parkway, in the wording of the 1913 legislation establishing the Rock Creek and Potomac Parkway, "for the purpose of preventing pollution and obstruction of Rock Creek and of connecting Potomac Park with the Zoological Park and Rock Creek Park."

On June 2, 1912, the reconstructed Joaquin Miller cabin (named for the California author of *Song of the Sierras*) was dedicated at a site just off Beach Drive, approximately a half-mile north of Military Road. The cabin, which had been disassembled and moved from its location across from Meridian Hill Park by the California State Association, soon became an "adopted" historic attraction in the park and a meeting point for picnic groups, hikers, and equestrian riders. Placement of the Miller cabin in the landscape was part of the picturesque improvement of the early 20th century Rock Creek Park, which was also evident in the design of Boulder Bridge, the dam at Peirce Mill, and the rustic stone improvements to Milkhouse Ford.

To accommodate the growing popularity of golf, two nine-hole golf courses were opened in 1923 and 1926 in the east side of the park north of Military Road at the site of a former arboretum, which had been removed in 1920. A remodeled farmhouse served as a clubhouse.

During the 1930s, numerous physical improvements in Rock Creek Park were made by the National Park Service and Depression-era work relief laborers. The National Park Service made an effort to blend new construction with the picturesque park landscape, designing new structures in a rustic style popularly known today as "parkitecture."

In 1935-36, the stone-lodge-style Lodge House was constructed as a U.S. Park Police substation near the intersection of Military Road and Beach Drive. The National Park Service continued to preserve historic buildings, including the Peirce-Klingler Mansion, the other structures at the Linnaean Hill complex, and the Peirce Mill with its adjacent springhouse and barn.

The 1930s marked the beginning of Rock Creek Park's use as a commuter route. The completion of a motor drive from the park's north end to East-West Highway in Maryland in 1932 and the opening of the Rock Creek and Potomac Parkway in 1936 created a continuous automobile route from Maryland to central Washington, D.C. However, it was not until 1966 that a truly continuous automobile route was created with completion of the zoo tunnel. Previously, evening zoo closure and flooding of fords hampered full use.

Historic National Register Properties. Historic properties within the park and parkway that are listed on the National Register of Historic Places (NRHP) include the

Peirce-Klingler Mansion

Peirce Mill

Peirce Springhouse and Peirce Mill Barn

Godey Lime Kilns

Boulder Bridge and Ross Drive Bridge

Fort DeRussy, which is listed as a contributing feature to the “Civil War Fort Sites” National Register nomination

In addition to the listing of individual properties, the area of Rock Creek Park covered by this general management plan was listed in the NRHP as Rock Creek Park Historic District (No. 91001524) on October 23, 1991. The historic district boundaries encompass Public Reservation 339 established as Rock Creek Park on September 27, 1890. The historic district included 31 resources classified as contributing to its significance. These resources are listed in appendix F.

In 1997-98, the National Park Service, in consultation with the District of Columbia State Historic Preservation Officer (DCSHPO), completed a comprehensive survey of structures in Rock Creek Park and the Rock Creek and Potomac Parkway that are eligible for listing on the NRHP. The Rock Creek and Potomac Parkway is eligible for listing, and the National Park Service currently is working with the DCSHPO to finalize a nomination.

Cultural Landscapes. Cultural landscapes reflect the relationship between what is natural and what is man-made. According to *The Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (Secretary of the Interior 1996), a cultural landscape is “a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or esthetic values.”

A cultural landscape inventory documents the qualities and attributes of a cultural landscape that make it significant and worthy of preservation. The goal of the National Park Service is to locate and evaluate cultural landscapes and provide information on their location, historical development, characteristics and features, and management to assist park managers in planning, programming, and recording treatment and management decisions.

In 1997, the National Park Service initiated a cultural landscape inventory of the area covered by this general management plan. The inventory team has tentatively determined that

Rock Creek Park meets the criteria for significance and integrity for listing in the National Register as a historic designated landscape

Linnaean Hill (which includes the Peirce-Kingle Mansion) and Peirce Mill meet the criteria for a “component landscape,” which is a definable physical component of a larger landscape that contributes to the significance of a National Register-listed property and is individually significant

VISITOR AND COMMUNITY VALUES

TRADITIONAL PARK CHARACTER AND VISITOR EXPERIENCE

Rock Creek Park was intended in the establishing legislation to be a “pleasure ground.” Visitors come for the scenery and the other sensory experiences that accompany a forested creek valley. They enjoy such features as the changing seasonal colors; life cycles and scents of the forest; sounds of water, wind, and small animals, including birds; and the quiet. The open spaces offer more active recreation and the sounds of people at play.

Recreation Opportunities. One of the favorite ways to experience Rock Creek Park is from Beach Drive. This roadway, which is within the narrow creek valley for much of the length of the park, is a popular site for such activities as walking, in-line skating, and bicycling. In the average week, approximately 40,000 people recreate along its length, with the greatest use during the weekend. Portions of Beach Drive and other park roads are closed to motorized traffic during weekends to accommodate this heavy recreational use.

A popular visitor experience on weekdays is motorized touring on Beach Drive and other park roads. Commuters and others use Beach Drive as a pleasant way to traverse the city in a north/south direction, even if they do not leave their cars for more direct contact with the outdoors. The park averages more than 235,000 visits per week (12.4 million visits per year) from people driving through the park.

The park offers a variety of views, from rugged expanses of mature, second-growth forest with little recent human disturbance to landscapes from the rural past. The engineered bridges are reminders of the monumental city to the south. Rock Creek Park provides a visual respite from the urban surroundings, an experience that draws almost 14.5 million visitors each year.

Rock Creek Park offers visitors a variety of recreation options, including

- paved multi-use trails and weekend closures of Beach Drive for jogging, bicycling, in-line skating, and other nonmotorized uses

- an extensive system of hiking and horseback riding trails

- Rock Creek Horse Center for public horseback riding and horse boarding (concession operated)

- an 18-hole public golf course (concession operated)

- tennis courts, including 21 soft-surface courts and 10 hard surface courts (concession operated)

- scenic roads

- picnic areas, including 20 unrestricted picnic areas and 10 picnic areas requiring a permit

- sports fields suitable for soccer, football, volleyball, field hockey, lacrosse, and rugby

the Carter Barron Amphitheater, which is a 4,200-seat outdoor theater offering summer musical and theatrical performances

Rock Creek Gallery, also known as the Art Barn and the Peirce Mill Barn, which displays work of local artists

two community gardens with a total of about 200 garden plots

Visitor Profile. Visitors to Rock Creek Park are primarily local residents of the Washington, D.C. metropolitan area. However, because it is a national park, it also is visited by people from all over the country and the world who are visiting the area. The park's recreational visitors come from a wide variety of demographic backgrounds representing many ethnic, racial, and economic groups reflective of the adjacent neighborhoods and society at large.

Most visitors to interpretive centers, concessions, and picnic areas drive to the park in private automobiles. Many users of trails and Beach Drive arrive on foot, bicycle, or in-line skates.

Visitors come to the park for a wide variety of reasons, including walking, hiking, jogging, bicycling, communing with or studying nature, studying history, picnicking and family reunions, interpretive and educational programs, spiritual meditation, reading, writing, and creating art. The length of a visitor's stay depends on the purpose of the visit. A jogger may only stay an hour while a picnicker may stay all day. Many visitors come to Rock Creek Park on a regular or frequent basis.

Park staff collect annual visitation statistics for the entire area that the park administers. Visitation estimates are developed using park ranger counts, car counting devices, and formulas developed by the NPS' Socio-Economic Studies Division in 1991. Visitation statistics are gathered and analyzed for all areas administered by the staff, so that visitation cannot be reported just for the area included in this general management plan. Therefore, the visitation statistics in table 13 reflect visitor use on all Rock Creek Park lands.

TABLE 13: AVERAGE ANNUAL VISITATION AT ROCK CREEK PARK, 1991 TO 1997

Visitation ^{a/}	Annual Visitors
Total visits	14,464,000
Nonrecreational (commuters)	12,389,000
Recreational	2,075,000

^{a/} All values include visitation on Rock Creek Park lands that are not included in this general management plan.

Recreational visits to Rock Creek Park occur fairly evenly over the warmer months of spring, summer, and early fall, and drop off in the late fall and winter. This pattern has been recorded at the nature center, where an average of 31 percent of annual visits occur during spring, another 31 percent occur during summer, 22 percent occur during fall, and 16 percent occur during winter.

Nonrecreational visits (commuters) are distributed evenly throughout the year, with an average of 25 percent of total visits occurring each season. Nonrecreational visitors are overwhelmingly automobile commuters and, to a much lesser extent, nonmotorized commuters, principally cyclists. During scoping, many commenters identified themselves as commuters (by both automo-

bile and bicycle) and emphasized that they consider their commute through the park to be recreational because it is an enjoyable ride through a scenic landscape and provides mental decompression from the workday.

Visitation Trends and Visitor Services. In the 1980s, recreational visitation to Rock Creek Park almost doubled, and then stabilized throughout the 1990s. In 1980 there were 1,060,000 recreational visitors. By 1989, this number had risen to 2,050,000 recreational visitors. Since then, there have been approximately 2 million recreational visitors each year. In the year 2000, the park supported 2,036,000 recreational visits.

At the same time, the park's visitor services have been severely reduced, resulting in a substantial decline in visitation to the park's two interpretive centers. The nature center and planetarium's visitation has dropped by more than half, from 49,000 visitors in 1979 to 24,000 visitors in 1997. Peirce Mill visitation had a similar decline, from 31,000 visitors in 1979 to 12,000 visitors in 1997. Visitor services such as publications and wayside exhibits also are inadequate. The result is that many visitors to Rock Creek Park never know they are in a national park. Most never have contact with park rangers or receive any basic orientation or visitor services.

Noise. In early December 1996, noise levels were measured at 21 sites in and around Rock Creek Park and the Rock Creek and Potomac Parkway (Robert Peccia and Associates *et al.* 1997). Results included the following.

Peak traffic noise levels within the park and parkway ranged from a low of 57 decibels (dB) equivalent sound level (L_{eq}) at the 4th hole of the golf course to 79 dB L_{eq} on the jogging trail south of Calvert, about 10 feet from the Rock Creek and Potomac Parkway.

Peak and off-peak noise levels were quite similar. Readings between these two periods varied by 4 dB or less at all 17 sites at which both peak and off-peak measurements were made.

Peak noise levels at seven sites met or exceeded the Federal Highway Administration's (FHWA's) noise abatement criterion (NAC) of 67 dB L_{eq} . All of these sites were within 100 feet of Beach Drive or the Rock Creek and Potomac Parkway and four of the seven were within 25 feet of the roads. Noise levels at four of these sites also met or exceeded the NAC during off-peak periods.

Generally, the study found the following.

Picnic areas along Beach Drive north of Military Road are not adversely affected by traffic noise.

South of Military Road, traffic noise exceeds FHWA standards at picnic areas that are within 60 feet of Beach Drive.

Visitor facilities within 110 feet to 125 feet of the Rock Creek and Potomac Parkway typically experience noise levels above the FHWA standard.

The noise standard is frequently exceeded along segments of recreation trails within 100 feet of Beach Drive and the parkway.

Noise samples near residences along Oregon Avenue, 16th Street, and Broad Branch Road, at Kalorama Circle and at the National Zoo were all within the FHWA standard.

REGIONAL AND LOCAL TRANSPORTATION

Regional Traffic Flows. Traffic congestion in the Washington, D.C. metropolitan area is the second worst in the nation (Reid 1998). A detailed description of traffic conditions in the vicinity of the park and parkway is provided in *Transportation Study, Rock Creek Park, Washington, D.C.* (Robert Peccia & Associates 1997). The roads in the vicinity of Rock Creek Park are an important component of the urban road network of Washington, D.C.

Principal arterial routes radiate out from the center of the district and include Massachusetts, Wisconsin, Connecticut, Nebraska, Georgia, and Virginia Avenues as well as 16th Street. Many of the arterial streets extend into Maryland and are primary commuter and delivery routes into the district.

Military Road, the Whitehurst Freeway, and Porter, Harvard, Calvert, and M Streets traverse the park and provide for cross-town traffic.

The Year 1990 Average Weekday Traffic Volumes map presents traffic counts on major roads in the vicinity of Rock Creek Park in 1990.

As shown on the map, the major arterials each had an average daily traffic (ADT) count of 20,000 to 40,000 vehicles

On weekdays, the peak-hour morning count and peak-hour evening count were nearly identical (difference of 10 percent or less) for almost every major roadway.

On almost all of these roads, the peak-hour morning count and peak-hour evening count each accounted for approximately 8 percent to 9 percent of the ADT.

During the morning and evening commuting periods, traffic levels on these arterial roadways typically meet or exceed their capacities. Table G.1 in appendix G shows the 1990 average daily traffic volumes for the major roadways in the area. The roadways usually can accommodate these high traffic volumes through aggressive traffic management measures such as reversing lanes during commuting periods.

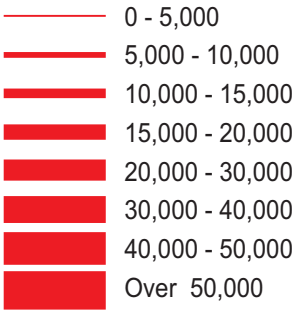
Both morning and evening traffic counts on virtually all of the roads in the mapped area have increased in the past 10 years. However, the patterns described above are still occurring. A traffic validation using actual traffic volumes from the year 1999 is provided in appendix H.

Excellent public transportation opportunities occur in the area. The Washington Area Metropolitan Transit Authority provides Metro Bus service throughout the area. The Metro Rail's red line runs to the west of the park and the green line runs to the east of the park. Several Metro Rail stops are within 1 mile of the central portion of the park.

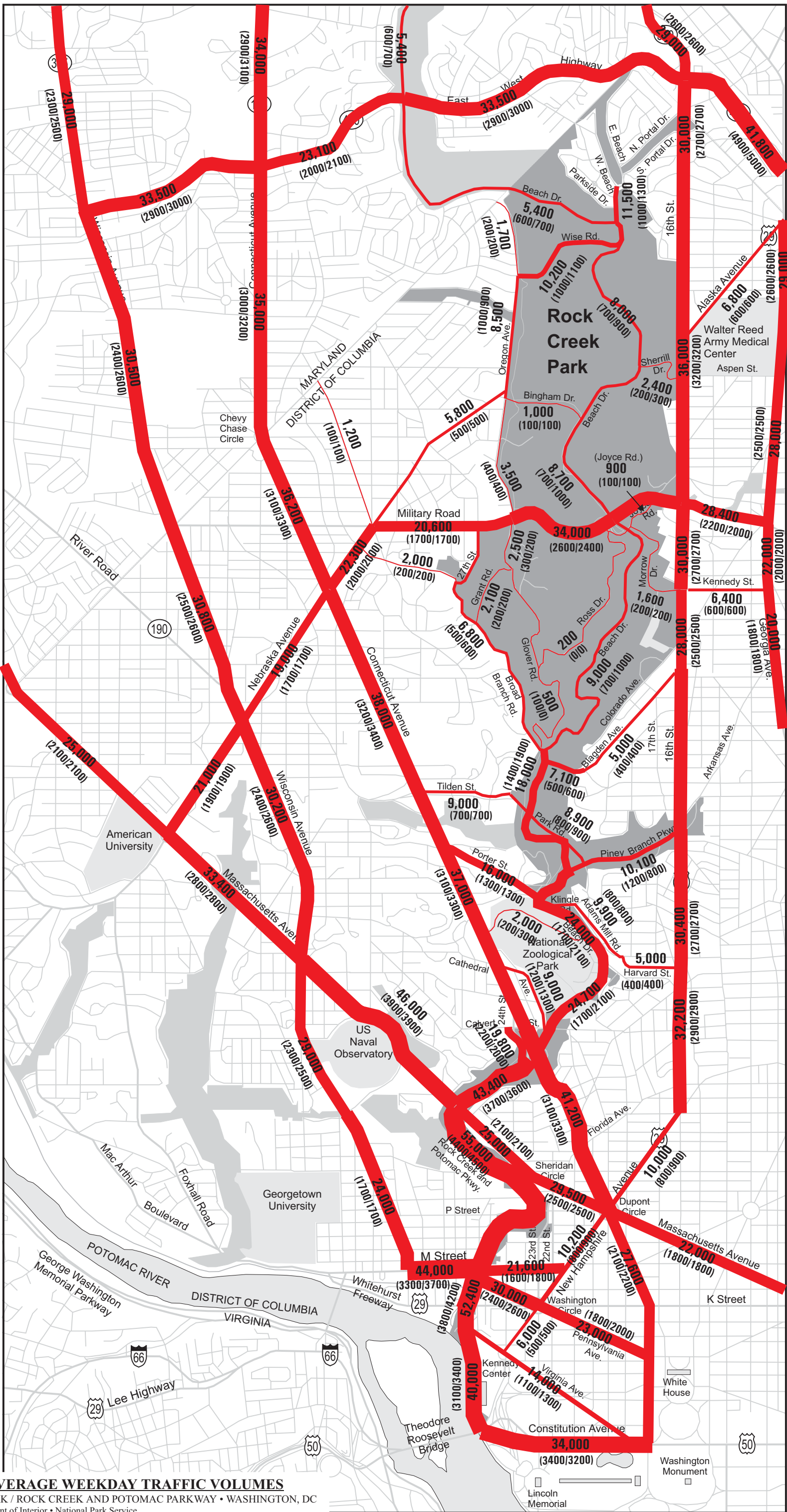


Map Scale: 1"= 0.5 Miles

Rock Creek Park



900 = ADT
(100/100) =
(AM Peak Hour/PM Peak Hour)



Local Traffic Flows. The Rock Creek and Potomac Parkway and Beach Drive are the principal roads within Rock Creek Park.

The Rock Creek and Potomac Parkway extends approximately 2.5 miles from the Theodore Roosevelt Bridge in the core of the district north to Calvert Street. The parkway is a four-lane, paved, limited-access facility with a posted speed limit of 35 miles per hour.

As shown on the Year 1990 Average Weekday Traffic Volumes map, this roadway carried more traffic than any other in the vicinity, with average daily traffic (ADT) counts of 40,000 to 55,000 vehicles.

Traffic patterns were very similar to those described above for other arterials, with similar morning and evening traffic volumes and peak-hour counts during the morning and evening each accounting for approximately 8 percent to 9 percent of the ADT.

From Calvert Street, Beach Drive extends approximately 6.5 miles north to the Maryland state line. Beach Drive is a two-lane, paved road with a posted speed limit of 25 miles per hour. In 1990, traffic exhibited the following characteristics.

Between Wise Road and Blagden Avenue, average daily traffic counts were 8,000 to 9,000 vehicles.

From Blagden Avenue south to the Rock Creek and Potomac Parkway, counts ranged from 18,000 to 24,700 vehicles per day.

On all stretches there was slightly more evening traffic than morning traffic. At all sites shown on the map, peak-hour evening traffic represented 9 percent to 11 percent of the average daily traffic, while morning peak-hour traffic accounted for 7 percent to 9 percent of the daily total.

As with the arterials, traffic has increased since 1990 on both the Rock Creek and Potomac Parkway and on Beach Drive. However, accurate estimates of the changes are not available.

Twenty-four entry routes provide access to Rock Creek Park (see Existing Conditions map). Although the park is closed at dark, park roads and entry points remain open.

Major entry points north of Military Road include Beach Drive at the Maryland state line, West Beach Drive, and Wise Road.

South of Military Road, major entry points include Joyce Road, Morrow Drive, Broad Branch Road, Blagden Avenue, Park Road, Tilden Street, and Piney Branch Parkway.

Visitors can also enter the park from 16th Street NW, the Kennedy Street area, and from the National Zoological Park.

Commuting has the greatest effect on traffic flows through Rock Creek Park. Traffic volumes show little seasonal variation and the highest traffic levels correspond to the peak morning and evening commuting times. To accommodate these peaks in commuter traffic, all lanes of the

Rock Creek and Potomac Parkway are designated as one-way southbound during the morning commute period and one-way northbound during the evening commute.

To provide recreational opportunities for pedestrians, bicyclists, and in-line skaters, the park closes portions of Beach Drive to motorized vehicle traffic during the day on weekends and holidays. During these times, Beach Drive is closed from Broad Branch Road to Joyce Road, picnic grove 10 to Wise Road, and West Beach Drive to the Maryland state line. Bingham Drive and Sherrill Drive also are closed.

During the week when all park roads are open to commuter traffic, interactions are common between automobiles and nonmotorized users, such as bicyclists and pedestrians. These particularly occur in areas where a trail does not parallel Beach Drive, where pedestrians and bicyclists often enter the traffic flow.

To understand commuter patterns, the National Park Service commissioned a license plate survey in 1996 (Robert Peccia & Associates 1997). The survey results indicated the following.

During weekday rush-hours, more than 99 percent of all vehicles using the Rock Creek and Potomac Parkway and more than 95 percent of vehicles entering Rock Creek Park pass through without stopping.

Commuting patterns through Rock Creek Park do not simply flow north and south. Instead, many rush-hour drivers use segments of park roads to traverse the park and reenter the city street grid.

Only 3 percent of the vehicles that enter the park at the Maryland state line exit onto the parkway.

In the morning, the greatest number of vehicles that exit onto the parkway enter the park at Broad Branch Road (17 percent), Blagden Avenue (20 percent), and Piney Branch Parkway (34 percent).

In the evening, the patterns are very similar. Only 1 percent of the vehicles that enter from the parkway exit the park at the Maryland state line. The majority of vehicles exit onto Broad Branch Road (18 percent), Blagden Avenue (19 percent), and Piney Branch Parkway (33 percent).

The study also determined vehicle occupancy in August 1996. During commuting periods, the average vehicle occupancy on park roads ranged from a low of 1.09 people per vehicle on Morrow Drive to a high of 1.38 people per vehicle on Tilden Street. On nearby streets in the district, the results ranged from 1.22 people per vehicle on Oregon Avenue to 1.34 people per vehicle on 16th Street. These averages indicate that much of the rush-hour use is by vehicles with a single occupant (Robert Peccia & Associates 1997).

Higher traffic volumes during peak hours cause delays at certain intersections during the commuting periods (Robert Peccia & Associates 1997).

In the morning, the following intersections failed or functioned very poorly: Beach Drive and Blagden Avenue, Beach Drive and Piney Branch Parkway, Beach Drive and Tilden Street/Park Road, and 16th Street and Kennedy Drive/Morrow Road.

In the evening, failures or poor operations occurred at Beach Drive and Joyce Road, Beach Drive and Porter Road, and Beach Drive and Tilden Street/Park Road.

Most vehicles travel at or above the posted speed limit through the park. Spot speed checks revealed that the average speed was 15 miles per hour over the posted speed limit. Commuters in Rock Creek Park also tend to have more aggressive driving habits than do visitors unfamiliar with the park. A detailed speed analysis can be found in *Transportation Study, Rock Creek Park, Washington, D.C.* (Robert Peccia & Associates 1997).

Traffic Safety. An analysis of accidents on park roads between January 1, 1993 and December 31, 1995 was included in the *Transportation Study, Rock Creek Park, Washington, D.C.* (Robert Peccia & Associates 1997). All of the information in this section is from that report.

The accident investigation indicated that the frequency and severity of accidents are relatively low for an urban area. However, the relatively low number of serious accidents in the park may result in part from a perceived risk to personal safety. During weekdays, the high traffic speeds and heavy volumes may discourage recreational use, one of the primary purposes of the park.

According to the 3-year accident study, the greatest safety problems are excessive vehicle speeds and aggressive driving tendencies. Conflicts between automobiles and recreational visitors are common, even when accidents are avoided.

A total of 1,175 accidents were reported from Rock Creek Park and the Rock Creek and Potomac Parkway during the 3-year period. A summary of the accidents, separated into three geographic areas, is provided in table 14.

TABLE 14: SUMMARY OF TRAFFIC ACCIDENTS IN ROCK CREEK PARK AND THE ROCK CREEK AND POTOMAC PARKWAY, 1993 THROUGH 1995

Accident Type	Beach Drive	Other Park Roads	Rock Creek and Potomac Parkway	Total
Total accidents	294 (25%)	224 (19.1%)	657 (55.9%)	1,175 (100%)
Fatal accidents	1 (0.3%)	1 (0.4%)	2 (0.3%)	4 (0.3%)
Injury accidents	75 (25.5%)	45 (20.1%)	155 (23.6%)	275 (23.4%)
Property damage only	218 (74.2%)	178 (79.5%)	500 (76.1%)	896 (76.3%)
Collision with motor vehicle or other object	273 (92.9%)	210 (93.8%)	621 (94.5%)	1,104 (94.0%)
Collision involved pedestrian or bicyclist	13 (4.4%)	4 (1.8%)	11 (1.7%)	28 (2.4%)
Non-collision accidents	8 (2.7%)	10 (4.5%)	25 (3.8%)	43 (3.6%)

Among the recorded accidents, almost 56 percent occurred on the parkway. Twenty-five percent were on Beach Drive, and 19 percent were on other park roads.

In all three areas, most accidents (more than 92 percent) involved collisions with other cars or collisions with objects such as poles, signs, trees, guardrails, rocks, bridges, ditches, or animals. On Beach Drive, collisions of motor vehicles with pedestrians or bicyclists accounted for 4.4 per-

cent of traffic accidents. Other park roads (1.8 percent) and the parkway (1.7 percent) had lower percentages of accidents involving collisions of motorized vehicles with pedestrians or cyclists.

Despite the difference in percentages of accidents involving pedestrians and cyclists, all three areas had similar fatality levels of 0.3 to 0.4 percent. Higher rates of collisions along Beach Drive with pedestrians and bicyclists probably were reflected by the injury rate of more than 25.5 percent, compared to 20.1 percent for other park roads and 23.6 percent along the Rock Creek Parkway. The injury rate along the parkway may reflect the higher traffic speeds.

In the 3-year period, there was little difference by year in the number of accidents occurring or the severity of the accidents (injury versus property damage only). This relatively constant level of accidents was observed in all three areas.

Beach Drive. If traffic conditions were identical throughout the week, each day would be expected to represent approximately 14 percent of the traffic accidents. However, the analysis of accidents on Beach Drive shows otherwise. During the work week, almost 19 percent of traffic accidents occurred on Tuesdays, while only 12 percent occurred on Wednesdays.

On Saturdays, three segments of Beach Drive are closed to motorized vehicles, and commuter use is absent. Despite traffic reductions associated with these factors, fully 14 percent of the traffic accidents on Beach Drive occurred on Saturdays. These same conditions (road closures and lack of commuters) also occur on Sundays, but Sunday accidents represented only about 8 percent of the weekly total.

The locations of the 518 accidents that were recorded in the park north of the parkway were mapped. Of these, nearly 57 percent occurred on Beach Drive. Other roads in the park that had 5 percent or more of the traffic accidents included Piney Branch Parkway (8 percent), Glover Road (6 percent), and Wise Road (5 percent).

Anecdotal evidence would indicate that many accidents occur along the narrow portion of Beach Drive where there is no trail, and pedestrians and cyclists enter the traffic flow. However, mapping shows that only 29 accidents, including six with injuries and no fatalities, occurred in the three-quarter-mile stretch extending from the intersection with Broad Branch Road north across Boulder Bridge and through the gorge area. More than half of these accidents occurred near the intersection at the south end of this segment. Factors that could contribute to the low incidence of traffic accidents along this stretch of road probably include its closure to motorized traffic on weekends and holidays, and the extra caution taken by motorists who recognize the gorge area as potentially dangerous.

The portion of Beach Drive south of the Wise Road intersection to picnic grove #10, which also is closed on weekends, had a similarly low level of accidents. However, this area appears to have an unusually high ratio of injury accidents (almost 60 percent, compared to 23 percent throughout the remainder of the park). The weekend closure segment between West Beach Drive and the Maryland border has accident and injury rates similar to those occurring along other parts of Beach Drive that are not closed on weekends.

Fatalities. Four traffic fatalities occurred in the park and along the parkway during the 3-year period. Two of the fatalities occurred along the Rock Creek and Potomac Parkway. One was located southbound on the parkway near K Street, and the other was on the parkway near Virginia. One of these fatal accidents was in September and the other was in October.

Both were collisions with pedestrians, and in both instances the fatality was a pedestrian.

Both accidents occurred in lighted areas, during mid-week, in the late evening or early night, in rainy weather, and on wet roads.

Contributing factors for both fatalities involved a pedestrian illegally on the roadway wearing clothing that was not visible.

The other two fatalities were recorded in the park.

Both fatalities were single-vehicle accidents where the driver died after colliding with a fixed object. Both occurred during the mid-week, in the late evening or early night.

One accident occurred in March in clear weather on dry roads. It was located on Morrow Drive south of Joyce Road.

The other was in November on wet roads in sleet, hail, or freezing rain. It occurred on Beach Drive near Blagden Road. Driving too fast for conditions was cited as a contributing factor.

Traffic Accidents involving Pedestrians and Bicyclists. As shown in table 14, there were 28 traffic accidents involving motorized vehicles and pedestrians or bicyclists during the 1993 through 1995 period. Eleven of these accidents were reported on the Rock Creek and Potomac Parkway.

Six of these were collisions with pedestrians, four were collisions with bicycles, and one accident report listed a pedestrian or cyclist as a contributing factor.

Two of the 11 accidents were fatalities, both of which killed the pedestrian. Additional information on these two accidents was provided above.

Six of the accidents resulted in injuries, three of which injured a pedestrian or bicyclist. In the other three cases, an occupant of the vehicle was injured.

Seven of the accidents occurred during the mid-week (Tuesday through Thursday). Five occurred during low-light conditions.

Contributing factors included “pedestrian/cyclist illegally in roadway” (six accidents), “pedestrian/cyclist disregarded traffic control” (three accidents), and “pedestrian/cyclist clothing not visible” (two accidents).

Within Rock Creek Park, there were 17 accidents involving pedestrians or bicyclists. Thirteen of these occurred on Beach Drive and four were on other park roads.

Five of the accidents were classified as collisions with pedestrians, and 12 were classified as collisions with bicycles.

Eleven accidents resulted in injuries, four of which injured a pedestrian or bicyclist. In the other seven cases, an occupant of the vehicle was injured. There were no fatalities.

Ten of the accidents occurred on a Saturday or Sunday. Only two occurred during low-light conditions.

All but one of the 17 accidents involved two or more motorized vehicles.

Factors most commonly cited as contributing to these accidents included “driver failed to yield the right of way” (five accidents) and “driver disregarded traffic signs, signals, or road markings” (three accidents).

Accident Rates. The accident rate for a road segment is described as the number of accidents per 100 million vehicle-miles traveled. Accident rates also can be determined for fatal and injury accidents.

Accident, injury, and fatality rates were calculated for the park and parkway for the 3-year period, 1993 through 1995. The results are presented in table 15. The area evaluated for the Rock Creek and Potomac Parkway extended from Calvert Street to Ohio Drive. Park data included Beach Drive from the Maryland line to the intersection with the parkway south of the National Zoo.

For comparison, table 15 also includes average accident, injury, and fatality rates in Washington, D.C. for 1993 through 1995 (calculated from data from the District of Columbia in 1995) and nationwide in 1998 (Federal Highway Administration 1999). The parkway had accident rates that were higher than those occurring throughout Washington, D.C., but lower injury rates, and fatality rates that matched those both in the city and nationwide. On Beach Drive, the accident rate was about 10 percent lower than the citywide rate, with an injury rate that was 33 percent lower and a fatality rate about 20 percent below both the city and national averages.

TABLE 15: ACCIDENT RATES FOR THE ROCK CREEK AND POTOMAC PARKWAY, BEACH DRIVE, AND WASHINGTON, D.C.

Location	Accident Rate (per 100 million vehicle-miles traveled)	Injury Rate (per 100 million vehicle-miles traveled)	Fatality Rate (per 100 million vehicle-miles traveled)
Rock Creek and Potomac Parkway	540	127	1.6
Beach Drive	387	99	1.3
Washington, D.C. area	425	147	1.6
Nationwide	--	125	1.6

Mass Transportation. There are 14 Metrorail stations within 1 mile of the park and parkway (see Vicinity map) and numerous bus stops. The Washington Metropolitan Area Transit Authority provides bus and rail service in the region, which includes the District of Columbia, two counties in Maryland, and three counties in Virginia. Ridership between July and the end of September 1999 totaled more than 1 million, a sizable portion of the 3.2 million residents in the service area (www.wmata.com/METFACTS/factsnfigs.htm).

Transit buses and commercial vehicles are not permitted on park roads or the parkway. The number of visitors entering the park and parkway by foot or bicycle from the mass transit network is unknown, but is believed to be relatively small.

Nonmotorized Transportation Flows. Nonmotorized transportation in this document includes walking, bicycling, and other means of personal transport for the purpose of getting from one location to another. This contrasts with nonmotorized recreation, defined here as walking or riding for pleasure, fitness, or some other recreational purpose.

The 1990 census reported that 5 percent of the population of the District of Columbia bicycles to work. Studies prepared for the National Capital Region Transportation Planning Board (NCRTPB) of the Metropolitan Washington Council of Governments (MWCOG) reported that cyclists represent a wide range of ages, and more than half have an annual income of \$75,000 or greater (Bairstow 1995a and 1995b).

A recent survey (Sacks 1994) found that 67 percent of all users on the paved recreation trails in Rock Creek Park and along the parkway during weekday peak hours were engaged in transportation rather than strictly recreation. Average distance traveled by such users was 5.3 miles. Typical nonmotorized transportation participants in the park and parkway lived within 2 miles of the paved trail system and were going to destinations within 1 mile of the trail.

Bicycling is the most popular form of nonmotorized transportation along the park and parkway, accounting for 54 percent to 86 percent of average weekday nonmotorized transit during a 1-day August 1996 survey (Robert Peccia & Associates 1997). Surveys (Bairstow 1995a and 1995b) of morning peak-hour bicyclists along the Rock Creek and Potomac Parkway trail determined the following characteristics.

Eighty-five percent of the trail users were going to destinations in the district and 16 percent were headed through the park to locations in Arlington, Virginia.

Bicyclists averaged 9.9 miles per trip on paved trails.

Sixty-eight percent of cyclists preferred off-street trails while 20 percent preferred bike lanes on streets or sharing streets with automobiles.

Bad weather was the greatest deterrent to cycling (72 percent). The threat to safety from traffic was the second most frequently mentioned deterrent (35 percent).

The same survey of bicyclists on radial routes into the city documented that paved trails have a 5-fold or greater increased bicycle use compared to designated street routes or low-traffic roads (Bairstow 1995a and 1995b). This survey, combined with 1993 counts, indicated about 60 bicy-

cles per hour during the evening peak-hours on the Rock Creek and Potomac Parkway paved trail at P Street. The studies considered 12 to 80 bikes per hour to be in the high range for the region.

A 1-day, 8-hour sample of nonmotorized transportation in the park and parkway was collected on Thursday, August 22, 1996 (Robert Peccia & Associates 1997). Similarly to the NC RTPB survey (Bairstow 1995a and 1995b), the Peccia survey found preferential use of trails, with an average weekday hourly volume of 34 users per hour on the bike/foot trail south of the Beach Road/Broad Branch Road intersection and 14 users per hour on Beach Drive north of this intersection. Beach Drive in the vicinity of Joyce Road averaged 22 users per hour, and 112 users per hour were recorded on the bike/foot path along the Rock Creek and Potomac Parkway south of P Street.

Little information is available on pedestrian nonmotorized transportation. Most weekday and weekend walkers appear to be recreationists, but a small percentage of pedestrians are likely walking to their jobs or to some other destination.

There are several hundred miles of paved trails and designated bicycle routes in the region. Major trails connecting to the paved trails through Rock Creek Park and the parkway include the Rock Creek Trail (in Rock Creek Regional Park, Maryland), the Capital Crescent Trail, and the C and O Canal Trail.

COMMUNITY CHARACTERISTICS

Community characteristics are included as an impact topic based on the criteria presented in the "Impact Topics - Resources and Values at Stake in the Planning Process" section.

Metropolitan Washington, D.C. The Washington, D.C. metropolitan area is generally illustrated in the Regional map shown at the beginning of this general management plan. More than 4 million people reside in the U.S. Census Bureau's Washington metropolitan statistical area, including just over 600,000 who live within the boundaries of the district. The remainder of the statistical area consists of five Maryland counties, six Virginia counties, and four Virginia cities (District of Columbia Government 1996c).

Washington, D.C.'s population is approximately 66 percent African American, 30 percent white, and 4 percent other races. Approximately 5 percent of Washington, D.C.'s citizens also identify themselves as Latino. Compared to statistics from the 50 states, the district's per capita income is the third highest in the nation, and in 1989 was 42 percent above the national average (District of Columbia Government 1996c).

Generalizations cannot be made about ethnic composition of the nearby areas in Maryland and Virginia. For example, populations in some of these communities are 90 percent or more white, while the Takoma Park area just north of the Maryland state line is 36 percent black, 48 percent white, and 16 percent other races, with about 17 percent of the residents identifying a Latino heritage.

Surrounding Wards and Neighborhoods. The Neighborhood map shows the Washington, D.C. wards and neighborhoods in the vicinity of the park. It also shows the Maryland communities of Chevy Chase, Silver Springs, and Takoma Park that are just north of the park.

Within the District of Columbia, eight wards have been established for purposes of voting and representation. As shown in the Neighborhood map, four of the wards border the park. Detailed descriptions of the wards are available in *Indices: A Statistical Index to District of Columbia Services* (District of Columbia Government 1996c). Table 16 summarizes some of the ward characteristics.

Each ward includes from four to six Advisory Neighborhood Commissions (ANCs) that advise the district government on matters of public policy and review and make recommendations concerning neighborhood planning and development. They also participate in the district's comprehensive planning process. The ANCs do not correlate to the traditional neighborhood boundaries shown in the Neighborhood map.

As shown on the map, Rock Creek Park and the parkway are bordered by established urban neighborhoods. Those in the district include Hawthorn, Chevy Chase, Forest Hills, Garfield Heights, Massachusetts Park, North Cleveland Park, Cleveland Park, Massachusetts Avenue Heights, Cathedral Heights, Georgetown, Central, Hillcrest, Mount Pleasant, Crestwood, 16th Street Heights, Brightwood, Shepherd Park, and Colonial Village.

The neighborhoods surrounding the park are some of the most racially, ethnically, and economically diverse in the Washington, D.C. metropolitan area. Many residential and mixed-use areas, including Adams Morgan, DuPont Circle, and Georgetown, as well as office buildings and

foreign embassies, also are located near the park and parkway. During scoping, citizens living in the adjoining neighborhoods both east and west of Rock Creek Park expressed concerns about local increases in traffic that might be associated with changes in park management.

To the north of the park in Montgomery County, Maryland, are communities that are primarily residential, with commercial development extending along the major thoroughfares. These include Connecticut Avenue, Wisconsin Avenue, and 16th Street.

Montgomery County neighborhoods are grouped into planning areas. The three planning areas nearest the park are Bethesda/Chevy Chase, Silver Spring, and Takoma Park. Table 17 summarizes some of the characteristics of the people living in each of these planning areas. A complete profile of the planning areas is available from the Maryland-National Capital Park and Planning Commission at:

<http://www.clark.net/pub/mncppc/montgom/factmap/>

TABLE 16: GENERAL CHARACTERISTICS OF THE POPULATIONS OF WASHINGTON, D.C. WARDS 1 THROUGH 4 ^{a/}

	Ward 1	Ward 2	Ward 3	Ward 4 ^{b/}	Total District
Population	79,641	78,743	77,774	78,425	606,900
Area (acres) ^{c/}	1,222	4,025	4,746	3,087 - 3,706 ^{d/}	27,879 - 29,779 ^{d/}
Land area used for housing	82%	48%	87%	87%	75%
Median household size (number of people)	2.17	1.75	1.91	2.53	2.26
Population density (residents per acre)	66	19	13 - 16 ^{d/}	21 - 25 ^{d/}	20 - 22 ^{d/}
Residential population density (residents per residential acre)	81 - 120 ^{e/}	41 - 108 ^{e/}	19 - 28 ^{e/}	24 - 47 ^{e/}	27 - 58 ^{e/}
Median household income	\$26,798	\$31,716	\$48,967	\$33,025	\$30,727
Age distribution					
Under 18 years	17%	10%	12%	18%	19%
18-64 years	72%	78%	71%	82%	68%
65+ years	11%	12%	17%	18%	13%
Racial composition					
Black	57%	35%	6%	85%	66%
White	30%	57%	88%	12%	30%
Other	13%	8%	6%	3%	5%
Also identified Latino heritage	18%	7%	7%	5%	5%
Education attainment					
Less than high school diploma	32%	19%	6%	36%	27%
High school graduate (only)	16%	12%	9%	25%	21%
College, 1-3 years	16%	17%	15%	24%	19%
College, 4 or more years	36%	52%	70%	25%	33%
Housing unit occupancy [`]					
Owner occupied	25%	26%	47%	53%	35%
Renter occupied	64%	60%	48%	42%	54%
Vacant	11%	14%	5%	5%	11%

a/ All data are from District of Columbia Government 1996c. All population data are based on the 1990 census.

b/ Ward 4 data for age distribution and education attainment are in error in the source document and total more than 100 percent.

c/ Excludes public rights-of-way and areas within Rock Creek Park.

d/ The source document presents two values for this parameter. Therefore, both values are presented here as a range.

e/ The source document presents two values for this parameter, and a third can be calculated by dividing population by land area used for housing. Therefore, the maximum and minimum values are presented here as a range.

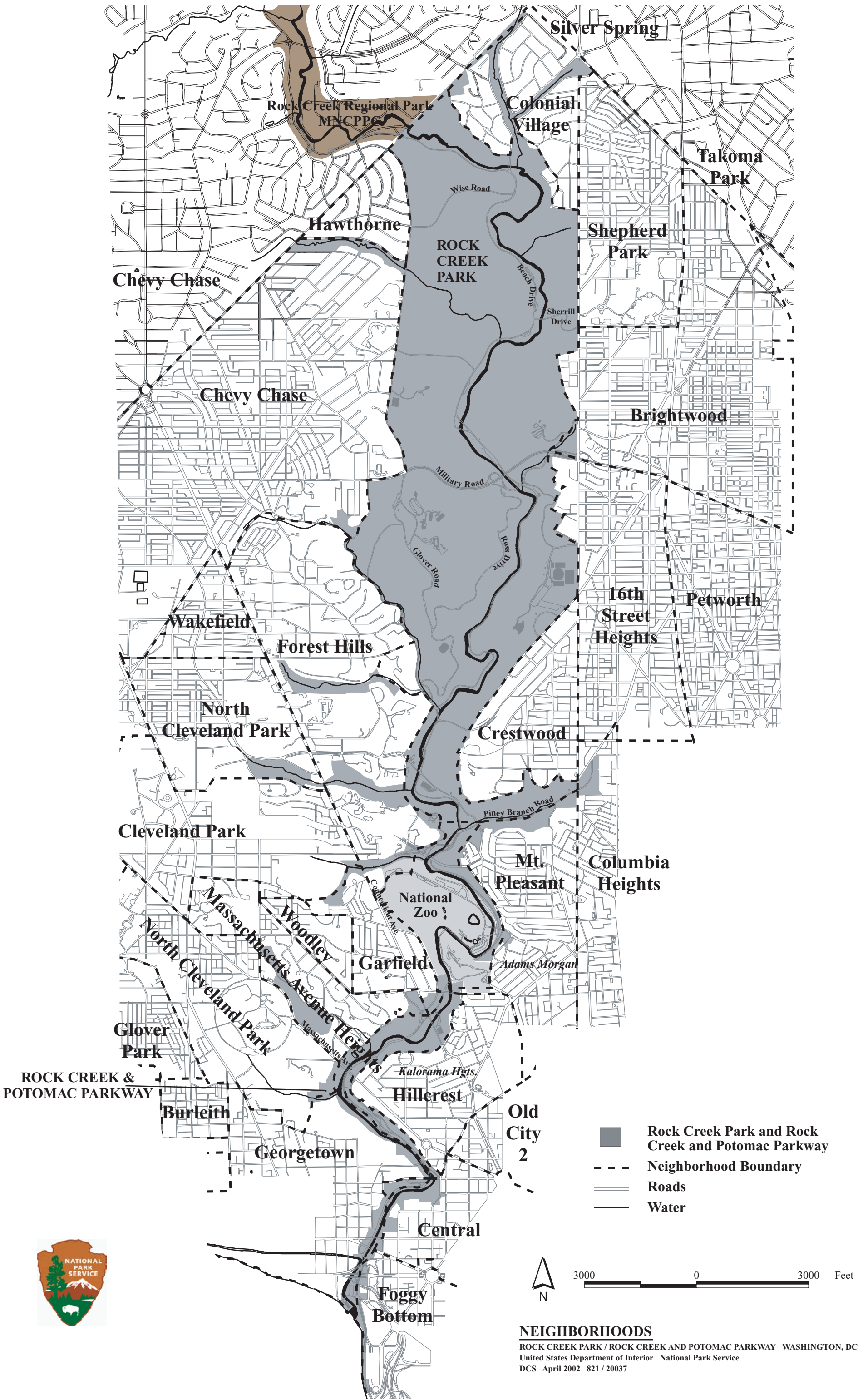


**TABLE 17: GENERAL CHARACTERISTICS OF THE POPULATIONS OF
MARYLAND COMMUNITIES NEAR ROCK CREEK PARK^{a/}**

	Bethesda/ Chevy Chase (Planning Area 35)	Silver Spring (Planning Area 36)	Takoma Park (Planning Area 37)	Total Montgomery County
Population	85,000	31,820	34,855	823,500
Area (acres)	12,864	2,816	4,096	318,080
Average household size (number of people)	2.37	2.06	2.63	2.64
Population density (residents per acre)	7	11	8	3
Median household income (1996)	\$95,495	\$49,500	\$44,030	\$66,085
Age distribution				
Under 18 years	21%	18%	26%	25%
18-64 years	59%	70%	66%	63%
65+ years	20%	12%	8%	12%
Racial composition				
Black	3%	26%	36%	13%
White	90%	62%	48%	73%
Other	7%	12%	16%	14%
Also identified Latino heritage	5%	8%	17%	9%
Education attainment level				
Less than high school diploma	4%	7%	15%	8%
High school graduate (only)	18%	22%	29%	28%
Some college, no degree	2%	6%	5%	5%
College degree	76%	65%	51%	59%
Housing unit occupancy				
Owner occupied or vacant	74%	35%	43%	71%
Rental unit	26%	65%	57%	29%

a/ All data are from Maryland-National Capital Park and Planning Commission 1999. All population data are based on the 1997 census update survey.

In addition to Rock Creek Park, many other recreational and educational opportunities exist in the area. Some of these are identified below. However, Rock Creek Park is unique because it is the only major natural area in this urban environment.

More than 40 recreation centers, 25 swimming pools, and 75 tennis courts provide active recreational opportunities in the areas neighboring the park.

More than 100 public and private schools are located in the surrounding area, along with major universities such as American University, University of the District of Columbia, George Washington University, Georgetown University, and Howard University.

Many other public parks occur in the area, including the C&O Canal National Historical Park, the sites of the Civil War Defenses of Washington, Meridian Hill Park, Dumbarton Oaks Park, Glover-Archbold Park, Montrose Park, and the National Zoological Park.

Montgomery County's Rock Creek Regional Park borders Rock Creek Park to the north. The regional park follows Rock Creek through southern Montgomery County and provides many recreational opportunities such as fishing, boating, canoeing, picnic shelters, a golf course, and trails.

ENVIRONMENTAL CONSEQUENCES

For each impact topic, this section identifies the applicable regulations and policy, describes the methods used to determine environmental effects, presents the results of the analysis, identifies cumulative impacts, and presents a conclusion.

ENVIRONMENTAL IMPACTS OF ALTERNATIVE A: IMPROVED MANAGEMENT OF ESTABLISHED PARK USES

IMPACTS ON AIR QUALITY

Regulations and Policy

The regulations and policies that guide NPS actions with respect to air quality are presented in the “Servicewide Mandates and Policies” section of this document.

Methodology

Within Rock Creek Park, vehicle tailpipe emissions are the only substantial source of air pollutants. Occasionally, dust emissions from exposed soils and smoke particulates from small wildfires contribute particulate pollutants. However, dust and smoke particulate emissions occur only sporadically, for short periods, and in such small quantities that their contributions to overall park air quality are very small. Consequently, dust and smoke emissions are not considered further in this analysis.

Tailpipe emissions from automobiles and other internal combustion engines contain particulates, hydrocarbons, and oxides of carbon, nitrogen, and sulfur. As described in the “Affected Environment” section, the Washington, D.C. region only recently attained compliance with the National Ambient Air Quality Standard (NAAQS) for carbon monoxide and now implements a maintenance plan to prevent violations. Therefore, this impact evaluation focuses on changes in emissions of carbon monoxide that result from each alternative. It is assumed that if carbon monoxide concentrations are within the standard, other tailpipe emissions, which have not historically been a problem in the region, also will not exceed air quality standards.

Air quality has been improving in the region because of improved controls on tailpipe emissions. It is believed that improvements will continue into the future. However, there is no basis for quantifying these improvements. Therefore, this evaluation assumed a worst-case condition where emissions per vehicle in the year 2020 will be identical to those that occurred during the December 1996 air quality monitoring described in Robert Peccia & Associates *et al.* (1997). Another assumption made for the analysis was that the highest monitored carbon monoxide concentration detected during the December 1996 study is representative of a “worst case meteorological condition” in the park and parkway area.

During the December 1996 sampling, the highest concentrations of carbon monoxide were recorded at 16th Street and Colorado Avenue near Military Road. At this location, 2,500 vehicles passing this point during the peak-hour (estimated from the Year 1990 Average Weekday Traffic

Volumes map) resulted in a carbon monoxide concentration of 3.38 parts per million (ppm). From these values, it was calculated that the emission contribution from each vehicle was about 0.00135 ppm or 1.35 parts per billion (ppb). This value was then multiplied by the anticipated peak-hour traffic count in the year 2020 at various intersections to estimate carbon monoxide concentrations at each location.

Each car both enters and exits an intersection. To avoid double-counting of cars, all of the peak-hour traffic counts around an intersection were summed, and the total was divided by two. For example, using values from the Alternative A Year 2020 Average Weekday Traffic Volumes map at the intersection of 16th Street and Military Drive, the morning peak-hour counts (which at this site would be equal to or slightly higher than the evening peak-hour counts) were summed (total equals 13,200) and divided by two to determine that 6,600 vehicles pass through the intersection during the highest-use hour of the day. The exception is at the intersection involving the one-way Rock Creek and Potomac Parkway, where traffic only enters the intersection from one direction and therefore was not being double-counted.

Most tailpipe emissions in the Washington, D.C. area come from automobile traffic. Regardless of any actions taken by the National Park Service at Rock Creek Park, local and regional traffic levels are expected to increase from those defined in the “Affected Environment” section. The magnitude of these increases is presented in the “Impacts on Regional and Local Transportation” section. Because traffic will increase, the evaluation of impacts to air quality for each action alternative was determined through comparisons to the conditions that are modeled for the year 2020 without any change in park management (Alternative B).

The traffic modeling for the year 2020 did not identify any changes in regional traffic because of management actions at Rock Creek Park. Instead, the alternatives would redistribute the same traffic volume onto different roadways. Based on the traffic modeling, this air quality analysis assumed that regional air quality also would not change among alternatives. The analysis focused on changes that would occur at individual intersections.

The geographic area that was included in the air quality analysis is the area shown on the Year 1990 Average Weekday Traffic Volumes map. Within this area, the following locations were evaluated to determine effects on air quality.

The Rock Creek and Potomac Parkway/M Street/Pennsylvania Avenue intersection, because this is the busiest intersection.

The intersections of Beach Drive/Wise Road, Beach Drive/Military Road, and Beach Drive/Broad Branch Road/Blagden Avenue, because the management prescriptions vary among alternatives at these intersections.

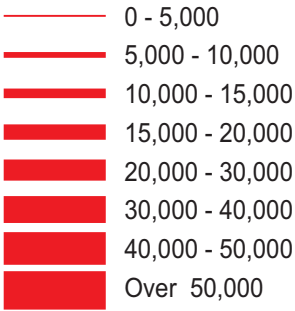
Wisconsin Avenue north of Nebraska Avenue, Connecticut Avenue north of Nebraska Avenue, and the 16th Street/Military Road intersection, since these are the locations that would receive the greatest increases in traffic if traffic management procedures were implemented in the park and along the parkway.

Changes in air quality could be either beneficial (reducing carbon monoxide concentrations relative to Alternative B) or adverse (increasing carbon monoxide concentrations relative to Alternative B).

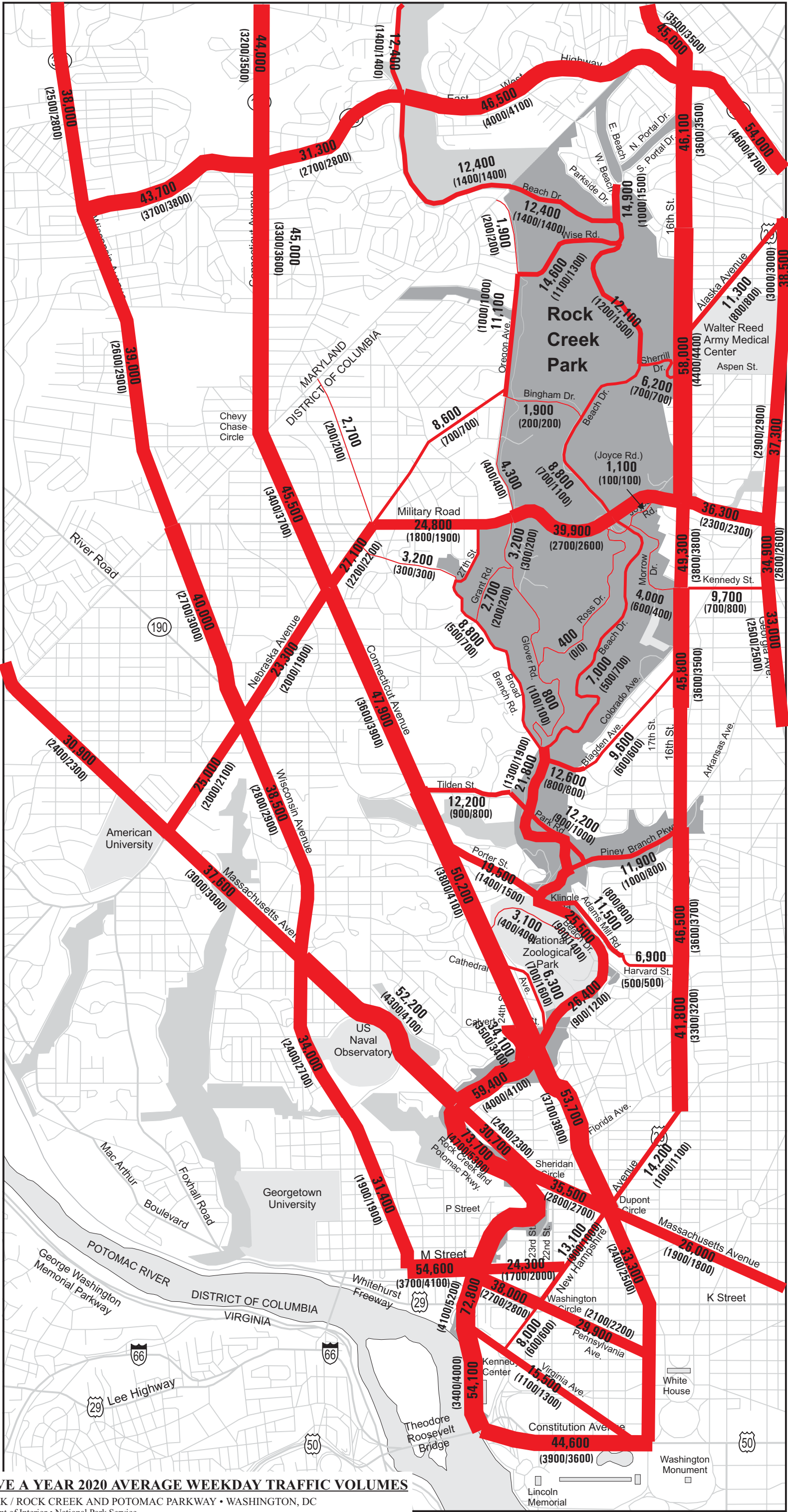


Map Scale: 1"= 0.5 Miles

Rock Creek Park



900 = ADT
(100/100) =
(AM Peak Hour/PM Peak Hour)



A short-term air quality impact could last over a period of several weeks or months, but would not be expected to recur after a defined period. For example, dust and construction-vehicle emissions associated with rehabilitation and expansion of the Rock Creek Nature Center and Planetarium would cause a short-term air quality impact but would end with the completion of construction. A long-term air quality impact may last for only a few hours each day, but would recur regularly, creating a pattern of changes in carbon monoxide concentrations relative to Alternative B. Changes in tailpipe emissions at an intersection because of changes in traffic management would be an example of a long-term air quality impact.

A negligible impact to air quality was defined as a change resulting from an alternative that would cause the concentration of carbon monoxide at any intersection to change by less than 2 ppm relative to Alternative B.

A minor impact to air quality was defined as a change resulting from an alternative that would cause the concentration of carbon monoxide at any intersection to change by 2 ppm to 5 ppm relative to Alternative B.

A major impact to air quality was defined as a change resulting from an alternative that would cause the concentration of carbon monoxide at any intersection to change by more than 5 ppm relative to Alternative B. In addition, any change resulting from an alternative that would cause a change in carbon monoxide NAAQS attainment at any intersection relative to Alternative B was identified as a major impact.

Impairment of air quality would occur if there was a major adverse impact on air quality resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

As described in the “Affected Environment” section, the Washington, D.C. metropolitan area does not meet the ozone NAAQS. However, as discussed in that section, ozone is not a tailpipe emission but is a secondary pollutant that results from region-wide interactions of air pollutants with sunlight. Ozone would not be affected by the redistribution of traffic that would occur from the Rock Creek Park management alternatives and therefore was not considered in this impact evaluation.

Analysis

Regardless of the actions associated with Alternative A, the air quality of Rock Creek Park and the Rock Creek and Potomac Parkway would be affected more by emissions throughout the regional airshed than by tailpipe emissions from vehicles using the park and parkway.

Table 18 summarizes the effects of Alternative A on air quality in the year 2020 compared to Alternative B. The analysis showed the following.

The differences between Alternative A and Alternative B would be negligible at all intersections, and would differ by only a few tenths of a part per million (ppm)

**TABLE 18: AIR QUALITY IMPACT EVALUATION BASED ON ESTIMATED
3-HOUR AVERAGE CARBON MONOXIDE (CO) CONCENTRATIONS**

Location	Alternative A	Alternative B	Alternative C	Alternative D
Rock Creek and Potomac Parkway/M Street/Pennsylvania Avenue				
Peak-hour traffic count (vehicles)	9,650	10,000	9,900	10,000
	(evening)	(evening)	(evening)	(evening)
3-hour average CO conc. at 1.35 ppb/vehicle	13.03 ppm	13.50 ppm	13.36 ppm	13.50 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	yes	yes	yes	yes
Change relative to Alternative B	negligible	-	negligible	negligible
Beach Drive/Wise Road				
Peak-hour traffic count (vehicles)	2,850	3,000	1,300	3,000
	(evening)	(evening)	(evening)	(evening)
3-hour average CO conc. at 1.35 ppb/vehicle	3.85 ppm	4.08 ppm	1.76 ppm	4.08 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	no	no	no
Change relative to Alternative B	negligible	-	negligible	negligible
Beach Drive/Military Drive				
Peak-hour traffic count (vehicles)	3,500	3,750	2,800	3,750
	(evening)	(morning)	(both)	(morning)
3-hour average CO conc. at 1.35 ppb/vehicle	4.72 ppm	5.06 ppm	3.78 ppm	5.06 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	no	no	no
Change relative to Alternative B	negligible	-	negligible	negligible
Beach Drive/Broad Branch Road/Blagden Avenue				
Peak-hour traffic count (vehicles)	2,100	2,600	1,800	2,600
	(evening)	(evening)	(evening)	(evening)
3-hour average CO conc. at 1.35 ppb/vehicle	2.84 ppm	3.51 ppm	2.43 ppm	3.51 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	no	no	no
Change relative to Alternative B	negligible	-	negligible	negligible
Wisconsin Avenue north of Nebraska Avenue				
Peak-hour traffic count (vehicles)	3,000	2,900	3,100	2,900
	(evening)	(evening)	(evening)	(evening)
3-hour average CO conc. at 1.35 ppb/vehicle	4.05 ppm	3.92 ppm	4.18 ppm	3.92 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	no	no	no
Change relative to Alternative B	negligible	-	negligible	negligible
Connecticut Avenue north of Nebraska Avenue				
Peak-hour traffic count (vehicles)	3,700	3,600	3,700	3,600
	(evening)	(evening)	(evening)	(evening)
3-hour average CO conc. at 1.35 ppb/vehicle	5.00 ppm	4.86 ppm	5.00 ppm	4.86 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	no	no	no
Change relative to Alternative B	negligible	-	negligible	negligible
16th Street/Military Road intersection				
Peak-hour traffic count (vehicles)	6,600	6,750	6,900	6,750
	(morning)	(morning)	(evening)	(morning)
3-hour average CO conc. at 1.35 ppb/vehicle	8.91 ppm	9.11 ppm	9.32 ppm	9.11 ppm
Exceeds 1-hour NAAQS of 35 ppm	no	no	no	no
Exceeds 8-hour NAAQS of 9 ppm	no	yes	yes	yes
Change relative to Alternative B	negligible	-	negligible	negligible

The worst 3-hour average carbon monoxide concentrations for Alternative A (13.03 ppm) at the busiest intersection near the park would be well below the 1-hour NAAQS of 35 ppm.

The 3-hour average carbon monoxide concentrations for Alternative A would exceed the 8-hour average NAAQS of 9 ppm at the intersection of the Rock Creek and Potomac Parkway/M Street/Pennsylvania Avenue. However, it is anticipated that when this 3-hour concentration is averaged over the entire 8-hour period, the 8-hour standard would not be exceeded.

Alternative A would include some construction in the park that would not occur with Alternative B. This would include preserving historic structures, expanding the nature center and planetarium, and possibly constructing new buildings at the maintenance yard or the H-3 area. Best management practices and prompt revegetation would be applied in association with all construction to ensure that dust and construction-vehicle emissions associated with these activities would not be substantially greater than those that would occur with Alternative B.

There would not be any irretrievable or irreversible commitment of air quality resources with this alternative.

Cumulative Impacts

No changes would occur in air emissions from vehicles in the region because of Alternative A's management actions at Rock Creek Park and the Rock Creek and Potomac Parkway. Instead, Alternative A would redistribute the same traffic volume onto different roadways, compared to Alternative B. This redirection of the same volume of traffic would have negligible effects on the regional air quality.

Provisions of Alternative A to reduce traffic volumes and speeds in the park and on the parkway may encourage some commuters to use bicycles rather than automobiles. This change in transportation mode would result in a beneficial but negligible effect on the regional air quality.

Conclusions

Alternative A would result in negligible effects on air quality compared to Alternative B. It would not result in the exceedence of the 1-hour or 8-hour NAAQS for carbon monoxide. In addition, it would not cause any impairment of resources or values associated with air quality.

IMPACTS ON ROCK CREEK AND ITS TRIBUTARIES

Regulations and Policy

The regulations and policies that guide NPS actions with respect to water quality and hydrology in Rock Creek and its tributaries are presented in the "Servicewide Mandates and Policies" section of this document.

Methodology

The area addressed in the water quality and hydrology analysis of Rock Creek and its tributaries is described in the “Geographic Area Covered by the General Management Plan” section. This includes

the 1,754 acres administered by the National Park Service in the Rock Creek valley from the Maryland state line south to the National Zoo

the Rock Creek and Potomac Parkway from the National Zoo to Virginia Avenue

selected tributaries to Rock Creek and associated roadways

All of the alternatives include implementing best management practices (BMPs) to improve the hydrology and quality of surface waters in the park. Therefore, the analysis for each alternative included an evaluation of the effects of the BMPs compared to current conditions. In addition, conditions that would occur under Alternatives A, C, and D were compared to conditions that would occur under Alternative B to determine differences that would result compared to continuing with current management practices at the park.

Historical and current water quality within the park were determined from existing water quality data. The effects of Alternatives A, C, and D were estimated by adding the incremental effect of the alternatives to the estimated water quality conditions with continuation of existing management practices (Alternative B).

Changes to Rock Creek and its tributaries could be either beneficial (reducing pollutant loadings or the intensity of storm water flows) or adverse (increasing pollutant loadings or the intensity of storm water flows).

A negligible effect would be a change that probably would not be detected by water quality or quantity monitoring.

A measurable effect on Rock Creek and its tributaries was defined as a change that probably would be detected by water quality or quantity monitoring, but that would not be major.

A major effect on the water quality of Rock Creek and its tributaries was defined as a change caused by an alternative that would alter the ability of the waterway to meet a water quality standard. For example,

a change that would enable Rock Creek to consistently meet fecal coliform standards, which it frequently fails, would be a major beneficial change

a change that caused Rock Creek to repeatedly exceed the standard for lead, which it has met in all 57 monitoring events summarized in *Baseline Water Quality Data, Inventory and Analysis: Rock Creek Park* (NPS 1994), would be a major adverse change

A major effect on the hydrology of Rock Creek and its tributaries would result in visually obvious changes in channel configuration, such as areas of scour or deposition.

Impairment of Rock Creek or its tributaries would occur if there was a major adverse impact on water resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Short-term effects would be temporary changes. Increased sediment loading from construction runoff would be a short-term effect, even though the construction-related increase might last for more than a year. Long-term effects would occur for many years, such as increased runoff from the installation of a large area of impervious surface (a new parking lot). For storm water flows, a long-term effect would refer to a change in the hydrologic pattern, rather than changes associated with any particular storm event.

Analysis

No new point-source discharges in the park are anticipated as a result of Alternative A. The contribution of pollutants from existing point source discharges would be expected to decline as BMPs and corrective measures to stop discharges were implemented. The result of these activities would produce beneficial, long-term, negligible to measurable effects on water quality.

Continued cooperation with local, district, state, and federal environmental and sanitation agencies for monitoring and completing timely repair of sanitary and combined sanitary/storm sewers would reduce contamination of Rock Creek and its tributaries. Continued progress toward eliminating combined sanitary/storm sewers would also improve water quality. This would produce beneficial, long-term, measurable to major effects on water quality.

The application of BMPs at the three park stables, the maintenance yard and storage area, the golf course, and other existing park facilities would reduce contaminated runoff. Specific sources of potential contamination in the park and recommendations for BMPs to minimize pollution are presented in the *Best Management Practices for Water Quality – Rock Creek Park* (URS Greiner Woodward Clyde 1999). Implementation of BMPs at these sites would produce beneficial, long-term, measurable effects on water quality.

Alternative A would include preservation of historic features, expansion of the nature center and planetarium, and relocation of the park administrative offices and the D-3 U.S. Park Police substation. The relocations preferably would be to commercial space outside of the park, but could involve construction of a new administrative facility at the maintenance yard and/or construction of a new park police substation at the H-3 area. During construction activities and throughout long-term operations, the National Park Service would employ conventional soil erosion and runoff prevention BMPs that have proved effective in minimizing both the volume and sediment loading of runoff. Anticipated effects during construction would be adverse, but would be short-term and would not last more than 2 to 3 months after construction was completed.

Without BMPs, construction activities could cause temporary increases in sedimentation and turbidity in surface water as a result of soil disturbance. However, the sites are already disturbed, are well removed from streams (at least 1,200 feet), and are buffered by surrounding natural

vegetation cover. When combined with BMPs, these factors should result in negligible adverse, short-term effects on water quality and hydrology compared to conditions under Alternative B.

If administrative and U.S. Park Police functions were relocated within the park, new impervious surfaces, such as building roofs and parking areas, could cause small, long-term increases in runoff volumes and pollutant loadings. However, the mitigating factors described above for construction would also reduce these changes to produce negligible effects on either water quality or hydrology compared to conditions under Alternative B. The new facilities also could be designed to minimize impervious surfaces, and modifications could be made to existing areas such as parking lots so that no net increase in runoff occurred.

Automobile traffic on Beach Drive and the parkway adjacent to Rock Creek would be reduced by an average of about 25 percent compared to Alternative B. This reduction could result in lower pollutant loadings (sediments, oils and grease, and metals washed from the road surface) of the creek during and after storm events. This reduced loading would produce beneficial, long-term, negligible to measurable effects on water quality. This beneficial effect would be further increased when combined with such actions as the revegetation of road shoulders with dense ground cover, another BMP frequently applied to improve stream water quality.

There would be no irretrievable or irreversible commitment of the resources of Rock Creek and its tributaries with this alternative.

Cumulative Impacts

Water quality and flows in Rock Creek and its tributaries would continue to be more heavily influenced by urban development in the upstream watershed than by activities in the park. However, the incremental effects of reducing pollutant loading inside the park through the application of BMPs would benefit stream water quality.

NPS programs to encourage public awareness of water quality problems could improve citizen stewardship of water resources in the region. Improvements could result from the cumulative effects of small measures taken by better-informed individual citizens on their properties. In addition, park water quality improvements could result from the increased action of citizen groups in upstream communities. Implementation of water pollution control regulations in Maryland, especially storm water controls, would improve water quality and storm water flows in the park.

Use of BMPs in the park to reduce runoff from impervious surfaces would have a small beneficial effect in offsetting general watershed trends of increased storm water runoff. The higher runoff flows from the upstream watershed appear responsible for scouring the streambed in some areas of the park and depositing sediment in others. Coordination with upstream jurisdictions to implement BMPs in the upstream watershed as well as in the park would result in beneficial, long-term, measurable to major reductions in streambed alterations such as scour and sedimentation.

Continued cooperation with local, district, state, and federal environmental and sanitation agencies for monitoring and completing timely repairs of sanitary and combined sanitary/storm sewers would reduce contamination of Rock Creek and its tributaries. Continued progress toward

eliminating combined sanitary/storm sewers would also improve water quality. This would produce beneficial, long-term, measurable to major effects on water quality.

As described in the “Affected Environment” section, the Washington, D.C. Water and Sewer Authority has proposed a \$1 billion storm water management program that includes installing a 5-million-gallon-capacity tunnel along Rock Creek to provide temporary storage of combined storm runoff and sewage. This would eliminate most of the 60 to 70 overflow events that currently occur each year. The remaining 5 to 10 overflow events that would occur annually would be associated with major storms. Elimination of most combined sewer overflow events would produce major, beneficial, long-term effects on water quality of Rock Creek and its tributaries. An alignment for placing such a tunnel “along Rock Creek” has not yet been proposed, and would require extensive coordination to ensure that park resources and values were not adversely affected.

The National Park Service would continue to provide support of, and participation in, other regional programs to improve water quality and watershed management. Collectively, these could have measurable to major, beneficial, long-term effects on water quality of Rock Creek and its tributaries.

The installation of a fish bypass at the dam at Peirce Mill and the removal of other impediments to fish migration in Rock Creek as part of the Woodrow Wilson Bridge mitigation was described in the “Connected, Cumulative, and Similar Actions” section. Environmental compliance for these projects, including federal permitting to dredge and fill under Section 404 of the Clean Water Act, would be completed prior to initiation of work.

Intermittently throughout the 35-week construction period for improvements for migratory fish, disturbances in the streambed would cause increases in turbidity. Turbidity effects generally would not persist more than 2 to 3 days after sediment-disturbing activities at any site were completed. Use of silt containment curtains would minimize potential silting of downstream aquatic invertebrate community. Higher flows associated with spring rains would flush sediment deposits out of Rock Creek and into the Potomac River, where they would represent only a short-term, small proportional increase in the river’s sediment load. Streambed disturbance activities would be an adverse, short-term, measurable effect on water quality.

Conclusions

Compared to future conditions occurring under the alternative of no action/continue current management (Alternative B), Alternative A would produce long-term improvements in water quality and storm water hydrology. Cumulatively, the incremental effects of the improvements would be major and beneficial.

Compared to Alternative B, construction proposed by Alternative A could have short-term, adverse effects on both water quality and hydrology. Short-term water quality effects would be produced by soil disturbance associated with construction, while long-term effects of higher runoff volumes could result from increases in impervious surfaces. Recognizing that both conditions would be mitigated with BMPs, these conditions would result in negligible net adverse effects on either water quality or to stream hydrology.

The management actions of Alternative A would not result in impairment of resources or values associated with Rock Creek and its tributaries.

IMPACTS ON WETLANDS AND FLOODPLAINS

Regulations and Policy

The regulations and policies that guide NPS actions with respect to wetlands and floodplains are presented in the “Servicewide Mandates and Policies” section of this document.

Methodology

The area addressed in the analysis of wetlands and floodplains is described in the “Geographic Area Covered by the General Management Plan” section.

Protection of wetlands and floodplains has been a standard practice at Rock Creek Park for many years. Protection of these resources will continue in conformance with NPS guidance documents such as

NPS Floodplain Management Guidelines, Special Directive 93-4 (NPS 1993a)

Procedural Manual #77-1: Wetland Protection (NPS 1998e)

Director’s Order 77-1, Wetland Protection (NPS 1999a)

Management Policies (NPS 2001b)

The protection of freshwater spring-fed wetlands and seeps and the biota found in and around them, including rare amphipods, would be an important management objective. None of the alternatives would allow any actions that potentially would cause adverse effects on these sites. Therefore, effects on these specific wetland resources were not considered further in this impact analysis.

Potential effects were assessed based on the potential for locating new construction in floodplains, or near known seep locations; conducting ground disturbing activities or depositing fill material in wetlands, seeps, or floodplain zones; or changing the existing hydrologic regime of one of these locations through facility construction or operation. Indirect effects from construction, management activities, or visitor use upgradient from floodplain and wetland areas were also considered.

The analysis consisted of identifying the locations and types of wetlands, seeps, and floodplain areas from existing park maps. The locations of the proposed facilities associated with the alternative were superimposed on the wetland and floodplain locations to determine which facilities (if any) would be located in or across one or more of these features. The potential consequences of the facility or activities anticipated at each location were then estimated.

Short-term effects were defined as temporary changes, such as the temporary placement of fill in a wetland or floodplain in association with construction that would last less than one growing season, followed by site restoration. Long-term effects would occur for many growing seasons.

Intensities of effects on wetlands were defined as follows.

A minor adverse effect on a wetland would include a change that would not require a Section 404 nationwide dredge-and-fill permit.

A major adverse effect on a wetland would include any of the following:

a change that needed a individual Section 404 dredge-and-fill permit

a change that resulted in the loss of one or more wetland functions

the permanent loss of a wetland, regardless of whether or not it was included in the National Wetland Inventory or was classified as jurisdictional by the Corps of Engineers

A major adverse effect on a floodplain would be an action that reduced the hydraulic capacity of the floodplain or caused the floodplain boundaries to shift outside its current 100-year boundary.

Impairment of wetlands or floodplains would occur if there was a major adverse impact on wetlands or floodplain resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Analysis

None of the proposed actions in Alternative A would have long-term, adverse effects on wetlands.

Rehabilitation of the Peirce Mill complex would occur within the 100-year floodplain. This historic structure is allowed within the 100-year floodplain under *NPS Floodplain Management Guidelines* (NPS 1993a). Prior to rehabilitation, the National Park Service would perform a floodplain analysis and would include appropriate mitigation to prevent adverse, long-term impacts to the floodplain capacity or boundaries. Short-term adverse effects on the 100-year floodplain capacity could occur during construction.

Alternative A would include improving and possibly rerouting of the recreation trails along Rock Creek, portions of which are in the 100-year floodplain. Trail construction in a floodplain is acceptable under *NPS Floodplain Management Guidelines* (NPS 1993a). Short-term adverse effects on the 100-year floodplain capacity could occur during construction. All trail modifications and route alignments would be designed to avoid wetland areas.

This alternative's better education of the public on the need to control storm water runoff upstream from the park could produce a beneficial effect on the park's wetlands and floodplains relative to Alternative B. However, the size of this effect probably would be negligible.

There would be no irretrievable or irreversible commitment of the park's wetland or floodplain resources with this alternative. Floodplain alterations could be reversed and new structural facilities could be removed if unanticipated future wetland or floodplain effects developed.

Cumulative Impacts

Alternative A would not produce any adverse, long-term impacts to wetlands, seeps, or floodplains. Therefore, it would not contribute to any cumulative adverse impacts to wetlands or floodplains in the park or in the region.

Floodplains and wetlands throughout the park would be continue to be protected from direct disturbance from development. Application of best management practices (BMPs) would help reduce risk to floodplain and wetland resources from polluted runoff, erosion, filling activities, water diversions, and sedimentation from sources within the park. Wetlands located in the Rock Creek floodplain would continue to be threatened by sediments transported during high storm water discharges originating upstream from the park.

The removal of impediments to fish migration, including construction of a fish bypass at Peirce Mill dam, would represent a new construction action in the 100-year floodplain. These actions will be implemented as part of the mitigation program for the Woodrow Wilson Bridge. Construction activity would represent a short-term adverse effect on the 100-year floodplain capacity. However, because federal floodplain management strategies require no net loss of 100-year floodplain hydraulic capacity, the bypass structure and barrier removals will be designed so there is no long-term loss of floodplain hydraulic capacity.

Construction would temporarily increase downstream water turbidity while construction was in progress. Use of BMPs to control downstream siltation would ensure that the deposition of silt in wetlands did not occur and that silt deposition did not reduce floodplain capacity.

Conclusions

Alternative A would not produce any adverse, long-term effects on wetlands or floodplains. Short-term reductions in floodplain capacities could occur during construction activities at the Peirce Mill complex and along trails. There would be no impairment of resources or values associated with wetlands and floodplains.

IMPACTS ON DECIDUOUS FORESTS

Regulations and Policy

The regulations and policies that guide NPS actions with respect to deciduous forests are presented in the "Servicewide Mandates and Policies" section of this document.

Methodology

The area addressed in the analysis of deciduous forests is described in the “Geographic Area Covered by the General Management Plan” section. Particular emphasis is placed on lands within the park’s designated Forest Zone management prescription.

Protection of the deciduous forest has been a long-term management goal at Rock Creek Park. Protection has included such actions as minimizing or avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of invasive species. Protecting the forest resource from disturbance factors will continue in conformance with NPS guidance policies. Therefore, these types of management actions will not be considered further in this impact analysis.

The deciduous forest impact evaluation consisted of comparing conditions that would occur under Alternatives A, C, and D to those under Alternative B, which would strive to maintain current park conditions. It involved comparing the proposed locations of new and upgraded structural facilities to present forest distribution and to the susceptibility of forest areas to disturbances. Anticipated changes in the operational characteristics of future park activities were reviewed to determine whether such activities could lead to the substantial loss of portions of the forest, conversion of one plant assemblage to another type of plant composition, or reduced productivity. The assessment also examined whether facilities were proposed for forested sites that were steep or that possessed difficult-to-revegetate conditions.

Because deciduous forests require a long time to reach maturity, the concepts of short-term versus long-term effects were defined based on plant associations rather than maturity.

Short-term effects were defined as the removal of forest vegetation, followed by restoration with native woody species representative of the various successional stages of the eastern hardwood forest. It is recognized that areas of short-term effects may not have the appearance of the mature deciduous forest for 50 to 80 years.

Long-term effects involve the removal of forest vegetation, followed by a change in vegetation. This could include conversion to another use such as a paved trail or a building site, implementation of management techniques such as mowing to maintain herbaceous vegetation, selected clearing to preserve historic views, or revegetation with exotic species.

A negligible effect would not be measurable.

A minor effect on the deciduous forest would be measurable, but would involve changes smaller than those described in the next paragraph as major.

A major effect would include any of the following. All of these effects would include the aggregate loss or gain from the same action in different locations. For example, all forest alterations associated with trail improvements and construction of new paved trails under an alternative would be considered together.

A permanent loss or gain of the upland deciduous forest resource in an area totaling 12 acres or more. This area represents approximately 0.5 percent of the forested area in the park.

A permanent loss or gain of the riparian deciduous forest resource in an area totaling 1 acre or more. This criterion recognizes the ecological importance of riparian areas and their relative scarcity.

Conversion of similar-sized upland or riparian areas to or from a vegetation type dominated by invasive or non-native species.

Any loss or creation of a rare plant community within the deciduous forest.

Any disturbance or rehabilitation of the deciduous forest on slopes greater than 30 percent.

Impairment of the deciduous forest would occur if there was a major adverse impact on deciduous forest resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Adverse effects to the deciduous forest would involve loss of existing forest, or conversion of a native species plant assemblage to predominantly exotic or invasive plant species. Beneficial effects would include such actions as restoring unvegetated areas to deciduous woodlands, amending poor or impaired soil conditions to accommodate restoration of deciduous tree species, realigning trails away from steeply sloping areas and revegetating the former alignments, and discontinuing the artificial suppression of tree regeneration through periodic cutting or mowing.

Analysis

Rock Creek Park is the only large area of deciduous forests in the Washington, D.C. metropolitan area, and the deciduous forest is a major factor in defining park character. As such, changes in the area or character of the deciduous forest are an important management factor.

The primary action under Alternative A compared to Alternative B that would affect the abundance and presence of deciduous forest is the reconstruction of 2.5 miles of existing trails from about 6 feet to a width of 9 feet where possible, and the net construction of 500 feet of new, 8-foot-wide foot/horse trail. This latter action would involve the construction of 3,500 feet of new trail and the restoration of 3,000 feet of former trail. The total deciduous forest area that would be permanently converted to new trail area would be about a half acre. This would represent a minor, long-term, adverse effect on the upland deciduous forest resource of Rock Creek Park.

As much as 4 to 5 additional acres of forest could be disturbed by trail rehabilitation. Following completion of trail work, this construction zone would promptly be planted with native grasses to stabilize the soil, and would then be allowed to revegetate naturally with native woody species. This would be a minor, short-term, adverse effect on the park's upland deciduous forest resource.

Prior to any trail construction, the National Park Service would perform research and detailed field investigations to select the optimal trail alignment. Improvements would be designed to maximize safety and the quality of the visitor recreational experience, and to accommodate historic alignments of old roads and trails without compromising the long-term composition and reproductive capability of the surrounding forest. This would include routing trails around rare

plant and animal communities and areas with slopes greater than 30 percent to avoid adverse effects on these areas.

In areas where current trail alignments are moderately to severely eroded, in areas of rare or unusual plant or animal assemblages, or in areas where trails cross slopes of 30 percent or more, the trail may be relocated to more appropriate areas and the former alignment would be revegetated. This would produce a major, long-term, beneficial effect on the deciduous forest by protecting forest resources and by helping to maintain soil productivity and prevent erosion on steep slopes.

Effects on riparian deciduous forest zones could include the following. The effect would be beneficial in the long term, but the impact intensity would depend on the aggregate acreages of all of these actions.

Within riparian zones, restoration would be implemented to correct problem areas. This would supplement the regenerating capabilities in this zone.

Existing trails in riparian zones may be relocated outside of the riparian zone. After stabilization with native grasses, riparian vegetation would be reestablished along the former alignment either naturally or with the assistance of plantings. This would be a beneficial, long-term effect.

The improved education and interpretation elements of Alternative A may increase the public's appreciation for deciduous forests. However, the impact of this beneficial, long-term effect probably would be negligible in the park because, as demonstrated by scoping, the public already recognizes the value of the deciduous forest to Rock Creek Park. The beneficial impact would increase if this appreciation were translated into action to protect other remnant woodlands in the region.

The traffic management changes in Alternative A would not affect the forest resources of Rock Creek Park and the Rock Creek and Potomac Parkway.

There would be no irretrievable or irreversible commitment of deciduous forest resources with this alternative. Forest alterations could be reversed with sufficient time using such measures as site protection, discontinuation of maintenance activities, or active plant restoration and revegetation.

Cumulative Impacts

Ongoing urbanization of the Rock Creek watershed and other forested areas of Maryland and Virginia near Washington, D.C. will continue to eliminate deciduous forests. Park management practices associated with Alternative A would have little effect on regional, development-related decreases in deciduous forests. However, as discussed above, the improved education and interpretation elements of Alternative A could provide beneficial, long-term effects if the public's appreciation for deciduous forests obtained at Rock Creek Park were translated into action to protect other remnant woodlands in the region.

Conclusions

Compared to Alternative B, trail reconstruction and new trail segments associated with Alternative A would result in the permanent, long-term loss of about a half-acre of upland deciduous forest. This would represent a minor, long-term, adverse effect on this resource. Major, long-term, beneficial effects may occur in both upland and riparian deciduous forest areas through rehabilitation and/or restoration of problem areas of trails. There would be no impairment of resources or values associated with deciduous forests.

IMPACTS ON PROTECTED AND RARE SPECIES

Regulations and Policy

The regulations and policies that guide NPS actions with respect to protected and rare species are presented in the “Servicewide Mandates and Policies” and “Affected Environment” sections of this document. The National Park Service is required under the Endangered Species Act to ensure that federally listed species and their designated critical habitats are protected on lands within the agency’s jurisdiction. Although the National Park Service is not under any legal obligation to protect rare plants or animals identified by the adjoining states of Maryland and Virginia, park policy and management actions include maintaining these uncommon native species.

Methodology

This analysis evaluated impacts to protected and rare species in the area described in the section entitled “Geographic Area Covered by the General Management Plan.” Lists of species of interest were identified from the current federal list of endangered or threatened fish, wildlife, and plants and from the lists of special interest species that are maintained by the states of Virginia and Maryland.

The analysis consisted of comparing known species location information and typically occupied habitat conditions in the park to the proposed locations of facilities associated with each alternative. Areas of potential overlap were considered indications of potential adverse effects on the species. Conditions that would occur under Alternative A, C, and D were compared to those under Alternative B, which would strive to maintain current park conditions.

Moderate effects on protected or rare plant or animal species would include any of the following:

- short-term degradation of critical habitat, followed by effective restoration
- restoration of a previously degraded habitat
- the loss of one or more individuals of a plant or animal listed as being of interest by the states of Virginia and Maryland

Any of the following would be a major adverse effect:

- the destruction or long-term degradation of critical habitat for a protected or rare plant or animal species

the loss of a rare plant community

the loss of one or more individuals of a federally listed or candidate plant or animal

Impairment of protected or rare plant or animal resources would occur if there was a major adverse impact on protected or rare species resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Analysis

The groundwater amphipods that were described in the “Affected Environment” section, including the federally endangered Hays spring amphipod, inhabit seeps and springs in several park locations. The National Park Service is aware of these sites and may implement additional measures to protect these important habitats under Alternative A. Compared to Alternative B, long-term protection of the endangered Hays spring amphipod could be enhanced by implementing more active protection of the springs and their upgradient drainages.

Alternative A would include construction at several park locations. All of these sites have previously been disturbed and do not support any protected or rare species. Therefore, these activities would not have any effects on protected or rare species.

As described in the section on deciduous forests, prior to any trail construction, the National Park Service would perform detailed field investigations to ensure that new or upgraded trail segments would not affect any rare plant and animal communities. As a result, the effect of trails on rare or protected species would be negligible.

None of the activities that would affect the waterways within the park, including Rock Creek, would adversely affect protected or rare aquatic species because no species of concern are known to occur in the park’s drainages.

The improved education and interpretation elements of Alternative A may increase the public’s appreciation for protected and rare species. This could include assisting the public in gaining a better understanding of the importance of rare plants and animals, the need to prevent species extinction, and the importance of habitat in the maintenance of protected and rare species. The resulting beneficial, long-term effect probably would be negligible in the park because the National Park Service already protects rare species within park boundaries. The beneficial effect would increase if this appreciation were translated into action by members of the public to protect rare species in other locations throughout the region.

There would be no irretrievable or irreversible commitment of protected or rare plant or animal resources.

Cumulative Impacts

Under Alternative A, the park’s assemblage of national and regionally rare plants and animals would continue to benefit from the protection that the park affords.

Ongoing urbanization of the Rock Creek watershed and other areas of Maryland and Virginia near Washington, D.C. will continue to eliminate individuals and habitats of protected and rare species. Park management practices associated with Alternative A would have little effect on regional, development-related effects on these species. However, as discussed above, the improved education and interpretation elements of Alternative A could provide beneficial, long-term effects if the public's appreciation for rare species obtained at Rock Creek Park were translated into action to protect these species outside of the park.

Conclusions

Compared to Alternative B, long-term protection of the endangered Hays spring amphipod could be enhanced by implementing more active protection of springs and their upgradient drainages. Opportunities for the public to learn about protected and rare species would be improved. There would be no impairment of resources or values associated with protected and rare species.

IMPACTS ON OTHER NATIVE WILDLIFE

Regulations and Policy

The regulations and policies that guide NPS actions with respect to native wildlife are presented in the "Servicewide Mandates and Policies" section of this document.

Methodology

The effects analysis was conducted by identifying the general wildlife habitats of representative native species that would be affected by the alternative. Once identified, an evaluation was made whether the physical environmental changes associated with each alternative were likely to displace some or all members of a species present in the park, or result in the substantial loss or creation of habitat conditions needed for the continued survival and welfare of the species. The potential for attracting and support new wildlife species also was considered by the analysis.

This analysis evaluated effects on native wildlife species associated with the area described in the "Geographic Area Covered by the General Management Plan" section.

Long-term effects on native wildlife were considered to encompass a period of one year or more. Effects of less than this duration would be short-term.

Beneficial effects would result from the maintenance or restoration of native wildlife populations, including their habitat. Adverse effects would involve the loss of native species diversity, supporting habitat, or population numbers.

Intensity was defined as follows.

Negligible effects would cause changes (including death) to individual animals, but would not affect the viability of a wildlife population or assemblage, either locally or park-wide.

A moderate effect would result in the displacement, loss, or restoration of a wildlife population or wildlife assemblage within a localized area of the park.

A major effect would result in the displacement, loss, or restoration of a wildlife population or wildlife assemblage throughout the entire park.

Impairment of the native wildlife resource would occur if there was a major adverse impact on wildlife resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Throughout the park, little change in the overall management approach for native wildlife would occur under any of the alternatives. The native wildlife evaluation consists of comparing conditions that would occur under Alternatives A, C, and D to those under Alternative B, which would strive to maintain current park conditions.

Analysis

Native species that require deciduous forest habitats in relatively large, contiguous tracts would continue to benefit from the protection of most of the park's land area as relatively undisturbed woodland.

Trail realignments and proposed construction activities associated with Alternative A may cause the localized, short-term displacement of individuals. Minor, temporary effects on species from trail realignments would be controlled by using best management practices (BMPs). There would be no removal of substantial blocks of forest, which might eliminate or substantially alter habitat conditions for species affiliated with the park.

Compared to Alternative B, actions to reduce traffic speeds and volumes in the park and on the parkway would reduce the number of wildlife individuals killed or injured by motor vehicles. Additional mitigating efforts to reduce roadkill such as increasing public awareness, strategic traffic calming, and providing underpasses could further reduce the frequency of wildlife mortality. This would produce long-term, beneficial effects on the park's native wildlife. For most park species, the change would be negligible, because their populations are stable or expanding. Expected effects on species that have been identified by park staff as potentially declining would be as follows.

Effects on opossums would be negligible. This prey species has a high reproductive rate to compensate for the high mortality it typically experiences from predation. Reducing deaths by the average recorded roadkill of 10 individuals per year would have little effect on populations of this species in the park.

Effects on black rat snakes would be negligible. Recorded roadkill within the park averages less than one individual per year, which would have little effect on the population, either locally or in the park as a whole.

Effects on box turtles would be moderate, long-term, and beneficial. The survival of an additional two to three box turtles per year could help ensure the long-term success of localized populations of this species, which has long-lived individuals with low reproductive potential.

Effects on gray foxes would be major, long-term, and beneficial. As described in the “Affected Environment” section, the gray fox population in the park is small and experiences multiple stress factors. Under these conditions, even infrequent roadkills could contribute to an overall reduction of the resident population or even local extirpation. Actions that reduced roadkill of gray foxes could help ensure the continued existence of this species in the park.

Alternative A would better provide the public with information that removing box turtles from the park is illegal and would provide better education on the adverse effects on box turtles of removing them from the park or even moving them within the park. Because anecdotal evidence suggests that a substantial number of box turtles are removed from the park each year for use as pets, this would provide a moderate, long-term, beneficial effect on box turtles.

For the following reasons, other actions associated with Alternative A would be unlikely to substantially affect native wildlife population abundance, diversity, or habitat abundance compared to Alternative B.

Areas along roadways already experience a high level of human presence and disturbance that degrades habitat conditions for species that are intolerant of human presence. Reductions in traffic volumes associated with Alternative A without substantial decreases in nonmotorized use of park roads and trails would be unlikely to alter wildlife conditions sufficiently to encourage new species presence or increases in abundance.

If suitable commercial space cannot be located outside of the park, new administrative or U.S. Park Police facilities could be constructed at the park maintenance yard or H-3 stable areas, respectively. These actions would be in already-disturbed areas with low habitat values and would have little effect on wildlife.

The restoration of some historic clearings could produce beneficial effects by restoring edge areas that are preferred habitat for many native wildlife species. However, these areas would be limited in size and would have negligible effects when considered on a park-wide basis.

There would be no irretrievable or irreversible commitment of native wildlife resources under Alternative A.

Cumulative Impacts

Both terrestrial and aquatic native wildlife species within the District of Columbia and the region would continue to benefit from habitat protection provided by natural areas in Rock Creek Park. Benefits could be enhanced through cooperative efforts with the municipal sewer district and other agencies to reduce or eliminate pollutant discharges in currently developed areas of the drainage.

As described in the section entitled “Connected, Cumulative, and Similar Actions,” mitigation for the Woodrow Wilson Bridge will be constructed in Rock Creek Park. This will include removing or mitigating man-made obstructions to fish migration in Rock Creek, including the Peirce Mill dam, fords, and sewerline crossings. This action is expected to have a major beneficial effect for at least three native species.

The blueback herring and alewife are anadromous, returning from saltwater to spawn in freshwater. The Woodrow Wilson Bridge mitigation actions would provide access to historical Rock Creek spawning grounds for these species.

The American eel is catadromous, living primarily in freshwater but migrating to saltwater to spawn. The fish migration improvements would help restore access to its historical habitat throughout the Rock Creek drainage.

The pollution control measures described previously for Rock Creek and its tributaries also would enhance the restoration of these species upstream from the Peirce Mill dam and throughout the drainage.

Protection of wildlife habitat in the park is important. However, despite the actions taken under Alternative A, terrestrial and semi-aquatic wildlife habitat on privately owned land throughout the region would continue to be lost and fragmented because of continued high-density urban development and in-filling. This would result in declines in both numbers and diversity of native wildlife, and would be a major, long-term, adverse effect.

Species with relatively small home ranges, high reproduction rates, generalized habitat requirements, and/or a high tolerance of human activities, such as squirrels, opossums, raccoons, white-tailed deer, coyotes, and many birds, would likely persist in the region.

Wildlife species with limited mobility, low reproduction rates, specialized habitat requirements, or large home ranges, such as many amphibians and reptiles, some birds, and many predatory mammals, would continue to decline and could be locally extirpated.

Watershed development outside of the park also would alter aquatic life habitat within the park and throughout the drainage. Effects on aquatic life could be either beneficial or adverse.

Development would alter the hydrology of the basin. Adverse effects to aquatic life could occur as increases in impervious areas increased the intensity of flood flows and the scouring of stream channels and banks. Conversely, runoff to storm sewers from lawn irrigation would increase creek flows during dry periods and could produce beneficial effects on aquatic life.

Short-term increases in sediment, which can suffocate aquatic life, could result from construction sites where best management practices were not employed. However, long-term sediment loadings could decrease as agricultural fields were converted to turf and impervious surfaces.

Modern sewage collection and treatment systems installed in new developments would prevent the introduction of massive nutrient loadings into Rock Creek. At the same time, non-point pollutant loadings would change. Runoff from animal wastes, agricultural pesticides, and agricultural fertilizers would decrease. Loadings of heavy metals, and oil and

grease from roadways would increase, as would runoff from lawn fertilizers. Effects on aquatic life could be either beneficial or adverse, and would result both from changes in direct toxicity of pollutant loadings and indirectly from algal blooms associated with nutrient inputs.

Conclusions

Alternative A would not produce any major changes in the overall abundance, diversity, or habitat availability for native wildlife. However, long-term, beneficial effects could result within the park to box turtles (moderate) and gray foxes (major) from reductions in roadkill associated with Alternative A's traffic management provisions, and from better education of visitors on the importance of not disturbing or removing box turtles. Alternative A would not result in any impairment of resources or values associated with native wildlife.

Cumulative impacts from actions outside of the park would have much larger effects than those actions associated with Alternative A. Woodrow Wilson Bridge mitigation, which would restore upper watershed access for at least three species of migratory fish in Rock Creek, would produce a major, long-term, beneficial effect within the park and the entire creek system. Adverse effects to terrestrial and semi-aquatic native wildlife would occur from the loss of habitat associated with development in the watershed. Development-related effects on native aquatic life within the park could be either adverse or beneficial, based on changes in pollutant loadings and basin hydrology from development occurring upstream from the park.

IMPACTS ON ARCHEOLOGICAL RESOURCES

Regulations and Policy

The regulations and policies that guide NPS actions with respect to archeological resources are presented in the "Servicewide Mandates and Policies" section of this document.

Methodology

This analysis evaluates effects on archeological resources within the area described in the "Geographic Area Covered by the General Management Plan" section. The archeological resource evaluation consists of comparing conditions that would occur under Alternatives A, C, and D to those under Alternative B, which would strive to maintain current park conditions.

The Advisory Council on Historic Preservation's "Regulations for the Protection of Historic Properties" (36 Code of Federal Regulations 800) provide guidance for determining whether an archeological or historic property is eligible for inclusion on the National Register of Historic Places (NRHP) and provides a procedure for nominating such properties to the NRHP. The regulations also define what constitutes an impact or effect on an archeological or historic property listed on or eligible for listing on the NRHP. These definitions, described below, were used in this environmental impact statement.

An activity has an effect on a prehistoric or historic property when that activity may alter characteristics of the property that may qualify the property for inclusion on the NRHP.

Alteration to a property's location, setting, or use may be relevant in determining effect, depending on the property's characteristics.

An action is considered to have a significant adverse impact when the effect on the pre-historic or historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Impairment of archeological resources would occur if there was a major adverse impact to archeological resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Determination of effect is made jointly by the National Park Service, District of Columbia State Historic Preservation Officer (DCSHPO), and Advisory Council on Historic Places. Properties that have been evaluated and are deemed ineligible for listing on the NRHP following consultation may be altered without further consultation among the three parties. Properties that are listed on the NRHP or have been determined eligible for listing require consultation among the parties to ensure that the actions proposed do not "adversely affect" (in the language of the National Historic Preservation Act) the resource.

Analysis

As discussed in the "Affected Environment" section, there is a high probability that there are unknown prehistoric and historic archeological resources within the boundaries of the park and parkway. Any ground-disturbing activities associated with Alternative A would have the potential to affect such sites.

Until an NRHP evaluation for any site was completed, it would be assumed that the site is eligible for listing on the NRHP. Therefore, until proven otherwise, disturbance to any archeological site that was discovered during an archeological survey of the proposed site prior to design or construction of any facilities under Alternative A would be considered a significant adverse effect. Because Alternative A includes construction that would not occur under Alternative B, Alternative A has a higher potential for adverse construction-related effects on archeological resources than does Alternative B.

As described in the section entitled "Servicewide Mandates and Policies," the National Park Service is required to protect archeological resources within the park and parkway. Therefore, prior to undertaking any construction activities under Alternative A, the National Park Service would

conduct cultural resources surveys of areas to be disturbed, including trail alignments

identify all archeological resources that are discovered during the surveys

systematically evaluate each site to determine and document its significance to support its evaluation for NRHP eligibility

determination eligibility in concert with the DCSHPO and Advisory Council on Historic Places

avoid locating any proposed facilities in areas that would disturb NRHP-eligible sites, or mitigate the adverse effect by conducting scientific evaluation in advance of construction

The collection of data to support the eligibility evaluation, and the determination of eligibility can be time consuming. Therefore, as a time-saving approach, the National Park Service would assume that any archeological site that is discovered is eligible for listing, and would relocate the facility to be constructed to avoid that site. This approach would substantially reduce the potential for construction-related significant adverse effects on archeological resources.

Under Alternative B, the integrity of some sites would be degraded by natural processes such as wind and water erosion, or by vandalism or inadvertent damage by visitors. Alternative A would include actions to reduce these effects, such as increased ranger monitoring and visitor education programs. These actions would reduce the potential for non-construction-related significant adverse effects compared to Alternative B.

Where sites were disturbed, data recovery and preservation efforts would partly mitigate impacts. However, the disturbance could result in some irretrievable and irreversible loss of archeological resources.

Cumulative Impacts

Archeological resources in most of the Washington, D.C. area have been lost due to construction activity during the historic period. Therefore, it is important that the archeological resources remaining in the park and parkway be protected as examples of the types of resources that formerly existed throughout the region.

A systematic program to identify and inventory the archeological resources in the park and parkway is scheduled to begin in 2003. This program will offer an opportunity to add to the knowledge of the prehistory and history of the park and the entire vicinity. This survey is not part of any of the general management plan alternatives.

Conclusions

Because it includes ground-disturbing activities, Alternative A would have a higher potential for construction-related significant adverse effects on archeological resources than Alternative B. However, the survey, identification, and avoidance measures that would be implemented prior to construction would avoid most or all of the significant adverse effects. There would be no impairment of resources or values associated with archeological resources.

IMPACTS ON HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Regulations and Policy

The regulations and policies that guide NPS actions with respect to historic structures and cultural landscapes are presented in the "Servicewide Mandates and Policies" section of this document.

Methodology

The historic structures and cultural landscapes analysis used the same effects criteria and definitions as the archeological resources analysis. Please refer to the previous section for a description of the procedures that were applied.

Analysis

Most historic structures in the park and parkway, such as Boulder Bridge, the Godey Lime Kilns, and the Jules J. Jusserand Memorial, would not be changed relative to Alternative B. However, under Alternative A, a significant beneficial impact would occur to

the Peirce Mill Barn, Peirce-Klingling Mansion, and Lodge House, which would be rehabilitated to preserve their architecturally significant features and be used in accordance with park resource values

historic trails in the park and parkway, where improvements or rehabilitation would enhance their integrity and preservation

Rehabilitation of the significant cultural landscape features and attributes of the Linnaean Hill and Peirce Mill areas would enhance park preservation and visitor understanding of the historic settings in the park. This would be a beneficial effect compared to Alternative B. Historic-designed roads would be preserved and maintained.

Where sites were disturbed, data recovery and preservation efforts would partly mitigate impacts. However, the disturbance could result in some irretrievable and irreversible loss of historic resources.

Cumulative Impacts

Rock Creek Park and the Rock Creek and Potomac Parkway contain a variety of cultural resources that are significant to the historic development of the Rock Creek valley and Washington, D.C. area. Some of these resources are among the last remaining examples of their construction types in the region. Protection and rehabilitation of these resources by Alternative A would have a significant beneficial effect in preserving them for the future.

Conclusions

Under Alternative A, the historic structures and cultural landscapes in Rock Creek Park would be afforded enhanced protection and preservation treatment. Rehabilitation of historic structures and cultural landscapes would occur. Several significant historic structures would be returned to their original uses, while others would be rehabilitated and adaptively reused in accordance with park resource values. There would be no impairment of resources or values associated with historic structures and cultural landscapes.

IMPACTS ON TRADITIONAL PARK CHARACTER AND VISITOR EXPERIENCE

Regulations and Policy

The regulations and policies that guide NPS actions with respect to park character and visitor experience are presented in the “Servicewide Mandates and Policies” section of this document.

Methodology

This analysis evaluates effects on traditional park character and visitor experiences associated with the area described in the “Geographic Area Covered by the General Management Plan” section. The evaluation consists of comparing conditions that would occur under Alternative A, Alternative C, and Alternative D to those under Alternative B, which would strive to maintain current park conditions.

Information for this analysis was obtained from park visitation records collected by Rock Creek Park staff and processed by the National Park Service Public Use Statistics Office in Denver, Colorado. Data related to vehicle use and nonmotorized recreation come from studies conducted by Robert Peccia & Associates for the National Park Service (Robert Peccia & Associates 1997; Robert Peccia & Associates *et al.* 1997)

Public comments submitted during scoping were used as an indication of the range of public concerns regarding the park. Comments from the public commonly addressed the traditional character of Rock Creek Park, including the historic appearance of facilities and landscapes, and the availability of traditional ways of enjoying the park and parkway. Safety of park users along roadways also was a commonly expressed concern related to visitor experience.

Commenters often disagreed on their perception of what constituted “traditional” use of the park. Some interpreted this as retaining established use patterns, including through traffic. Others felt that reductions in automobile traffic in the park would return it to lower use levels, which they consider more traditional.

This analysis uses the following definitions of common terms.

“Visitor” refers to members of the public within the boundaries of Rock Creek Park or the parkway.

“Visit” means a recorded entry into the park.

“Nonrecreational visit” means an entry by a visitor who is passing through the park to some other destination, rather than coming to the park specifically to recreate. As noted in the “Affected Environment” section, nonrecreational visits make up more than 85 percent of visitation at Rock Creek Park and the parkway.

“Traditional character” means that the park’s natural scenery and rustic structures would predominate.

“Traditional visitor experiences” include all of the activities that currently occur in the park and along the parkway.

A major adverse effect on traditional park character and visitor experience would be the elimination of a traditional visitor experience or a visual change such that the park's natural scenery and rustic structures would no longer predominate. The addition of a visitor experience would not be a major effect, since through the years the park has accommodated many new experiences, including the recent growth of in-line skating.

Changes in traditional park character and visitor experience associated with traffic were described as noticeable, considerable, and major. These modifiers were defined in terms of a change in level of service (LOS) for traffic as follows:

A change of one LOS would be considered a noticeable change.

A change of two LOSs would be considered a considerable change.

A change of three or more LOSs or the elimination of traffic would be considered a major change.

See the "Impacts on Regional and Local Transportation" section for definitions of LOS and data related to projected LOS changes.

Safety of visitors along roadways also was considered as part of the visitor experience. Effects were defined as followed.

A negligible effect would not measurably change the safety of park visitors.

A minor effect would be measurable, but would not change any ratios of accidents.

A moderate effect would change the ratio of accidents to the number of visitors or the ratio of injury to non-injury accidents.

A major effect would cause a change in the number of fatal accidents that would be expected to occur annually on park roads, along the parkway, and on nearby city streets that would handle traffic diverted from the park.

Impairment to traditional park character and visitor experience would occur if there was a major adverse impact on resources or values whose conservation was (1) necessary to fulfill specific purposes identified in the establishing legislation of the park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents.

Analysis of Effects on Traditional Character and Experiences

The overall character of the park would not change under Alternative A. Recognition of cultural landscape values and management for those values would help maintain the traditional appearance of the park. Development of design standards for park facilities and signs would also enhance the traditional ambiance.

The traditional appearance of Beach Drive, the Rock Creek and Potomac Parkway, and other park roads would be largely maintained. Some new traffic-calming structures such as speed humps,

photographic speed monitors, and signs would be necessary to implement controls on automobile speeds and volumes under Alternative A. Visual intrusion of such facilities could be offset by removal of some existing traffic structures such as right-turn lanes and signs.

As described under “Impacts on Regional and Local Transportation,” Alternative A would reduce traffic volume on Beach Drive by 10 to 40 percent and traffic volume on the parkway by 3 to 8 percent compared to Alternative B (Robert Peccia & Associates 1997). These reductions would be almost exclusively in nonrecreational, automobile-based visits, and most would occur during the morning and afternoon rush-hour periods. The effects of these changes on the levels of service (LOSs) on Beach Drive and the Rock Creek and Potomac Parkway compared to Alternative B are presented in table 19. As shown in the table,

Park visitors in the vicinity of Beach Drive would observe major improvements in levels of automobile traffic from Porter Street south to 24th/Cathedral during both the morning and evening.

Park users would probably observe noticeable decreases in traffic on the segments of Beach Drive from Joyce Road to Broad Branch Road and from Blagden Avenue to Tilden/Park during both the morning and evening. A decrease in traffic on Beach Drive from Wise Road to Sherrill Drive during the afternoon also would be evident.

Noticeable improvements in levels of traffic would be seen by visitors along much of the Rock Creek and Potomac Parkway during the morning.

TABLE 19: BEACH DRIVE AND ROCK CREEK AND POTOMAC PARKWAY SEGMENTS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN TRAFFIC LEVELS OF SERVICE BETWEEN ALTERNATIVE A AND ALTERNATIVE B

Road Segment	Peak-Hour Period	Alternative A LOS	Alternative B LOS	Change ^{a/}
Improved level of service – Beach Drive				
Wise Road to Sherrill Drive	P.M.	C	D	N
Joyce Road to Broad Branch Road	A.M.	A	B	N
Joyce Road to Broad Branch Road	P.M.	B	C	N
Blagden Avenue to Tilden/Park	A.M.	C	D	N
Blagden Avenue to Tilden/Park	P.M.	E	F	N
Porter Street to zoo	A.M.	B	E	M
Porter Street to zoo	P.M.	C	F	M
Improved level of service – Rock Creek and Potomac Parkway				
Zoo to 24th/Cathedral	A.M.	B	E	M
Zoo to 24th/Cathedral	P.M.	C	F	M
24th/Cathedral to Waterside ramps	A.M.	C	D	N
24th/Cathedral to Waterside ramps	P.M.	C	D	N
Waterside ramps to P Street ramps	A.M.	D	E	N
K Street/Whitehurst to Virginia	A.M.	C	D	N
Reduced level of service				
None				

a/ N = noticeable. C = considerable. M = major.

HOV restrictions during rush-hours would inconvenience visitors who did not carpool. Nonrecreational cyclists, who represent about 65 to 85 percent of weekday nonmotorized visitors (Sacks 1994; Metropolitan Washington Council of Governments 1995a), would benefit with a less-stressful commute through the park.

Noise levels in the Rock Creek valley would follow the existing pattern. However, because of this alternative's traffic-reducing and traffic-calming measures, the Beach Drive segments shown in table 19 would have lower noise levels than with Alternative B. Even so, noise levels close to major roadways would probably continue to exceed Federal Highway Administration noise abatement criteria during both peak and off-peak traffic periods. During weekdays, traffic noise would remain the dominant background sound at picnic groves and along Rock Creek.

Weekend road closures would continue current opportunities for nonmotorized recreation in the park. Alternative A would have similar weekend use levels and experiences as Alternative B, since weekend traffic management would be similar for both alternatives.

Compared to Alternative B, upgraded recreation trails, bridle trails, and foot trails throughout the park would increase visitor safety and provide a more pleasant recreational experience for most trail users. Rehabilitated trails and better directional and information signs would enhance visitor access, safety, and orientation to park areas and facilities.

The use of Peirce Mill Barn for interpretation and education would provide visitors with greater opportunities to understand the land-use history of the Rock Creek valley and its contribution to the development of the nation's capital. A visitor contact station at the Lodge House would improve the park experience for recreational visitors. They would have greater opportunities to learn about and experience the park's natural and cultural resources and to take advantage of the programs and exhibits at the park's other interpretive centers.

Improvements to the Rock Creek Nature Center and Planetarium would result in better opportunities for the public to learn about and understand the park's natural resources and their relationship to the urban environment. It would also greatly improve services to school and youth groups. As a result, more young people would have opportunities to participate in quality, resource-based environmental education programs.

The more efficient and cohesive working environment that Alternative A would provide for park staff, and the dispersed park police presence would result in better service to park visitors. Increased visitor services and activities in the park may give some visitors a perception of improved security.

Analysis of Effects on Safety along Roadways

Traffic management measures associated with Alternative A would include

- enhanced enforcement

- use of traffic-calming measures, such as speed humps, all-way stops, rumble strips, or raised intersections

reconfiguration of the intersection of the parkway with Beach Drive near Connecticut Avenue to improve safety

continuation of one-way traffic restriction on the Rock Creek and Potomac Parkway during peak periods

HOV restrictions on segments of Beach Drive during rush hours

HOV restrictions might improve safety by reducing traffic volumes. However, without other controls, traffic speeds in HOV zones might increase, which could increase the frequency or severity of accidents. Because of these potentially conflicting effects, the safety effects of HOV restrictions were not considered extensively in this section. The effects of the other traffic management measures on safety are described below, with a summary of effects on vehicle occupants and to pedestrians and cyclists.

Most vehicles travel at or above the posted speed limit through the park. Spot speed checks showed that the average speed was 15 miles per hour over the posted speed limit (Robert Peccia & Associates 1997). This finding is consistent with traffic management problems occurring throughout the nation and around the world. Studies in the United States, Canada, and Europe that were reviewed by the Federal Highway Administration (1998) consistently found that about 70 percent of the vehicles on low- and moderate-speed roads exceed the posted speed limits.

Multiple studies reviewed by the Federal Highway Administration (1998) show that the incidence of crashes depends not so much on speed as on the difference in speed between an individual vehicle and the mean speed of traffic. Large differences in speed commonly occur in the park, where nonrecreational visitors using park roads to get to a destination encounter slow-traveling cyclists, pedestrians, and recreational visitors driving for pleasure. Therefore, a key traffic management component of Alternative A would be to reduce the mean speed of traffic to the posted speed limit of 25 miles per hour (mph) along Beach Drive and 35 mph along the Rock Creek and Potomac Parkway. This would reduce the difference in speed among park users.

Enhanced Enforcement. The effectiveness of the improved speed enforcement measures associated with Alternative A would depend on the types of actions and how frequently and consistently they were applied. Studies reviewed by the Federal Highway Administration (1998) found that

The duration of speed-reducing effects of using mobile patrols could end almost immediately after the patrol activities ceased (Benekahal *et al.* 1992) or could last as long as 8 weeks following intensive enforcement (Vaa 1997).

Parking a marked patrol car in a problem area was an effective method of reducing speeds (Armour 1986; Stuster 1995) and crashes (Stuster 1995). However, speeds returned to their pre-enforcement level within 3 days after a single episode of stationary enforcement (Hauer *et al.* 1982). Exposure of traffic to a stationary patrol vehicle over a 5-day period had the greatest effect in suppressing speeds after the enforcement period (Hauer *et al.* 1982).

The effect of automated enforcement (speed cameras) was variable. Rogerson *et al.* (1994) found that in 35 mph and 45 mph zones, such devices decreased the percentage of

vehicles that exceeded the speed limit by 10 mph or more. This produced a statistically significant reduction in casualty crashes within about a half mile of the speed camera. However, no significant change in the mean speed was detected, and the distribution of vehicle speeds recorded in 60 mph zones did not change.

Speed feedback indicators that are intended to increase awareness of excessive speeds and encourage drivers to slow down sometimes reduce speeds in the vicinity of the placement site. However, they have no effect on traffic speeds after they are removed unless they were combined with enforcement activities (Dart and Hunter 1976; Casey and Lund 1990, Perrillo 1997).

The Federal Highway Administration (1998) observed that a large proportion of the reviewed studies mentioned a public information or education program. None of them attributed a significant reduction in speed, speeding, crashes, or crash severity to any such campaign that was not closely tied to an enforcement or engineering action. However, a combined program of enforcement with public information or education can effectively reduce injury crashes (Sali 1983) and result in successful speed enforcement using such methods as speed indicators and photo radar (Hamalainen and Hassel 1990; Cameron *et al.* 1992).

The enhanced enforcement elements of Alternative A would have a minor to moderate beneficial effect on visitor safety. However, if traffic enforcement levels were reduced because of budget cuts or the need to assign U.S. Park Police staff to other duties, the beneficial effects would not be expected to continue for very long.

Traffic-Calming Devices. As described by the Federal Highway Administration (1998), traffic-calming techniques are street design or regulatory features that cause motorists to be more attentive to their surroundings and to drive more slowly. The National Highway Traffic Safety Administration (1999) in its *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries* identifies the following advantages for traffic-calming devices.

Once implemented, they are effective without constant attention (such as enforcement).

They can be placed in areas where regular enforcement would be unaffordable.

They require little maintenance, so engineering changes can be implemented as funding is available without placing burdens on future budgets.

Fildes and Lee (1993) pointed out that traffic-calming techniques have the common objective of transferring the costs associated with excessive speed from unprotected road users (that is, death and injury of pedestrians and cyclists) to speeding drivers through such mechanism as increased inconvenience, wear to vehicles, and longer travel time. In many roadway situations, this transfer conflicts with the goal of moving traffic more efficiently. However, there is no such dilemma in the park, which has mandates for resource preservation and public enjoyment (see the Park Mission section) but no requirement to accommodate large volumes of nonrecreational traffic.

Other features identified by the National Highway Traffic Safety Administration (1999) make traffic-calming devices especially suitable for uses in the park and parkway.

These measures are most practical on moderate- and low-speed roadways. Posted speed limits on Beach Drive and the parkway are 25 mph and 35 mph, respectively.

Because they cause alterations to the driving environment, their success requires the public's understanding, involvement in planning, and approval. The public involvement capabilities of Rock Creek Park, such as those described in the "Consultation and Coordination" section, could be used to ensure the success of these measures.

The Federal Highway Administration (1998) reported that the most effective traffic-calming measures involve vertical shifts in the roadway, such as speed humps and speed tables. Greater reductions in vehicle speeds and crashes were achieved when combinations of measures were implemented and when traffic calming was implemented systematically over a wide area. Reductions in the incidence and severity of crashes of 50 percent or more were frequently reported. However, the Federal Highway Administration review pointed out that most traffic-calming projects also resulted in reductions in traffic volume, and that the traffic and associated crashes could be migrating to other roads.

Data reviewed by the National Highway Traffic Safety Administration (1999) included analyses of the safety and cost benefits of traffic-calming devices in Europe, Australia, the United States, and Canada (Geddes *et al.* 1996; Zein *et al.* 1997). For 85 case studies reviewed, the median crash reduction was about 80 percent. In the 15 cases with expected numbers of crashes of five or more, the median reduction was about 70 percent. Looking at case studies where it was possible to isolate the effectiveness of individual types of traffic-calming measures, Geddes *et al.* (1996) found the following levels of crash reduction:

traffic circles and chicanes, 82 percent

speed humps, 75 percent

narrows, 74 percent

stop signs, 70 percent

multiple measures, 65 percent

pedestrian refuges, 57 percent

speed limit reductions, 30 percent

Cost-benefit analyses were performed on the Canadian projects (Geddes *et al.* 1996). On average, costs of the modifications were paid back in approximately 6 months in crash-reduction savings.

The use of traffic-calming devices in Alternative A would have a moderate to major beneficial effect on visitor safety in the park and parkway compared to Alternative B. If these measures were successful in reducing the frequency and severity of crashes by the levels indicated above, they would have moderate beneficial effects by substantially altering both the ratio of accidents to the number of visitors and the ratio of injury to non-injury accidents. A major beneficial effect would occur if they reduced fatalities by a similar amount. As long as the traffic-calming devices were maintained, these would be long-term effects.

Effects on Vehicle Occupants. As described in the “Affected Environment” section, more than 97 percent of the automobile accidents in the park and parkway do not involve cyclists or pedestrians (see table 14). For these accidents, the risk of injury to vehicle occupants depends on the change in speed on impact. Bowie and Waltz (1994) found that the risk of moderate or greater injury was about 10 percent when the change in speed on impact was 20 mph or less, was more than 50 percent at changes in speed up to 40 mph, and was almost 70 percent for changes in speed greater than 50 mph.

It is probable that geometric deficiencies are contributing to the accident history at the intersection of Beach Drive and the parkway near Connecticut Avenue. Based on results typically associated with the redesign of major intersections, improvements have the potential to reduce accidents related to the deficiency by 40 to 60 percent.

Two accidents where vehicle occupants died occurred during the 3-year period investigated by Robert Peccia & Associates (1997). Because of this low number compared to the 14.5 million visits to the park and parkway each year, the effect of Alternative A on the number of fatal accidents cannot be accurately calculated. However, if the Alternative A actions reduced accidents by 50 percent or more (reasonable reduction estimates, based on studies reviewed by the Federal Highway Administration (1998) and National Highway Traffic Safety Administration (1999)), a reduction in fatalities also would be expected. Monitoring would be needed to determine if the alternative’s traffic-reducing measures (HOV requirements), which would divert some traffic onto nearby city streets, was increasing the number of fatal accidents outside of the park.

Alternative A would have a long-term, moderate to major, beneficial effect in reducing the number and severity of motor-vehicle-only accidents in the park and along the parkway. The reduced traffic levels caused by the HOV restrictions and the reduced speeds produced by enhanced enforcement and traffic-calming measures would reduce both the number of accidents and the number and severity of injuries to vehicle occupants. This would reduce the ratio of accidents to number of visitors, the ratio of injury to non-injury accidents, and the frequency of fatal accidents.

Effects on Pedestrians and Cyclists. The National Highway Traffic Safety Administration (1999) summarized information in three United States databases containing the outcome of hundreds of thousands of crashes involving pedestrians. Information in all three databases demonstrated that the pedestrian had a 98.8 percent or better chance of surviving if the pre-crash speed of the vehicle was less than 20 mph. Fatalities were about 5 percent when the pre-crash speed of the vehicle was below 35 mph. Speeds up to 45 mph doubled or tripled the fatality rate for the pedestrian. Crashes at speeds greater than 45 mps killed more than 20 percent of the pedestrians and caused incapacitating injuries to at least 25 percent more.

As shown in table 14, only 28 of the 1,175 accidents recorded in the park and along the parkway from 1993 through 1995 involved pedestrians or cyclists. Among these, seven cyclists or pedestrians were injured and two were killed. Contributing factors for both fatalities involved a pedestrian illegally on the roadway in rainy weather wearing clothing that was not visible.

By slowing traffic speeds, the traffic management measures of Alternative A would have a long-term, moderate to major, beneficial effect in reducing the number and severity of collisions between automobiles and pedestrians or cyclists in the park and along the parkway. However, because of the low number of this type of accidents (average of fewer than 10 per year) compared to

the 14.5 million annual visits to the park and parkway, some year-to-year fluctuation in the number of pedestrian and cyclist accidents would be expected.

Commitment of Resources

There would not be any irretrievable or irreversible commitment of park character and visitor experience resources with this alternative. Any management actions that altered traditional park character and visitor experience could be reversed.

Cumulative Impacts

The Maryland Office of Planning (1993) predicted that demand for bicycling, hiking, and picnicking facilities in the state would increase by 6 to 14 percent between the years 2000 and 2010. Rock Creek Park and the parkway would continue to contribute to the regional mix of recreational opportunities and would be compatible with regional recreational plans.

Conclusions

The traditional character of the park would be maintained, and there would be moderate to major improvements in visitors' safety under Alternative A, compared to Alternative B. Traffic control measures in Alternative A would retain a driving experience in the Rock Creek valley, but traffic would be lighter than in Alternative B. Improvements to visitor facilities and facilities used for administration and operations would enhance educational and interpretive experiences. There would be no impairment of resources or values associated with traditional park character and visitor experience.

IMPACTS ON REGIONAL AND LOCAL TRANSPORTATION

Regulations and Policy

All roads proposed for management changes under Alternative A are within NPS ownership and jurisdiction. Chapter 9 of the NPS' *Management Policies 2001* (2001b) provides guidance for management of park access and circulation systems. While there are no legal restrictions to the traffic management actions associated with any of the alternatives, their implementation in the park would require coordination with local, regional, and federal transportation agencies.

All park roads are designated as contributing resources to the Rock Creek Park Historic District listed on the National Register of Historic Places (NRHP). The Rock Creek and Potomac Parkway appears to be eligible for nomination to the NRHP. Any changes in the physical layout of the roads or their setting may require consultation with the District of Columbia State Historic Preservation Officer and the Advisory Council on Historic Preservation under Section 106 of the National Historic Preservation Act (see "Impacts on Archeological Resources").

Methodology

The area addressed in the regional and local transportation analysis is the area shown on the map entitled Year 1990 Average Weekday Traffic Volumes. The evaluation of effects on regional and

local transportation consisted of comparing conditions that would occur in the year 2020 under Alternative A to those in the year 2020 under Alternative B, which would strive to maintain current park conditions.

The National Park Service wanted to be certain that the alternatives and the evaluation of effects incorporated the concerns of major transportation agencies in the vicinity. Therefore, early in the planning process, the National Park Service consulted with representatives of the

District of Columbia Department of Public Works

Federal Highway Administration

Maryland Department of Transportation

Maryland National Park and Planning Commission

National Zoological Park.

Washington Area Transit Authority

Washington Metropolitan Council of Governments (MWCOC) Transportation Planning Board

Potential impacts of the action alternatives were estimated using a refined traffic projection model based on the official regional model developed by the MWCOC. A summary of the traffic modeling technique is presented in appendix H. Information on the validation of the traffic model also is provided in this appendix.

The modeling assumed that the current widespread use of private automobiles would continue, and did not anticipate major shifts toward mass transit or other transportation modes. Regional plans that support increased intermodal travel and the use of “intelligent transportation systems” to better manage traffic flows and reduce congestion have been developed by the State of Maryland, Montgomery County, and the Washington Metropolitan Council of Governments. If these programs are successful, the results of the transportation model may be somewhat higher than actual year 2020 traffic levels. Conversely, traffic in the past two decades has grown more quickly than anticipated, and may continue to do so. Based on these both positive and negative uncertainties, the model results are considered reasonable estimates.

The modeling results for the alternatives in the year 2020 are provided in appendix G. The following maps show the modeling results used for the Alternative A evaluation:

Alternative A Year 2020 Average Weekday Traffic Volumes map

Alternative A Year 2020 A.M. Peak-hour Volume Changes with Respect to Alternative B

Alternative A Year 2020 P.M. Peak-hour Volume Changes with Respect to Alternative B

Alternative B Year 2020 Average Weekday Traffic Volumes map

As appropriate, the maps for the other alternatives are provided with their respective analyses.

Results of the model are also presented as potential “levels of service” (LOS) along road segments. The LOS scale was defined by the American Association of State Highway and Transport-

tation Officials (AASHTO, 1990) and is widely used to describe traffic and driving characteristics at various intensities of traffic flow and congestion. These characteristics are described in table 20.

**TABLE 20: LEVEL-OF-SERVICE CHARACTERISTICS OF
URBAN AND SUBURBAN ARTERIALS ^{a/}**

Level of Service	Descriptor	Characteristics
A	Light traffic	Average travel speed is about 90 percent of free flow speed. Stopped delay at signalized intersections is minimal.
B	Moderate traffic	Average travel speeds drop due to intersection delay and inter-vehicle conflicts, but remain at 70 percent of free flow speed. Delay is not unreasonable.
C	Substantial traffic	Stable operations. Longer queues at signals result in average travel speeds of about 50 percent of free flow speeds. Motorists experience appreciable tension.
D	Heavy traffic	Approaching unstable flow. Average travel speeds are down to 40 percent of free flow speed. Delays at intersections may become extensive.
E	Very heavy traffic	Unstable flow. Average travel speeds are 33 percent of free flow speed. Continuous backups occur on approaches to intersections.
F	Extremely heavy traffic	Forced flow; near gridlock conditions. Average travel speed is between 25 and 33 percent of free flow speed. Vehicular backups and long delays occur, particularly at signalized intersections.

a/ Source: American Association of State Highway and Transportation Officials 1990

An LOS analysis was conducted for the major routes within the study area. The analysis was developed as an interpretive tool to help define existing and future traffic conditions. The analysis compared the projected peak-hour traffic volumes for each alternative to the estimated traffic capacity of each corridor. Both the morning and afternoon peak-hour conditions were evaluated.

The capacity of each corridor was estimated based on the number of travel lanes, the number of stop or signal-controlled intersections, the presence of buses and heavy trucks in the traffic mix, and other roadside friction factors such as on-street parking and the number of access points. The following volume/capacity relationships were used to define the levels of service:

LOS A: volume/capacity = 0 to 28 percent

LOS B: volume/capacity = 29 to 47 percent

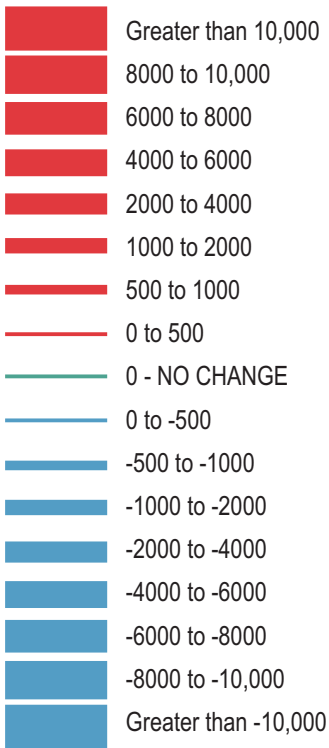
LOS C: volume/capacity = 48 to 66 percent

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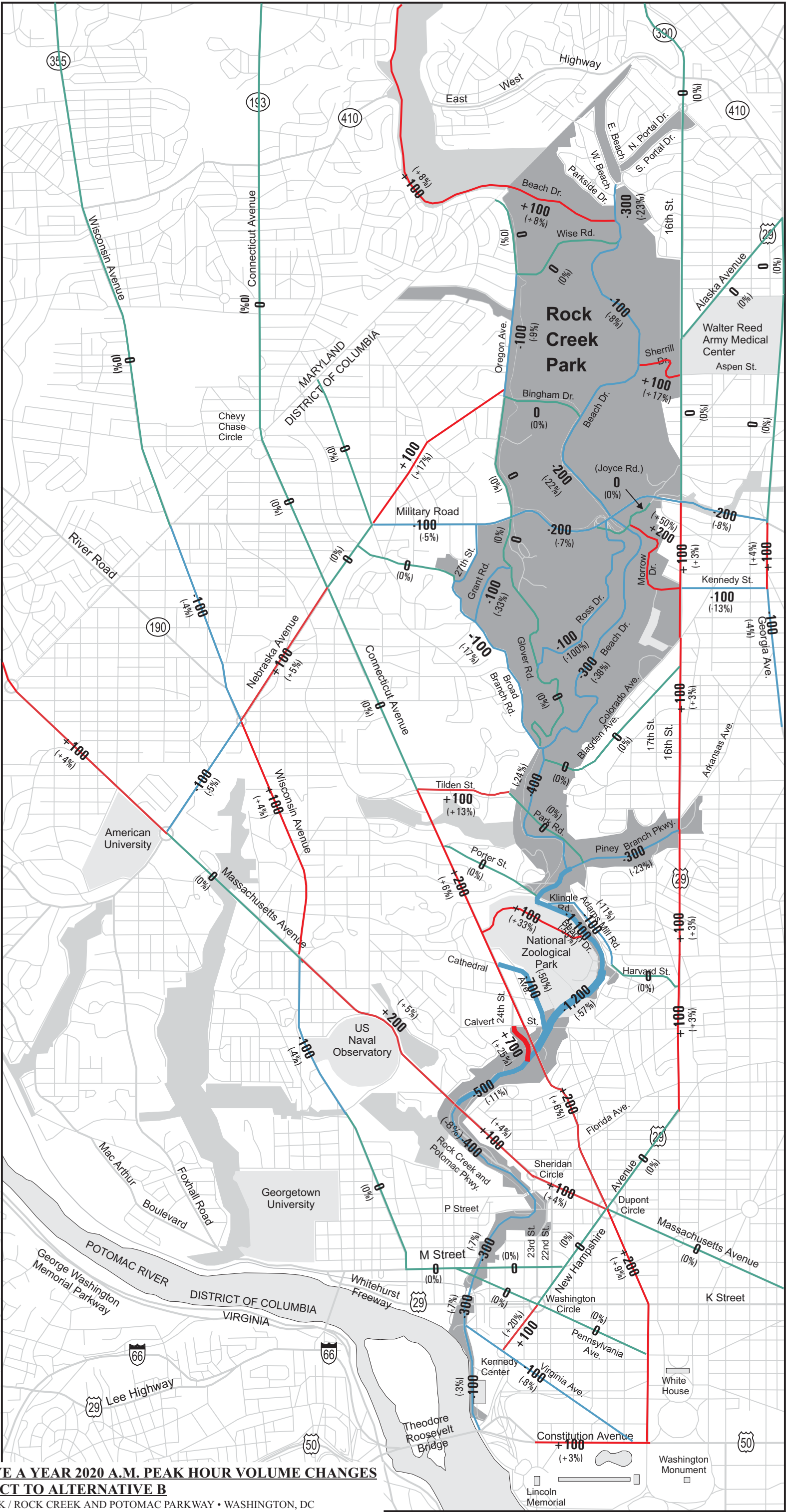


Map Scale: 1"= 0.5 Miles

Rock Creek Park



+900 = Volume Change With Respect to Alternative B in The Year 2020.
(+5%) = % Volume Change With Respect to Alternative B in The Year 2020.



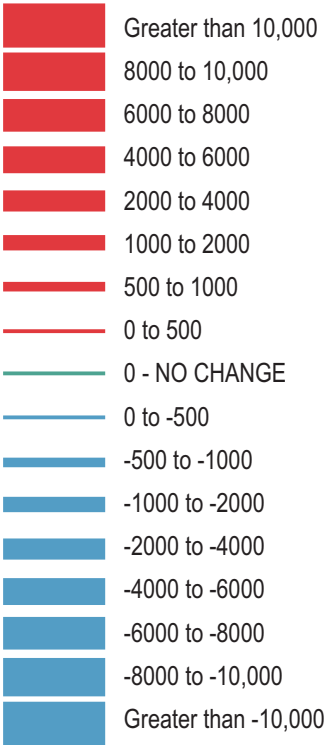
ALTERNATIVE A YEAR 2020 A.M. PEAK HOUR VOLUME CHANGES WITH RESPECT TO ALTERNATIVE B
ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY • WASHINGTON, DC
United States Department of Interior • National Park Service
DCS • January 2002 • 821 / 20047

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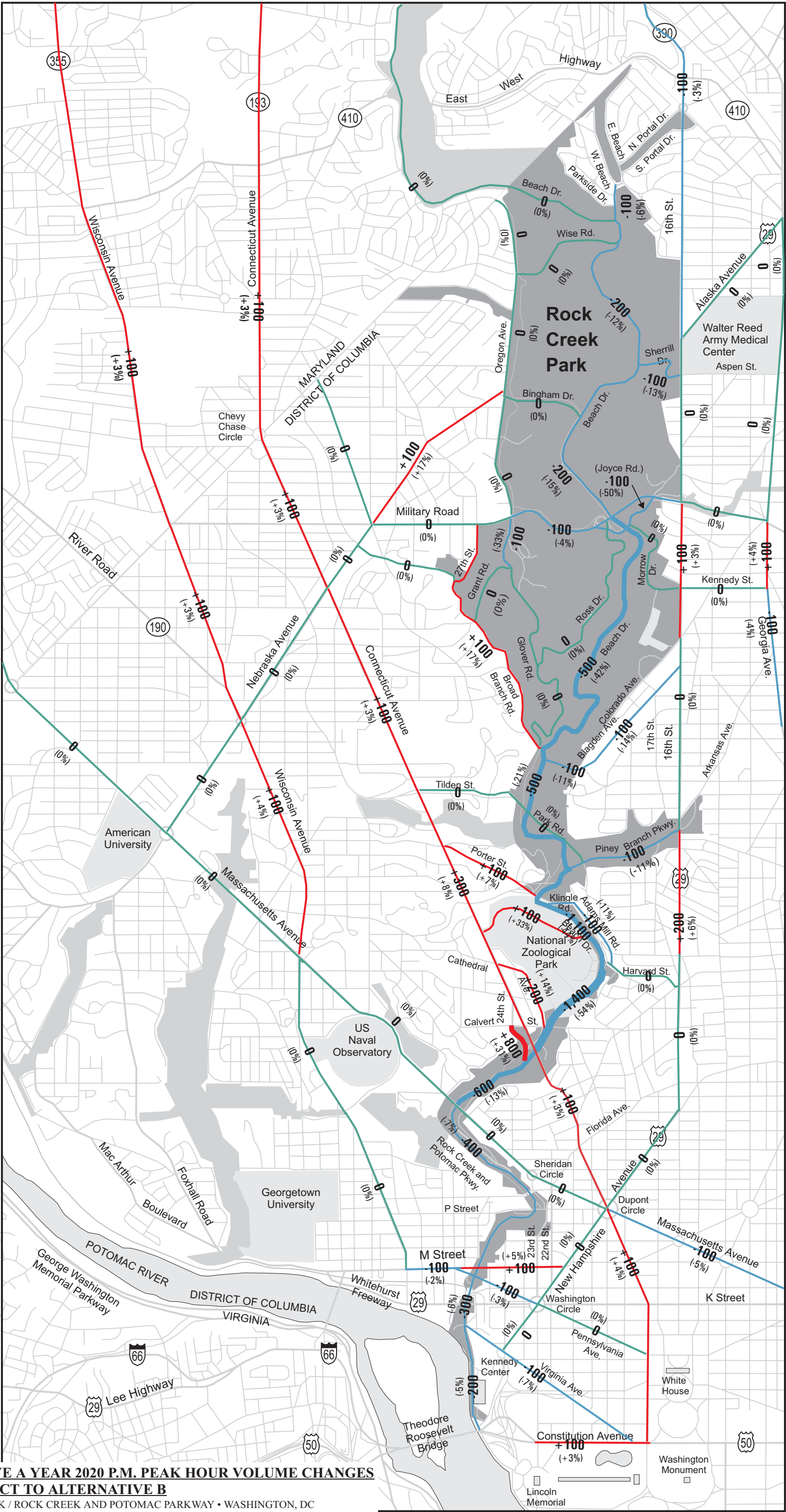


Map Scale: 1"= 0.5 Miles

Rock Creek Park



+900 = Volume Change With Respect to Alternative B in The Year 2020.
(+5%) = % Volume Change With Respect to Alternative B in The Year 2020.

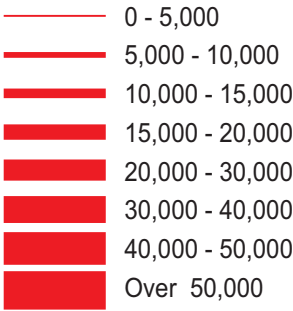


ALTERNATIVE A YEAR 2020 P.M. PEAK HOUR VOLUME CHANGES WITH RESPECT TO ALTERNATIVE B
ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY • WASHINGTON, DC
United States Department of Interior • National Park Service
DCS • January 2002 • 821 / 20048

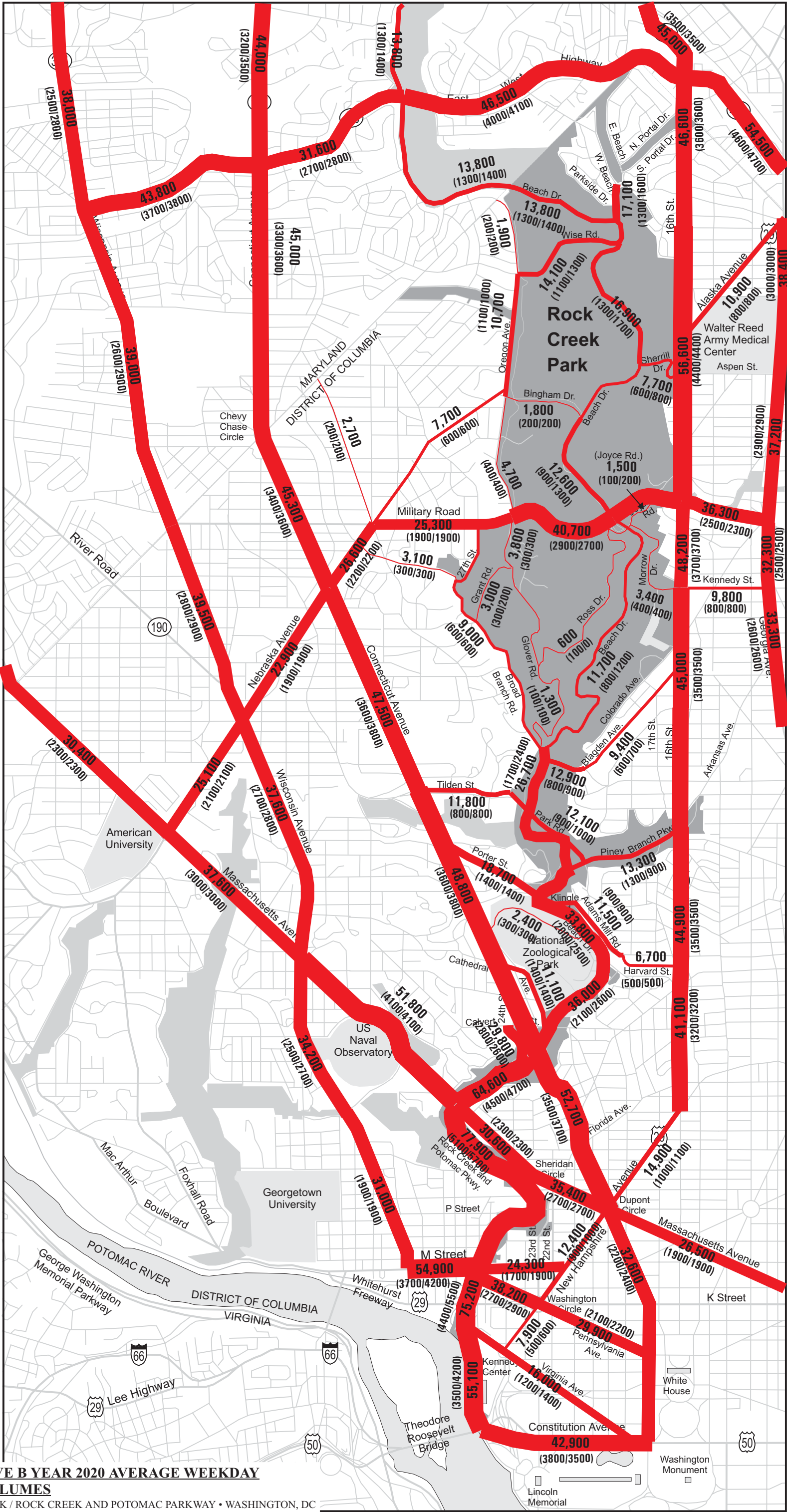


Map Scale: 1"= 0.5 Miles

Rock Creek Park



900 = ADT
(100/100) =
(AM Peak Hour/PM Peak Hour)



ALTERNATIVE B YEAR 2020 AVERAGE WEEKDAY TRAFFIC VOLUMES

ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY • WASHINGTON, DC
United States Department of Interior • National Park Service
DCS • January 2002 • 821 / 20049

LOS D: volume/capacity = 67 to 79 percent

LOS E: volume/capacity = 80 to 100 percent

LOS F: volume/capacity = 100+ percent

The LOS categories are designed for urban and suburban driving conditions. In contrast, public expectations for recreational driving conditions on park roads are often at a very high LOS. For instance, many people would describe existing evening rush-hour traffic through the gorge section of Beach Drive between Joyce Road and Broad Branch Road as heavy because the stream of traffic is constant, fast flowing, and demands constant attention of the driver. However, it is classified as LOS B, moderate traffic, because the flow is steady with few traffic-related delays.

The LOS analysis is only an approximation of the traffic on various segments of the road network and does not reflect the operation of specific intersections. In many cases, intersections within the study area operate at a different LOS than the adjacent corridors. Within the park, three intersections currently operate poorly. These include the intersections at Beach Drive and Park Road/Tilden Street, Beach Drive and the parkway, and Virginia Avenue and the parkway. All of these intersections are currently providing LOS E/F during the morning and evening peak-hours. These poor LOS conditions would not be correctable without expanding the intersection corridors to include additional traffic lanes, and the National Park Service does not propose to take such action in this general management plan.

Traffic impacts of the action alternatives are defined as the differences between future traffic conditions predicted without changing existing management (represented by Alternative B) and future traffic conditions if the traffic management measures included in the action alternative are implemented.

A change of one level of service (for example, LOS D to C) is characterized in this analysis as a noticeable effect.

A change of two levels of service (for example, LOS B to D) is characterized as a considerable effect.

A change of three levels of service or more (for example, Level B to E) is characterized as a major effect.

Analysis

Average Daily Traffic. Compared to Alternative B, the predicted changes in weekday average daily traffic volumes on Beach Drive, the Rock Creek and Potomac Parkway, and other roadways in the park under Alternative A are summarized in table 21 and table G.1 in appendix G. Visual representations of estimated traffic levels are shown in the Alternative A Year 2020 Average Weekday Traffic Volumes map and the Alternative B Year 2020 Average Weekday Traffic Volumes map.

TABLE 21: AVERAGE DAILY TRAFFIC UNDER ALTERNATIVE A COMPARED TO AVERAGE DAILY TRAFFIC UNDER ALTERNATIVE B IN THE YEAR 2020

Road Segment	Alternative A	Alternative B	Change	Percent Change
Beach Drive – Wyndale to East Beach Drive	12,400	13,800	-1,400	-10
Beach Drive – Wise Road to Sherrill Drive	12,100	16,900	-4,800	-28
Beach Drive – Bingham Drive to Joyce Road	8,800	12,600	-3,800	-30
Beach Drive – Joyce Road to Broad Branch Road	7,000	11,700	-4,700	-40
Beach Drive – Blagden Avenue to Tilden/Park Road	21,800	26,700	-4,900	-18
Beach Drive – Porter Street to Zoo	25,500	33,800	-8,300	-25
Beach Drive – Zoo to 24 th /Cathedral	26,400	36,000	-9,600	-27
Rock Creek and Potomac Parkway – 24 th /Cathedral to Waterside	59,400	64,600	-5,200	-8
Rock Creek and Potomac Parkway – Waterside to P Street	73,700	77,900	-4,200	-5
Rock Creek and Potomac Parkway – K Street/Whitehurst to Virginia	72,800	75,200	-2,400	-3
Rock Creek and Potomac Parkway – Virginia to Teddy Roosevelt Bridge	54,100	55,100	-1,000	-2
West Beach – Wise Road ^{a/}	14,900 and 14,600	17,100 and 14,100	-2,200 and +500	-13 and +4
Bingham Drive – Sherrill Drive ^{a/}	1,900 and 6,200	1,800 and 7,700	+100 and -1500	+6 and -19
Joyce Road – Morrow Drive ^{a/}	1,100 and 4,000	1,500 and 3,400	-400 and +600	-27 and +18
Broad Branch Road – Blagden Avenue ^{a/}	8,800 and 9,600	9,000 and 9,400	-200 and +200	-2 and +2
Tilden Street – Park Road ^{a/}	12,200 and 12,200	11,800 and 12,100	+400 and +100	+3 and +1
Piney Branch Parkway – Porter Street ^{a/}	11,900 and 19,500	13,300 and 18,700	-1,400 and +800	-11 and +4

^{a/} Varies by segment. The order in which the segments are presented is consistent between alternatives so that comparisons can be made from the table.

Alternative A would divert 10 percent to 40 percent of the year 2020 weekday traffic flow from Beach Drive onto the city's commuter corridors. Traffic reductions on Beach Drive would be the greatest from Sherrill Drive to Broad Branch Road, including the gorge section of the park, where the number of vehicles per day would be reduced by about 40 percent compared to Alternative B.

High-occupancy-vehicle (HOV) restrictions on portions of Beach Drive during the morning and evening peak periods would be the primary cause of these shifts. Although HOV restrictions would only be applied to portions of Beach Drive, the impact would be felt the full length of Beach Drive and onto the Rock Creek and Potomac Parkway, where average daily traffic would be reduced by an estimated 8 percent at the northern end and 2 percent at the southern end. Within the park, traffic volumes are also projected to decline on Glover Road (varying by segment from 16 percent to 38 percent decrease), Grant Road (10 percent decrease), and Sherrill Drive (19 percent decrease).

All single-occupancy vehicles (SOV) currently using the restricted portions of Beach Drive would have to use alternate routes during HOV restrictions. Some commuter vehicles carrying two or more people and currently using the city street grid may relocate to Beach Drive. However, because there currently are approximately four SOVs for each HOV in the traffic mix using Beach Drive (Robert Peccia & Associates 1997), the net result of HOV restrictions would be a decrease in traffic volumes through the park during the morning and evening commute times, compared to Alternative B.

HOV restrictions would only be in effect for the predominant direction of commuter traffic. Therefore, there would be no impact on vehicles traveling in the opposing direction.

HOV restrictions on Beach Drive would not restrict the cross flow of traffic between the east and west sides of the park on routes such as West Beach-Wise, Bingham-Sherrill, Joyce-Morrow, Broad Branch-Blagden, Tilden-Park, and Piney Branch-Porter. As shown on table 21, Alternative A would have varying effects on the traffic on these routes, ranging from a decrease of 27 percent on Joyce Road to an increase of 18 percent on Morrow Drive, relative to Alternative B.

HOV restrictions in the southern portion of Beach Drive may affect the number and travel direction of vehicles going to and from the National Zoological Park. Zoo visitors riding alone in a vehicle would not be allowed to use Beach Drive in the direction of rush-hour flow during the morning and evening peak-hours. However, because most visits to the zoo are part of a social activity, vehicles with the zoo as a destination would usually have more than one occupant. HOV restrictions would not affect zoo visitors during the middle of the day from Monday through Friday, or at any time on weekends.

Modeling indicates that the HOV restrictions could increase cut-through commuter traffic taking advantage of the zoo circulation road by as much as 33 percent during morning and evening rush-hours. This could result in action by the zoo to limit through traffic. However, because the zoo road would carry only about 3,000 vehicles per day in 2020, such measures would not have a major effect on other roads in the area.

The decreases in traffic that would occur on Beach Drive, the Rock Creek and Potomac Parkway, and some cross-park roads would result in increases in traffic on other routes. Morrow Drive, shown in table 21, would experience the greatest increase, 18 percent, as a result of implementing

Alternative A. In addition to those already identified on table 21, road segments where traffic would increase by 3 percent or more compared to Alternative B include the following:

Road Segment	Percent Increase
16th Street from Park to Irving	4
Georgia Avenue from Missouri to Kennedy	8
Oregon Avenue from Chestnut to Nebraska	4
Broad Branch Road from 32nd Street to 27th Street	3
Nebraska Avenue from Oregon to Utah	12
Harvard Street from Adams Mill to 16th Street	3
24th/Calvert access from 24th/Calvert to Beach Drive	14
New Hampshire Avenue from 21st Street to M Street	6
Constitution Avenue from 23rd Street to Henry Bacon	4

Traffic-calming measures applied to Beach Drive between the Maryland state line and the Rock Creek and Potomac Parkway would reduce vehicle speeds through the park. These measures are not anticipated to cause any vehicles to reroute. Proposed safety modifications to the intersection of Beach Drive and the parkway would reduce vehicle conflicts and help minimize traffic congestion and delays.

One of the goals of Alternative A is to assert more control over nonrecreational use of park roads and improve visitor safety. To determine the effectiveness of Alternative A in meeting this goal, average daily traffic estimates in the year 2020 were compared to traffic counts in the year 1990. This analysis determined the following.

North of Bingham Drive, traffic on Beach Drive would be more than 150 percent greater in the year 2020 than in 1990.

Between Bingham Drive and Joyce Road, average daily traffic on Beach Drive would be virtually identical after 30 years.

Traffic would be reduced by more than 20 percent on Beach Drive between Joyce Road and Broad Branch Road in the year 2020 compared to 1990.

South of Blagden Avenue, traffic would increase modestly over the 30-year period, by about 20 percent on the segment to Tilden/Park, and by about 7 percent from there south to 24th/Cathedral.

Based on these results, it is concluded that Alternative A would be very effective in reducing nonrecreational traffic in the park south of Bingham Drive. In concert with reduced speeds that would result from the traffic restrictions and calming measures, Alternative A would meet the objective of improving visitor safety, even compared to 1990 conditions, while preserving the traditional visitor experience of automobile touring through the park.

Morning Rush-Hour Traffic. During the weekday morning rush-hour, most road segments would have identical levels of service (LOSs) in the year 2020 under Alternative A and Alternative B. Table 19, table 22, and the Alternative A Year 2020 A.M. Peak-Hour Volume Changes with Respect to Alternative B map show segments where the LOS between the two alternatives would vary by at least one step. Additional information on year 2020 peak-hour traffic volumes and LOSs for both the morning and evening are provided in tables G.2 and G.3 in appendix G.

**TABLE 22: OTHER ROAD SEGMENTS EXPERIENCING
NOTICEABLE OR GREATER CHANGES IN TRAFFIC LEVELS
BETWEEN ALTERNATIVE A AND ALTERNATIVE B**

Road Segment	Peak-Hour Period	Alternative A LOS	Alternative B LOS	Change ^{a/}
Improved level of service				
West Beach Drive - Beach Drive to Portal	A.M.	C	E	C
West Beach Drive - Beach Drive to Portal	P.M.	E	F	N
Sherrill Drive - Beach Drive to 16th Street	P.M.	B	C	N
Georgia Ave - Arkansas to Upshur	A.M.	D	E	N
Georgia Ave - Arkansas to Upshur	P.M.	D	E	N
Oregon Ave - Chestnut to Nebraska	A.M.	C	D	N
Kennedy - 14th to 13th	A.M.	B	C	N
Piney Branch Parkway - Beach Drive to 16th	A.M.	C	E	C
Cathedral Avenue - Calvert to Beach Drive/24th	A.M.	B	E	M
Reduced level of service				
Morrow Drive - Joyce Road to Carter-Barron	A.M.	B	A	N
Georgia Ave - Missouri to Kennedy	A.M.	E	D	N
Georgia Ave - Missouri to Kennedy	P.M.	E	D	N
Cathedral Avenue - Calvert to Beach Drive/24th	P.M.	F	E	N

a/ N = noticeable. C = considerable. M = major.

Alternative A would result in a noticeable to major improvement in weekday morning rush-hour traffic on Beach Drive south of Joyce Road. Morning traffic would be light (LOS A) through the gorge section between Joyce Road and Broad Branch Road. Beach Drive traffic between Blagden and Tilden would be substantial (LOS C), but would be considerably improved over future conditions with Alternative B (LOS E, very heavy). There would be a major improvement in traffic levels on Beach Drive between Porter Street and the north end of the Rock Creek and Potomac Parkway.

The morning traffic LOS on Piney Branch Parkway and West Beach Drive would see considerable improvement. Traffic along Glover Road, Ross Drive, Grant Road, Bingham Drive, Morrow Drive, and Joyce Road would remain light (LOS A).

There would be an improvement in level of service during weekday morning rush-hours on the Rock Creek and Potomac Parkway north of Virginia Avenue. Morning peak-hour traffic conditions on the parkway would range from substantial (LOS C) to heavy (LOS D), similar to today's conditions. However, these would be a noticeable improvement from the heavy to very heavy traffic that would occur under Alternative B.

Two road segments were identified as having a noticeably reduced LOS relative to Alternative B. These include Georgia Avenue between Missouri and Kennedy, and Morrow Drive between Joyce Road and Carter-Barron.

Evening Rush-Hour Traffic. During the weekday evening rush-hour, most road segments would have identical levels of service (LOS) in the year 2020 under Alternative A and Alternative B. Table 19, table 22, and the Alternative A Year 2020 P.M. Peak-Hour Volume Changes with Respect to Alternative B map show segments where the level of service between the two alternatives would vary by at least one step.

There would be a noticeable to considerable improvement in traffic conditions on Beach Drive during evening weekday rush-hours. North of Joyce Road, evening traffic would be to substantial. The LOS would improve along Beach Drive south of Joyce Road through the gorge section, where it would be moderate (LOS B). Traffic on Beach Drive between Blagden and Tilden Street/Park Road would be very heavy, as opposed to extremely heavy with Alternative B. There would be a major improvement to LOS C for the segment between Porter Street and the southern end of Beach Drive at the parkway. Under Alternative B, this area would continue to have extremely heavy traffic.

Weekday evening rush-hour traffic on the parkway would be noticeably improved at the northern end on the parkway above Waterside Drive. South of Waterside parkway traffic would be very heavy with or without Alternative A. Georgia Avenue, West Beach Drive and Sherrill Drive all would have noticeable improvements in LOS relative to Alternative B.

Two road segments were identified as having a noticeably reduced weekday evening rush-hour LOSs relative to Alternative B. These include Georgia Avenue between Missouri and Kennedy, and Cathedral Avenue between Calvert and Beach Drive/24th.

Nonmotorized Travel. Weekday nonmotorized travel for recreation and personal transport would increase in the park with Alternative A, primarily because this alternative would provide improved conditions for cyclists, pedestrians, in-line skaters, and others. Improvements would include rehabilitation of recreation trails in the park and reduced automobile traffic traveling at slower speeds on most of Beach Drive. The current weekend closures of sections of Beach Drive and all of Bingham and Sherrill Drives for recreational use would continue to support weekend nonmotorized recreation.

As stated in the section on average daily traffic, Alternative A would improve conditions for bicyclists and pedestrians using most of Beach Drive compared both to Alternative B and year 1990 conditions. The greatest effects would occur during rush-hours. The largest benefit would result from the reduction of automobile traffic through the gorge section of Beach Drive.

The reductions in traffic through the park could be sufficient to influence a some people to commute by bicycle on weekdays. However, bicyclists and other nonmotorized recreationists would still have to use park roads with extreme caution because of the narrowness of the roadways and continued, albeit less heavy, automobile traffic on Beach Drive north of Broad Branch Road.

Cumulative Impacts

Regional growth in the counties around the District of Columbia, especially to the north in Montgomery County, Maryland, is the primary reason for the projected increases in traffic volumes around the park. No matter which action is taken in Rock Creek Park or on the parkway, traffic in the region is expected to increase by at least 70 percent above 1990 levels by the year 2020 (Metropolitan Washington Council of Governments 1998). Growth-induced increases in traffic would have a detrimental impact on traffic on all of the roads in the area with or without Alternative A.

As noted in the section on average daily traffic, Alternative A would result in traffic changes on various roads ranging from decreases of 40 percent to increases of 18 percent, relative to Alternative B. Major commuter routes in the city would be unaffected by Alternative A.

Alternative A would have little influence on nonmotorized travel outside the park. While automobile traffic would decrease or increase slightly to moderately on some city street segments, the level of change would not be likely to influence individuals' decision to walk or ride a bicycle.

Conclusions

Alternative A would reduce both the average weekday and the peak-hour traffic volumes throughout Beach Drive, while allowing weekday vehicle access to all existing road segments and preserving the traditional visitor experience of automobile touring through the park. Traffic volumes on the Rock Creek and Potomac Parkway would remain substantial to very heavy. The decreased weekday traffic volumes and congestion on Beach Drive would reduce, but not eliminate, conflicts among automobile use and nonmotorized travel in Rock Creek valley.

The shift in commuter traffic from park roads to other commuter routes within the city would have very little effect on city traffic conditions. There would be no impairment of resources or values associated with regional and local transportation.

IMPACTS ON COMMUNITY CHARACTER

Regulations and Policy

There are no applicable regulations or policies to guide NPS actions with respect to community character because the entire area of concern is outside of the jurisdiction of the National Park Service.

Methodology

This analysis evaluated impacts to community character in the area described in the Washington, D.C. neighborhoods adjacent to Rock Creek Park and the Rock Creek and Potomac Parkway.

Changes in community character were assumed to be related to changes in traffic management because traffic changes are the one element of the alternatives that would have recurring, detectable effects outside the park. As a result, traffic changes associated with Alternative A were analyzed in relation to the wards and neighborhoods that the changes would potentially affect. Changes were measured against the projected traffic volumes for Alternative B, the continue current management/no action alternative, for the year 2020.

In addition, the projected changes were evaluated from an environmental justice perspective. This evaluation examined whether noticeable or greater increases in traffic would disproportionately occur in disadvantaged or minority neighborhoods or wards.

Traffic changes and the associated, qualitative changes in community character were described as noticeable, considerable, and major. This evaluation used the same criteria that were used to determine the effects of traffic changes on traditional park character and visitor experience. Effects were defined in terms of a change in level of service (LOS) as follows:

A change of one LOS would be considered a noticeable change.

A change of two LOS would be considered a considerable change.

A change of three or more LOS would be considered a major change.

See the “Impacts on Regional and Local Transportation” section for definitions of LOS and the data related to the projected LOS changes.

The environmental justice evaluation was conducted by examining current neighborhood demographic information to determine whether patterns were present that would suggest that noticeable or greater traffic increases would occur disproportionately in economically disadvantaged or ethnic neighborhoods. The ward and neighborhood boundary maps were superimposed on the forecast traffic volume increases for the traffic corridors that were analyzed.

Analysis

Traffic volume changes caused by Alternative A, and any associated changes in community character, would be minor compared to the substantial increased traffic volumes that are expected to result from continued regional population growth. For instance, MWCOG forecasts as much as a 70 percent increase in traffic in the region due to population growth by 2020 (MWCOG 1998). Residents adjacent to the park would be affected by this regional change regardless of traffic management actions in the park.

The Alternative A Year 2020 A.M. and P.M. Peak-Hour Volume maps show the projected traffic changes for streets in the park vicinity. These projections were compared to projected traffic volumes that would occur without a change in traffic management (Alternative B).

Traffic modeling suggests that the restrictions in Alternative A would tend to reinforce current commuter patterns. It is unlikely that traffic would be introduced onto streets where substantial commuter traffic does not currently exist.

Table 23 identifies the wards that contain the roads outside of the park and parkway where the community would experience a noticeable or greater traffic change between Alternative A and Alternative B. None of these changes would occur within Wards 1 or 2.

TABLE 23: WARDS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN COMMUNITY CHARACTERISTICS ASSOCIATED WITH TRAFFIC BETWEEN ALTERNATIVE A AND ALTERNATIVE B

Ward	Road Segment	Peak-Hour Period	Alt. A LOS	Alt. B LOS	Change ^{a/}
Improved level of service					
3	Cathedral Ave - Calvert to Beach/24th	A.M.	B	E	M
3	Oregon Avenue - Chestnut to Nebraska	A.M.	C	D	N
4	Georgia Avenue - Arkansas to Upshur	A.M.	D	E	N
4	Georgia Avenue - Arkansas to Upshur	P.M.	D	E	N
4	Kennedy - 14th to 13th	A.M.	B	C	N
Reduced level of service					
3	Cathedral Ave - Calvert to Beach/24th	P.M.	F	E	N
4	Georgia Avenue - Missouri to Kennedy	A.M.	E	D	N
4	Georgia Avenue - Missouri to Kennedy	P.M.	E	D	N

a/ N = noticeable. C = considerable. M = major.

Within Ward 3, the community around Cathedral Avenue from Calvert to Beach Drive/24th would experience major improvements in traffic-related community quality characteristics during the morning peak traffic hour, and a noticeable decline in these characteristics during the evening peak traffic hour. Georgia Avenue from Missouri to Kennedy in Ward 4 would be the only other location that would have a decline in traffic-related community quality characteristics relative to Alternative B. These detrimental effects would be noticeable during both the morning and afternoon peak traffic hours.

The environmental justice evaluation did not show any inequitable distributions of adverse effects from declines in traffic levels of service on ethnic or economically disadvantaged neighborhoods or groups. Citizens along one road segment in Ward 3 and one road segment in Ward 4 would experience noticeable declines in community characteristics related to traffic. Economically, these two wards are relatively advantaged, ranking first and second among the four wards in median household income and percent of housing units that are owner-occupied (table 16). Ward 3 has the highest white population, while Ward 4 has the highest percentage of non-white citizens. The location of one adversely affected road segment in each of these wards indicates an absence of ethnic bias in the location of adverse effects.

Alternative A would not have substantial economic impacts on any neighboring communities. Locating a new NPS headquarters office or U.S. Park Police substation outside of the park would generate new lease income at the local level. However, this income would not have a sizeable effect area business income or diversity.

There would be no irretrievable or irreversible commitment of resources with this alternative. Management actions that altered community character in association with traffic could be reversed.

Cumulative Impacts

Alternative A would contribute incremental increases in traffic volume on streets and highways that would receive traffic displaced from the park. However, this incremental increase would be masked by the cumulative effects of traffic volume increases of 70 percent that are expected throughout the Washington, D.C. metropolitan area (MWCOG 1998).

The HOV restrictions included in Alternative A are consistent with the goals of the *Draft Vision Document* (MWCOG 1997) and the Strategic Transportation Plan (District of Columbia Government 1997) that propose reducing congestion problems in the region by reducing dependency on single occupancy vehicles.

Regional economic patterns would not be substantially affected by the scale of the changes proposed in Alternative A.

Conclusions

Alternative A would produce noticeable adverse changes in the community character of only two road segments near the park, while four locations would experience beneficial changes that were noticeable to major. There would be no impairment of resources or values associated with community character.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

The Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Actions associated with Alternative A would be consistent with a long-term management strategy for ensuring natural, archeological, and historic resources and improving park visitor experiences.

Some motorists who use park roads as a commuter route would be inconvenienced by traffic-reducing and traffic-calming measures, and by increased travel times. However, this inconvenience would be offset by an improved weekday visitor experience that would be more compatible with the park character.

The development of new administrative and interpretive facilities would support the NPS mission while having no adverse cumulative impacts to ecosystems or resources. Removing NPS administrative facilities from historic sites would allow for improved educational and interpretive uses at the sites and would better protect these cultural resources.

Short-term degradation of local water quality during construction projects would largely be prevented by best management practices (BMPs). Any unmitigated short-term degradation would be overwhelmingly offset by long-term improvements resulting from reduced storm water contaminant discharges into Rock Creek and reduced non-point runoff from developed areas and roadways.

Short-term localized soil erosion (largely prevented by BMPs) and degradation of plant communities along trail construction corridors would be offset by long-term reductions in soil erosion resulting from the repair or realignment of poorly designed or damaged trails.

Any Irreversible or Irretrievable Commitments of Resources that Would Be Involved Should the Alternative Be Implemented

There would be a potential for irreversible or irretrievable commitments of archeological and historic resources under Alternative A.

None of the natural resource changes associated with Alternative A would be considered irreversible or irretrievable commitments. However, the effort required to reverse some resource commitments and decisions, once implemented, may require substantial planning and implementation efforts.

The construction of new administrative space and the renovation of historic structures would employ methods encouraging energy conservation and recycling when possible. The energy expended during any construction project would be an irretrievable resource commitment.

Financially, Alternative A would require funding to accomplish its goals. In the long-term, some costs may be reduced as a result of more efficient use of administrative space and lowered maintenance costs.

Any Adverse Impacts that Cannot Be Avoided Should the Action Be Implemented

Alternative A would result in the unavoidable adverse effect of reducing the traffic level of service on three road segments, one of which is within the park boundaries. This would be an unavoidable consequence of reducing commuter traffic through the park, a major goal of the alternative. Community characteristics associated with traffic also would be degraded along the two road segments outside of the park that experienced reduced traffic levels of service.

ENVIRONMENTAL IMPACTS OF ALTERNATIVE B: CONTINUE CURRENT MANAGEMENT/NO ACTION

The regulations and policy that apply to Alternative B, and the methods used to conduct the analysis are identical to those describe for Alternative A, unless otherwise noted.

IMPACTS ON AIR QUALITY

Analysis

Under Alternative B, the area of Rock Creek Park and the Rock Creek and Potomac Parkway would be affected more by emissions throughout the regional airshed than by tailpipe emissions from vehicles using the park and parkway. Table 18 summarizes the effects of Alternative B on air quality in the year 2020 based on modeling described in the "Methodology" section under Alternative A. The analysis showed the following would occur in the vicinity of Rock Creek Park if the National Park Service maintains its current management practices.

Peak-hour traffic would have increased substantially since the 1990 traffic counts shown in the "Affected Environment" section. For example, at the intersection of 16th and Colorado where monitoring was performed in 1996, traffic volumes with associated tailpipe emissions of carbon monoxide would have increased by 40 percent.

Despite traffic increases, the 3-hour average carbon monoxide concentrations for Alternative B (13.50 ppm) at the busiest intersection near the park would be well below the 1-hour NAAQS of 35 ppm.

The 3-hour average carbon monoxide concentrations for Alternative B would exceed the 8-hour average NAAQS of 9 ppm at the intersection of Rock Creek and Potomac Parkway/M Street/Pennsylvania Avenue and the intersection of 16th Street/Military Road. However, it is anticipated that when these 3-hour concentrations were averaged over the entire 8-hour period, the 8-hour standard would not be exceeded at either site.

There would be no irretrievable or irreversible commitment of resources with this alternative.

Cumulative Impacts

No changes would occur in emissions from vehicles in the region because of management actions at Rock Creek Park.

Conclusions

Alternative B would not result in the exceedence of the 1-hour or 8-hour NAAQS for carbon monoxide at any of the intersections in the vicinity of Rock Creek Park. In addition, it would not cause any impairment of resources or values associated with air quality.

IMPACTS ON ROCK CREEK AND ITS TRIBUTARIES

Analysis

No new point-source discharges in the park are anticipated as a result of Alternative B. The application of BMPs at the three park stables, the maintenance yard and storage area, the golf course, and other existing park facilities would reduce contaminated runoff from non-point sources. Specific sources of potential contamination in the park and recommendations for BMPs to minimize pollution are presented in the *Best Management Practices for Water Quality – Rock Creek Park* (URS Greiner Woodward Clyde 1999). Implementation of BMPs at these sites would produce beneficial, long-term measurable effects on water quality.

Alternative B would include repair and rehabilitation of the Carter Barron Amphitheater. During construction activities and throughout long-term operations, the National Park Service would employ conventional soil erosion and runoff prevention BMPs that have proven effectiveness in minimizing both the volume and sediment loading of runoff. Anticipated effects during construction would be non-measurable, adverse, and short-term, lasting only 2 to 3 months after construction was completed. Long-term effects from an improved drainage system at the site would be beneficial but negligible.

There would be no irretrievable or irreversible commitment of resources with this alternative. All actions, such as installation of BMPs, could be replaced or reversed.

Cumulative Impacts

Water quality and flows in Rock Creek and its tributaries would continue to be more heavily influenced by urban development in the upstream watershed than by activities inside the park. However, the incremental effects of reducing pollutant loading inside the park through the application of BMPs would benefit stream water quality.

Continued cooperation with local, district, state, and federal environmental and sanitation agencies for monitoring and completing timely repairs of sanitary and combined sanitary/storm sewers would reduce contamination of Rock Creek and its tributaries. Continued progress toward eliminating combined sanitary/storm sewers would also improve water quality. This would include the \$1 billion program for temporary storage of combined storm runoff and sewage, proposed by the Washington, D.C. Water and Sewer Authority, which was described for Alternative A. Collectively, these actions would produce major, long-term, beneficial effects on water quality. As with Alternative A, alignments for the storage tunnel project would require extensive coordination to ensure that park resources and values were not adversely affected.

As described for Alternative A, the installation of a fish bypass at the dam at Peirce Mill and the removal of other impediments to fish migration in Rock Creek would produce adverse, short-term, measurable effect on water quality.

Conclusions

Compared to current conditions, the implementation of BMPs under Alternative B would produce long-term improvements in water quality. However, these benefits potentially could be masked by effects from storm and combined sewer discharges, and from the upstream watershed.

The management actions of Alternative B would not result in impairment of resources or values associated with Rock Creek and its tributaries.

IMPACTS ON WETLANDS AND FLOODPLAINS

Analysis

None of the actions included in Alternative B would have any adverse effects on wetlands. Protection of these resources would continue in conformance with NPS guidance documents such as those listed in the “Methodology” section under Alternative A. There would be no irretrievable or irreversible commitment of the park’s wetland or floodplain resources with this alternative

Cumulative Impacts

Alternative B would not produce any adverse, long-term impacts to wetlands, seeps or floodplains. Therefore, it would not contribute to any cumulative adverse impacts to wetlands or floodplains in the park or in the region.

Floodplains and wetlands throughout the park would be continue to be protected from direct disturbance from development. Application of best management practices would help reduce risk to floodplain and wetland resources from polluted runoff, erosion, filling activities, water diversions, and sedimentation from sources within the park. Wetlands located in the Rock Creek floodplain would continue to be threatened by sediments transported during high storm water discharges originating outside the park.

Conclusions

Alternative B would not produce any adverse, long-term effects on wetlands or floodplains. There would be no impairment of resources or values associated with wetlands and floodplains.

IMPACTS ON DECIDUOUS FORESTS

Analysis

Alternative B would have little effect of the deciduous forests of Rock Creek Park. Protection of the deciduous forest has been a long-term goal at Rock Creek Park. The continuation of current management practices such as avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of or invasive species, would maintain the deciduous forest in a condition much like that currently seen in the park.

As described in the “Affected Environment” section, accelerated erosion currently is occurring along heavily used or improperly designed trails. Under Alternative B, this problem would continue and probably worsen.

There would be no irretrievable or irreversible commitment of deciduous forest resources with this alternative. Forest alterations could be reversed with sufficient time using such measures as site protection, discontinuation of maintenance activities, or active plant restoration and revegetation.

Cumulative Impacts

Ongoing urbanization of the Rock Creek watershed and other forested areas of Maryland and Virginia near Washington, D.C. will continue to eliminate deciduous forests. Park management practices associated with Alternative B would have little effect on regional, development-related decreases in deciduous forests.

Conclusions

Alternative B would have little effect on most of the deciduous forest areas of Rock Creek Park. At selected sites along heavily used or improperly designed trails where accelerated erosion is occurring, problems would continue and probably worsen. However, there would be no impairment of resources or values associated with the deciduous forest.

IMPACTS ON PROTECTED AND RARE SPECIES

Analysis

The groundwater amphipods that were described in the “Affected Environment” section, including the federally endangered Hays spring amphipod, inhabit several seeps and springs in the park. The National Park Service is aware of these locations and would continue measures to protect these sites in the long term from general park use.

There would be no irretrievable or irreversible commitment of resources. There would be no substantial change from present conditions in the management of protected and rare species.

Cumulative Impacts

Under Alternative B, the park’s assemblage of national and regionally rare plants and animals would continue to benefit from the protection that the park affords. Ongoing urbanization of the Rock Creek watershed and other areas of Maryland and Virginia near Washington, D.C. will continue to eliminate individuals and habitats of protected and rare species. Park management practices associated with Alternative B would have little effect on regional, development-related effects on these species.

Conclusions

Alternative B would continue to maintain protected or rare species populations currently present in the park. There would be no impairment of resources or values associated with protected and rare species.

IMPACTS ON OTHER NATIVE WILDLIFE

Analysis

Native species that require deciduous forest habitats in relatively large, contiguous tracts would continue to benefit from the protection of most of the park's land area as relatively undisturbed woodland.

Compared to current conditions, the number of wildlife animals killed or injured by motor vehicles in the park would increase under Alternative B as traffic volumes through the park continued to increase. Higher traffic volumes during daylight rush hours on park roads and adjacent streets would increase the risk to box turtles and black rat snakes, both of which are believed to be declining within the park.

Increased evening, nighttime, and early morning traffic, when many mammals are active, would probably result in increased gray fox deaths. The effect of this mortality on the gray fox population is unknown. However, the gray fox population in the park is small and experiences multiple stress factors. Under these conditions, even infrequent roadkills could contribute to an overall reduction of the resident population (a moderate, adverse, long-term effect) or even local extirpation (a major, adverse, long-term effect).

For native species that are not currently declining, continuing current traffic management patterns in Alternative B would be unlikely to affect on their population abundance, diversity, or habitat availability compared to present conditions. The park already experiences a high level of human presence and disturbance, and additional traffic would have little additive effect.

There would be no irretrievable or irreversible commitment of native wildlife resources.

Cumulative Impacts

Cumulative effects on native wildlife under Alternative B would be similar to those described for Alternative A. They would include:

- continued benefits from habitat protection provided by natural areas in Rock Creek Park

- improved habitat conditions from cooperative efforts with other agencies to reduce or eliminate pollutant discharges in currently developed areas of the drainage

- restoration of access to the watershed upstream from Peirce Mill dam by removing or mitigating man-made obstructions to fish migration

continued loss and fragmentation of wildlife habitat on privately owned land throughout the region because of continued urban development and in-filling

continued changes in hydrology and water quality because of watershed development outside of the park

Conclusions

Alternative B would not produce any major changes in native wildlife species abundance, diversity, or habitat availability. Increased roadkill from higher levels of traffic could produce long-term, adverse effects on species that are believed to already be declining. However, this would not result in any impairment of resources or values associated with native wildlife. As with Alternative A, cumulative impacts from actions outside of the park would have much larger effects on native wildlife than those actions associated with Alternative B.

IMPACTS ON ARCHEOLOGICAL RESOURCES

Analysis

Information about the location, characteristics, and significance of the majority of the archeological resources of Rock Creek Park and the Rock Creek and Potomac Parkway currently is lacking. However, following an archeological inventory and analysis of the park and parkway scheduled for 2003, park managers will have sufficient information to carry out their responsibilities for protection and interpretation in an effective and efficient manner.

Under Alternative B, the integrity of some sites would be degraded by natural processes such as wind and water erosion, or by vandalism or inadvertent damage by visitors. These processes could result in non-construction-related significant adverse effects on archeological resources.

Cumulative Impacts

Archeological resources in most of the Washington, D.C. area have been lost due to construction activity during the historic period. Therefore, it is important that the archeological resources remaining in the park and parkway be protected as examples of the types of resources that formerly existed throughout the region.

A systematic program to identify and inventory the archeological resources in the park and parkway is scheduled to begin in 2003. This program will offer an opportunity to add to the knowledge of the prehistory and history of the park and the entire vicinity. This survey is not part of any of the general management plan alternatives.

Conclusions

Following the scheduled year 2003 park-wide archeological inventory and evaluation, archeological resources should have adequate protection. There would be no impairment of resources or values associated with archeological resources as a result of Alternative B.

IMPACTS ON HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Analysis

Under Alternative B, Rock Creek Park would continue to inventory historic resources. Measures for the preservation of significant resources would be undertaken in accordance with NPS policies and guidelines. Historic designed roads and trails would be preserved and maintained as part of the cultural landscape, as would structures such as Peirce Mill, the Godey Lime Kilns, and Fort DeRussy.

Cumulative Impacts

Rock Creek Park and the Rock Creek and Potomac Parkway contain a variety of cultural resources that are significant to the historic development of the Rock Creek valley and Washington, D.C. area. Some of these resources are among the last remaining examples of their construction types in the region. Continuing protection and preservation of these resources by Alternative B would have a significant beneficial effect in preserving them for the future.

Conclusions

Under Alternative B, cultural resource management activities would protect, preserve, and interpret the park and parkway cultural resources in a manner consistent with *Management Policies* (NPS 2001b). Cultural resources would continue to be maintained as at present. There would be no impairment of resources or values associated with historic structures and cultural landscapes.

IMPACTS ON TRADITIONAL PARK CHARACTER AND VISITOR EXPERIENCE

Analysis of Effects on Traditional Character and Experiences

The traditional character of the park would not change under Alternative B. Visitors would continue to have access to the wide variety of established recreational activities described in the “Affected Environment” section. The appearance of park historic structures and grounds would be mostly preserved (see “Impacts on Historic Structures and Cultural Landscapes”), maintaining the traditional ambiance of the park setting.

Continuing current management under Alternative B would result in park visitors being affected by increased nonrecreational traffic along park roads and the parkway. Projections for traffic volumes on Beach Drive (table G.1 in appendix G) indicate that by the year 2020, average daily traffic north of Sherrill Drive would more than double from 1990 levels and south of that point traffic volumes would increase between 30 percent and 50 percent. Parkway daily traffic would increase between 38 percent and 50 percent over 1990 levels.

Increases in traffic, particularly during weekday rush-hours, would cause increased noise, and for several hours each weekday views along park roads would be dominated by long lines of slowly moving or stopped vehicles. When traffic volume allowed, speeding would continue to be a problem in the park. Visitors attempting to use park roads for auto touring, recreational bicycling, or

walking during weekdays could feel distracted and intimidated by the large volume of traffic and congestion on park roads.

Noise levels in Rock Creek valley would continue to follow the existing pattern. Noise levels within 60 feet Beach Drive and within 125 feet of the Rock Creek and Potomac Parkway would exceed the Federal Highway Administration's noise abatement criteria during high traffic periods. Traffic noise would remain the dominant background sound at picnic groves and along Rock Creek during weekdays. On weekends when road closures were implemented, traffic noise would be eliminated or greatly reduced in the valley north of Broad Branch Road.

Weekend road closures would continue current opportunities for nonmotorized recreation in the valley. As the number of visitors participating in nonmotorized recreation increased, weekend use could grow considerably above the 300 visitors per hour now occurring on portions of Beach Drive on weekends.

Without realignment of segments of the park horse and foot trails, trail erosion would be a continuing and growing problem in some areas. This would lead to unsightly and potentially unsafe conditions at some trail sites.

Park visitors would continue to have an opportunity to see works by local artists in the historic Peirce Mill Barn.

At the Rock Creek Nature Center and Planetarium, visitors would continue to have opportunities to learn about the park, although the exhibits and furnishings would be worn and dated. School children and their teachers would continue to participate in environmental education programs at the center within the existing facility.

Park maintenance, patrol, and resource management activities would have continuous difficulties in staying abreast of deteriorating infrastructure, inadequate administration and operations support, and increasing resource threats. This situation would have a deleterious effect on visitors' esthetic experience and, potentially, on their safety.

Analysis of Effects on Safety along Roadways

Alternative B would not materially change how traffic was managed in the park and on the parkway. As a result, as discussed below in "Impacts on Regional and Local Transportation," traffic volumes would increase on park roads and the parkway. By year 2020, traffic flows and levels of service throughout the park would deteriorate to a poor condition. Speeds would likely be highly variable, which would increase accident rates along Beach Drive and the Rock Creek and Potomac Parkway.

Because Alternative B would do little to mitigate existing safety problems, vehicle accident numbers and rates would either continue at present levels or increase. However, the stop-and-go nature of the overly congested traffic may reduce the *severity* of accidents that occur during peak periods.

Under Alternative B, increased numbers of pedestrians and bicyclists would be sharing the road with increased numbers of cars. Therefore, automobile accidents involving pedestrians or cyclists would be expected to increase.

Commitment of Resources

There would not be any irretrievable or irreversible commitment of resources with this alternative. Any management actions that altered traditional park character and visitor experience could be reversed.

Cumulative Impacts

The Maryland Office of Planning (1993) predicted that demand for bicycling, hiking, and picnicking facilities in the state would increase by 6 to 14 percent between the years 2000 and 2010. Rock Creek Park and the Rock Creek and Potomac Parkway would continue to contribute to the regional mix of recreational opportunities and would be compatible with regional recreational plans.

Conclusions

Visitors' safety and esthetic and recreational enjoyment of the park would decline over time under Alternative B. Already high traffic volumes would continue to increase through the park and would be the greatest cause for a deteriorated visitor experience and threat to safety. However, there would be no impairment of resources or values associated with traditional park character and visitor experience.

IMPACTS ON REGIONAL AND LOCAL TRANSPORTATION

The evaluation of effects on regional and local transportation for Alternative B involved comparing the conditions that would occur in the year 2020 under Alternative B to those in the year 1990. The intent of this analysis is to provide an understanding of traffic conditions in the year 2020 if current park management practices are maintained.

Analysis

Average Daily Traffic. Alternative B average daily traffic projections for the year 2020 are shown in table 21, table G.1 in appendix G, and the Alternative B Year 2020 Average Weekday Traffic Volumes map. Modeling shows that relative to the year 1990, traffic volumes would increase on all of the roads within the park and throughout the area. Traffic also would increase during the morning and evening peak-hours, and the peak periods would begin earlier and last longer than what currently occurs.

Daily traffic volumes on Beach Drive north of Sherrill Drive are projected to more than double by the year 2020. Traffic on other sections of Beach Drive would increase between 30 and 48 percent. All of the intersections along Beach Drive south of Joyce Road would operate at or near capacity during the morning and evening peak periods.

By the year 2020, traffic delays would create long lines both on Beach Drive and the side roads. The flow of traffic along Beach Drive would be quite congested. Bumper-to-bumper traffic conditions would be common on Beach Drive between the parkway and Joyce Road during all hours of the day.

Traffic congestion would be substantial at several intersections with Beach Drive. These include the intersections with the parkway, Porter Street, Piney Branch, Tilden Street/Park Road, Blagden Avenue, Broad Branch Road, and Wise Road. In some instances, the vehicle backups at one or more of these intersections would be long enough to interfere with the operation of adjacent intersections on the park road network and/or the city street grid.

Daily traffic on side roads in the park would also increase, compared to the year 1990. Traffic on Wise Road and West Beach Drive would increase by 38 percent (to 14,100 vehicles per day) and 49 percent (to 17,100 vehicles per day) respectively by the year 2020. Piney Branch Parkway traffic would increase by 32 percent, to 13,300 vehicles per day. There would be proportionately very large increases on lightly used side roads. For instance, daily volumes on Sherrill Drive and the Ross Drive-Glover Road connection would almost triple. Volumes on other side roads would increase from 40 to 100 percent. Despite such increases, service would be at LOS C or better on most side roads.

Traffic on the Rock Creek and Potomac Parkway also would increase by the year 2020. Traffic congestion on the parkway, created by the increased volumes, would be greatest at the north end near the intersection with Beach Drive and at the south end near Virginia Avenue. Traffic congestion would also occur on several of the ramps connecting with the parkway, including the on-ramp at P Street and the off-ramp at Waterside Drive.

Morning Rush-Hour Traffic. Table G.3 shows year 1990 levels of service (LOSs) and the LOSs that would occur with implementation of Alternative B. During both the morning and afternoon peak-hours, 57 percent of the modeled roadways would have very heavy (LOS D) to extremely heavy (LOS F) traffic. In contrast, fewer than 44 percent of these roadways were LOS D or worse in 1990.

During the morning rush-hour, the LOS would noticeably decline on four of seven segments of Beach Drive as compared to current conditions. There would be a considerable deterioration in LOS on the northern-most stretch of Beach Drive above West Beach Drive. Traffic conditions on Beach Drive south of Blagden would be heavy to very heavy in the mornings.

On the Rock Creek and Potomac Parkway, morning traffic would range from substantial (LOS C) to very heavy (LOS E). On three of the four segments modeled, this would be a noticeable decrease in LOS.

No change in level of service would be anticipated for Ross Drive, Glover Road, Grant Road, Bingham Drive, Morrow Drive, or Joyce Road in the mornings. Traffic LOS on all other park roads would decline noticeably by 2020. Morning traffic would increase considerably on West Beach Drive to very heavy levels.

Evening Rush-Hour Traffic. There pattern of declining level of service and increasing traffic on Beach Drive and the Parkway during the evening would be similar to the morning rush-hour. Level of service on Beach Drive would be noticeably reduced compared to year 1990 conditions. The worst traffic problems on Beach Drive would occur between Blagden Avenue and the parkway, reaching extremely heavy traffic conditions (LOS F).

Except on the south end where traffic would be substantial, the parkway would see heavy (LOS D) and very heavy (LOS E) conditions in the evenings. This would represent a noticeable reduction in service from year 1990 conditions.

With a few exceptions, side roads in the park would see less of a change in traffic levels. West Beach Drive would decline in level of service during the evenings from the year 1990 very heavy level (LOS E) to extremely heavy traffic (LOS F) by 2020. Traffic on Wise and Blagden would noticeably increase, and traffic on Sherrill Drive would considerably increase from light to substantial levels.

Nonmotorized Travel. Bicycling, walking, and in-line skating as personal transportation, as well as for recreation, have been increasing in recent decades. Although this trend would be likely to continue with Alternative B, the alternative would not provide any incentive to additional individuals to bike or walk in the park. Moreover, increasing traffic volumes, particularly on sections of Beach Drive where there is no parallel trail, could discourage potential cyclists. The frequency of accidents involving cyclists, pedestrians, and vehicles would probably increase on park roads. Maintaining the current width and alignment of the recreation trails in the park and along the parkway would lead to increase conflicts among users and increasing numbers of accidents associated with conflicting uses.

Cumulative Impacts

The Washington Metropolitan Area Council of Governments predicts that if current patterns of growth and motor vehicle use continue, traffic in the region would increase by 70 percent between 1990 and the year 2020 (Metropolitan Washington Council of Governments 1998). The Transportation Planning Board for the council of governments has targeted increased intermodal transportation, reduced single occupancy vehicle use, and improved management of the traffic grid to avoid further problems with flows in the region.

If past trends continue and there are no major changes in transportation management, future daily traffic would increase on all arterials in northwest Washington. Most major streets in the vicinity of the park would see a 20 to 30 percent increase in volume by 2020. This would include Connecticut Avenue, Massachusetts Avenue, Wisconsin Avenue, Military Road, and Pennsylvania Avenue. The greatest relative increases are predicted east of the park on 16th Street (28 to 62 percent), Georgia Avenue (32 to 56 percent), and New Hampshire Avenue (22 to 49 percent).

Already crowded commuter routes would become even more congested by the year 2020 during rush-hours. Levels of service on segments of many major arterials would noticeably decline and most would range from heavy (LOS D) to extremely heavy (LOS F) during peak traffic hours. Rush-hour levels of service would be noticeably reduced on several smaller streets around the park including Tilden, Harvard, and Kennedy Street.

The Rock Creek Trail, including the segment through the park and parkway, is a designated regional bikeway in the Washington metropolitan area. Maintaining existing facilities for bicyclist and pedestrians in the park and on the parkway would not contribute to regional efforts to promote nonmotorized transportation and could, to an unknown extent, discourage weekday nonmotorized travel.

Conclusions

Alternative B would result in steadily increasing traffic volumes on park roads with deteriorating levels of service on Beach Drive and the Rock Creek and Potomac Parkway as compared to current conditions. Traffic on Beach Drive south of Porter Street would reach near-gridlock levels during evening rush-hours by the year 2020. Conflicts and safety problems among nonmotorized travelers and automobile users would likely increase on park roads.

Alternative B would continue to support existing traffic patterns through and around the park but at greater volumes. There would be no impairment of resources or values associated with regional and local transportation.

IMPACTS ON COMMUNITY CHARACTER

Analysis

Continuing current management practices with Alternative B would not adversely affect community character and the quality of life of area residents or businesses. Although traffic and noise levels would continue to increase in both the park and surrounding neighborhoods, the cause would be regional population growth and not any actions by the National Park Service. Recreational opportunities and access to the park would continue to be compromised by traffic congestion in the area.

Cumulative Impacts

Traffic levels are anticipated to grow substantially by 2020 and increase congestion in the park and surrounding neighborhoods (Metropolitan Washington Council of Governments 1998). For example, traffic projections indicate residents of the Brightwood neighborhood can expect a 57 percent increase in traffic on 16th Street by the year 2020 over 1990 levels. Mount Pleasant residents would experience a 48 percent increase in traffic on 16th Street by the year 2020 over 1990 levels. Similar increases would occur on the western side of the park as well. Cleveland Park residents can expect a 32 percent increase in traffic on Connecticut Avenue by the year 2020 over 1990 levels and Barnaby Woods residents would see a 26 percent increase in traffic along Oregon Avenue north of Bingham Drive.

Although there would be economic impacts from continued regional growth, it is unlikely that area economic patterns would be substantially altered by continuing current management of the park as contained in Alternative B.

There would be no irretrievable or irreversible commitment of resources with this alternative. This alternative does not include management actions that would alter community character.

Conclusions

Alternative B would have mixed effects on the quality of life of area residents. Current traffic patterns would continue to worsen but park actions would not introduce additional traffic onto the roadways surrounding the park. However, opportunities to walk, jog, and bicycle in the area would be further decreased by anticipated levels of traffic congestion and noise. It is unlikely that Alternative B would produce substantial economic impacts. There would be no impairment of resources or values associated with community character.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

The Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Existing traffic problems, which will worsen with time, and the space constraints faced by NPS administrators are not likely to be sustainable as demand for recreation in the park grows. These conditions would jeopardize the long-term protection and enjoyment of park resources.

Any Irreversible or Irretrievable Commitments of Resources that Would Be Involved Should the Alternative Be Implemented

There would be a potential for irreversible or irretrievable commitments of archeological and historic resources under Alternative B. These losses could occur because of the continuing inability to place mitigative actions within an appropriate research context, to synthesize data, and to implement a comprehensive program for historic resource preservation.

Any Adverse Impacts that Cannot Be Avoided Should the Action Be Implemented

Alternative B would result in steadily increasing traffic volumes on park roads with deteriorating levels of service on Beach Drive and the Rock Creek and Potomac Parkway. Conflicts and safety problems among nonmotorized travelers and automobile users would likely increase on park roads. Visitors' esthetic and recreational enjoyment of the park also would decline over time because of high traffic volumes.

ENVIRONMENTAL IMPACTS OF ALTERNATIVE C: NONMOTORIZED RECREATION EMPHASIS

IMPACTS ON AIR QUALITY

Analysis

The area of Rock Creek Park and the Rock Creek and Potomac Parkway would be affected more by emissions throughout the regional airshed than by tailpipe emissions from vehicles using the park and parkway. Table 18 summarizes the effects of Alternative C on air quality in the year 2020 compared to Alternative B. The analysis showed the following.

The differences between Alternative C and Alternative B would be negligible at all intersections, and would differ by only a few tenths of a part per million (ppm).

The worst 3-hour average carbon monoxide concentrations for Alternative C (13.36 ppm) at the busiest intersection near the park would be well below the 1-hour NAAQS of 35 ppm.

The 3-hour average carbon monoxide concentrations for Alternative C would exceed the 8-hour average NAAQS of 9 ppm at the intersection of Rock Creek and Potomac Parkway/M Street/Pennsylvania Avenue and at the intersection of 16th Street and Military Road. However, it is anticipated that when these 3-hour concentrations were averaged over the entire 8-hour period, the 8-hour standard would not be exceeded.

Alternative C would include some construction in the park that would not occur with Alternative B. This would include preserving historic structures, expanding the nature center and planetarium, and possibly constructing new buildings at the maintenance yard and H-3 stables. Best management practices and prompt revegetation would be applied in association with all construction to ensure that dust and construction-vehicle emissions associated with these activities would not be substantially greater than those that would occur with Alternative B.

There would be no irretrievable or irreversible commitment of air quality resources with this alternative.

Cumulative Impacts

No changes would occur in air emissions from vehicles in the region because of Alternative C's management actions at Rock Creek Park and the Rock Creek and Potomac Parkway. Instead, Alternative C would redistribute the same traffic volume onto different roadways, compared to Alternative B. This redirection of the same volume of traffic would have negligible effects on the regional air quality.

Provisions of Alternative C to eliminate traffic on segments of Beach Drive and to create a transportation corridor separated from motorized vehicles may encourage some commuters to use bicycles rather than automobiles. This change in transportation mode would result in a beneficial but negligible effect on the regional air quality.

Conclusions

Alternative C would result in negligible effects on air quality compared to Alternative B. It would not result in the exceedence of the 1-hour or 8-hour NAAQS for carbon monoxide. In addition, it would not cause any impairment of resources or values associated with air quality.

IMPACTS ON ROCK CREEK AND ITS TRIBUTARIES

As described in the section “Impacts on Local and Regional Transportation,” automobile traffic on Beach Drive north of Broad Branch Road would decrease by 97 percent to 100 percent relative to Alternative B. South of Broad Branch Road, Beach Drive traffic would decrease by 15 percent to 25 percent. Traffic decreases greater than 5 percent would occur along most of the Rock Creek and Potomac Parkway. These decreases in traffic would result in lower pollutant loadings (sediments, oils and grease, and metals from the road surface) draining into Rock Creek and its tributaries during and after storm events. The reduced loading would produce negligible to measurable beneficial, long-term effects on water quality.

There would be no irretrievable or irreversible commitment of resources with this alternative. All actions could be replaced or reversed.

Aside from roadway runoff, Alternative C would have the same effects as Alternative A to Rock Creek and its tributaries. This includes identical cumulative impacts and conclusions.

IMPACTS ON WETLANDS AND FLOODPLAINS

Alternative C would have the same effects as Alternative A to wetlands and floodplains. This would include identical cumulative impacts and conclusions.

IMPACTS ON DECIDUOUS FORESTS

Alternative C would have the same effects as Alternative A to deciduous forests. This would include identical cumulative impacts and conclusions.

IMPACTS ON PROTECTED AND RARE SPECIES

Alternative C would have the same effects as Alternative A to protected and rare species. This would include identical cumulative impacts and conclusions.

IMPACTS ON OTHER NATIVE WILDLIFE

Except as noted below, Alternative C would have the same effects as Alternative A to native wildlife. This would include identical cumulative impacts and conclusions.

Permanent closure of segments of Beach Drive and other actions to reduce traffic speeds and volumes on park roads and the parkway would reduce the number of wildlife killed or injured by motor vehicles. Compared to Alternative B, this would produce long-term, beneficial effects on the park’s native wildlife.

For most park species, the reductions in mortality from closing the road would be negligible. As shown in table 10, nine animals were killed in the year 2000 on sections of Beach Drive that would be permanently closed under Alternative C (the same sections that currently are closed to traffic on weekends and holidays). This value represents less than 8 percent of the average roadkill recorded in the park each year (122 animals per year, calculated from table 9). Measures to reduce traffic volumes and speeds would further reduce roadkills compared to Alternative B, but would have little effect on the populations of most park species because their populations are stable or expanding. As with Alternative A, the effects on box turtles would be moderate, long-term, and beneficial. Effects on gray foxes would be major, long-term, and beneficial.

IMPACTS ON ARCHEOLOGICAL RESOURCES

Alternative C would have the same effects as Alternative A to archeological resources. This would include identical cumulative impacts and conclusions.

IMPACTS ON HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Analysis

Impacts on historic structures and cultural landscapes would be the same as those described for Alternative A with the following exceptions. Conversion of portions of Beach Drive to a paved recreation trail could have an effect on its historically significant design features if the paved surfaces were reduced over time. Its historic use would also change with the removal of vehicles, because the roadway was constructed for scenic driving.

Cumulative Impacts

Cumulative impacts under this alternative would be the same as described for Alternative A.

Conclusions

The impacts of this alternative would be similar to those described for Alternative A except that the design features of the roads converted to trails could be modestly affected and vehicles would be removed from the roadways. In addition, there would be a change in the use of Beach Drive from the historic use of scenic driving to other uses. Because the roadbed would not be greatly altered, the historic use could be returned at some future date if management goals changed. Consequently, there would be no impairment of resources or values associated with historic structures and cultural landscapes.

IMPACTS ON TRADITIONAL PARK CHARACTER AND VISITOR EXPERIENCE

Analysis of Effects on Traditional Character and Experiences

Except in the areas where Beach Drive was permanently closed, the overall character of the park would not change under Alternative C. Recognition of cultural landscape values and management

for those values would help maintain the traditional appearance of the park. Development of design standards for park facilities and signs would also enhance the traditional ambiance.

The traditional appearance of the Rock Creek and Potomac Parkway, the segments of Beach Drive that remained open to motorized vehicles, and other park roads would be largely unchanged. Some new traffic-calming structures such as speed humps, four-way-stop intersections, photographic speed monitors, and signs would be necessary to implement controls on automobile speeds and volumes under Alternative C. Visual intrusion of such facilities could be offset by removal of some existing traffic structures such as right-turn lanes and signs.

Along closed sections of Beach Drive, existing traffic control signs would be removed and in some cases replaced by control signs related to pedestrian and bicycle use. Beach Drive would remain paved in these sections, although the width of pavement could be reduced over time if warranted by recreational use.

Permanent closure of sections of Beach Drive north of Broad Branch Road would eliminate the traditional visitor experience of automobile touring along the length of the park, including the gorge area. This would be a major adverse impact on the traditional visitor experience. With the exception of cross-park access using the Wise Road-West Beach Drive and Bingham Drive-Sherrill Drive connections, both recreational and nonrecreational visits by automobile would cease north of Broad Branch Road.

Weekday visitation to the northern portion of the park would be substantially reduced. For example, motorized visitation on the segment of Beach Drive between Broad Branch Road and Joyce Road would be reduced on weekdays from about 15,000 visits per day (11,700 vehicles per day containing 1.3 people per vehicle) under Alternative B to an estimated 200 to 500 visits per day under Alternative C. Most of the traffic reductions in the park under Alternative C would be in nonrecreational visits.

With the exception of automobile touring along the length of the park, visitors would continue to have access to all of the traditional activities that were described in the "Affected Environment" section. The experience of driving along Beach Drive north of Broad Branch Road would be replaced by greatly enhanced opportunities for nonmotorized use. If current patterns continue, 65 to 85 percent of weekday visits would be nonrecreational commuter cyclists. The remainder would be recreational visitors such as joggers, hikers, in-line skaters, and birders. Conditions would be similar to those currently occurring during weekend periods when segments of Beach Drive are closed, although weekday use would be only about 30 percent of weekend use.

Even with the permanent closure of segments of Beach Drive, visitor-use facilities such as picnic grounds and trailheads would continue to be accessible via motorized vehicle. However, visitors would have to drive around the closed sections to access other portions of the park. This could be confusing, particularly to out-of-town visitors.

Continued weekend road closures north of Broad Branch Road under Alternative C would maintain current opportunities for nonmotorized recreation in the valley. The number of weekend users would probably be similar to those occurring under Alternative B on weekends.

South of the road closures on Beach Drive, HOV restrictions, speed limit enforcement, and traffic-calming measures would create a less congested driving experience compared to Alternative

B. HOV restrictions would inconvenience some nonrecreational visitors who did not carpool during weekday rush-hours. The experience for motorists and cyclists on Beach Drive south of Broad Branch Road would be similar to what it is today (and less crowded than under Alternative B), because cars would still be present in large numbers during weekday rush-hours.

Table 24 summarizes the effects of the Alternative C traffic management measures on the levels of service (LOSs) on Beach Drive and the Rock Creek and Potomac Parkway compared to Alternative B. The terms “noticeable,” “considerable,” and “major” were defined in the “Methodology” section that preceded the Alternative A analysis. As shown in the table,

The three closed segments of Beach Drive would exhibit major changes in levels of automobile traffic compared to Alternative B.

Park visitors in the vicinity of Beach Drive would observe considerable improvements in levels of automobile traffic from Porter Street to the zoo in the morning peak hour and from Bingham Drive to Joyce Road in the afternoon. Both of these stretches would have noticeable improvements in traffic levels during the other rush hour.

TABLE 24: BEACH DRIVE AND ROCK CREEK AND POTOMAC PARKWAY SEGMENTS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN TRAFFIC LEVELS OF SERVICE BETWEEN ALTERNATIVE C AND ALTERNATIVE B

Road Segment	Peak-Hour Period	Alternative C LOS	Alternative B LOS	Change ^{a/}
Traffic eliminated – Beach Drive				
Wyndale to West Beach Drive	A.M.	Closed	C	M
Wyndale to West Beach Drive	P.M.	Closed	C	M
Wise Road to Sherrill Drive	A.M.	Closed	C	M
Wise Road to Sherrill Drive	P.M.	Closed	D	M
Joyce Road to Broad Branch Road	A.M.	Closed	B	M
Joyce Road to Broad Branch Road	P.M.	Closed	C	M
Improved level of service – Beach Drive				
Bingham to Joyce Road	A.M.	A	B	N
Bingham to Joyce Road	P.M.	A	C	C
Blagden to Tilden/Park	A.M.	C	D	N
Blagden to Tilden/Park	P.M.	E	F	N
Porter Street to zoo	A.M.	C	E	C
Porter Street to zoo	P.M.	E	F	N
Improved level of service – Rock Creek and Potomac Parkway				
Zoo to 24th/Cathedral	P.M.	E	F	N
24th/Cathedral to Waterside ramps	A.M.	C	D	N
24th/Cathedral to Waterside ramps	P.M.	C	D	N
Waterside ramps to P Street ramps	A.M.	D	E	N
K Street/Whitehurst to Virginia	A.M.	B	D	C
K Street/Whitehurst to Virginia	P.M.	D	E	N
Reduced level of service				
Virginia to T. Roosevelt Bridge	P.M.	D	C	N

a/ N = noticeable. C = considerable. M = major.

Noticeable improvements in traffic levels would be observed by park visitors on Beach Drive from Blagden Avenue to Tilden/Park during both the morning and afternoon rush hours.

Noticeable improvements in levels of traffic would be seen by visitors along several portions of the Rock Creek and Potomac Parkway in the morning and afternoon. In the morning, the improvement from K Street/Whitehurst to Virginia Avenue would be considerable.

A noticeable decrease in the level of service compared to Alternative B would occur from Virginia Avenue to the Theodore Roosevelt Bridge during the afternoon period.

Weekday noise levels in Rock Creek valley north of Broad Branch Road would change considerably under Alternative C. Traffic noise would be eliminated along much of northern portion of Beach Drive, except for substantial cross-park traffic using the Wise Road-West Beach Drive and Bingham Drive-Sherrill Drive connections. Natural sounds and the sounds of people recreating would be dominant, similar to the conditions currently occurring on weekends. Noise levels in the valley south of Broad Branch Road would follow the existing pattern, where weekday noise levels within 60 feet of Beach Drive and within 125 feet of the Rock Creek and Potomac Parkway would exceed the Federal Highway Administration's noise abatement criteria during high-traffic periods.

Alternative C would have similar weekend use levels and experiences as Alternative B. This would occur because weekend traffic management would be similar for both alternatives.

Compared to Alternative B, upgraded recreation trails, bridle trails, and foot trails throughout the park would increase visitor safety and provide a more pleasant recreational experience for most trail users. Rehabilitated trails and better directional and information signs would enhance visitor access, safety, and orientation to park areas and facilities.

With Alternative C, effects on traditional park character and visitor experience that are not related to traffic would be identical to those described for Alternative A. These would include improved opportunities at Peirce Mill Barn, the Lodge House, and the Rock Creek Nature Center and Planetarium. Improvements in park services associated with a more efficient and cohesive working environment and the dispersed park police presence would be similar to Alternative A.

Analysis of Effects on Safety along Roadways

Traffic management measures associated with Alternative C would include

- permanently closing portions of Beach Drive to vehicular traffic

- enhanced enforcement

- use of traffic-calming measures, such as speed humps, all-way stops, rumble strips, or raised intersections

- reconfiguration of the intersection of the parkway with Beach Drive near Connecticut Avenue to improve safety

discontinuation of one-way traffic restriction during peak periods

HOV restrictions on the parkway and on Beach Drive south of Broad Branch Road during rush hours

HOV restrictions might improve safety by reducing traffic volumes. However, without other controls, traffic speeds in HOV zones might increase, which could increase the frequency or severity of accidents. Because of these potentially conflicting effects, the safety effects of HOV restrictions were not considered extensively in this section. The effects of the other traffic management measures on safety are described below, with a summary of effects on vehicle occupants and to pedestrians and cyclists.

Beach Drive Closures. The segments of Beach Drive that would be permanently closed by Alternative C were the site of 57 accidents between 1993 and 1995 (Robert Peccia & Associates 1997). These represent approximately 5 percent of the accidents that occurred in the park and on the parkway in this period. Closing these segments to motorized vehicle traffic would reduce accidents involving motorized vehicles in the area covered by this plan by approximately the same percentage.

Closing portions of Beach Drive may move accidents to other nearby areas. Traffic volumes along Wise Road, Oregon Avenue, Military Road, and 16th Street are projected to increase compared to Alternative B, and the numbers of accidents on these roads may also increase.

Enhanced Enforcement. The effectiveness of improved speed enforcement measures was described for Alternative A. The enhanced enforcement elements of Alternative C would have a minor to moderate beneficial effect on visitor safety, particularly when combined with reductions in volumes resulting from HOV restrictions. However, if traffic enforcement levels were reduced because of budget cuts or the need to assign U.S. Park Police staff to other duties, the beneficial effects would not be expected to continue for very long.

Traffic Calming Devices. The use of traffic-calming techniques to reduce speeds and enhance safety was described in the analysis of Alternative A. The use of traffic-calming devices in Alternative C would have a moderate to major beneficial effect on visitor safety in the park and parkway compared to Alternative B. If these measures were successful in reducing the frequency and severity of crashes by the levels indicated in studies reviewed by the Federal Highway Administration (1998) and National Highway Traffic Safety Administration (1999), they would have moderate beneficial effects by substantially altering both the ratio of accidents to the number of visitors and the ratio of injury to non-injury accidents. A major beneficial effect would occur if they reduced fatalities by a similar amount. As long as the traffic-calming devices were maintained, these would be long-term effects.

Discontinue One-Way Traffic Restriction during Peak Periods. Generally, one-way streets lead to higher speeds. One-way streets can also be more confusing for pedestrians. Both of these factors can increase the number of accidents.

There also are features of one-way streets that can reduce the number of accidents. These include reduced conflicts at intersections, more orderly traffic flow, and the creation of gaps for both pedestrians and vehicles to enter or cross the traffic stream.

The safety of one-way street systems typically has been assessed by comparing accidents before and after conversion to one-way operation, and most often has been studied for streets in central business districts. Most of these studies indicate that one-way streets are safer, by perhaps 20 to 30 percent. However, other studies have found that in locations outside of central business districts, accident rates were higher on one-way streets.

For the Rock Creek and Potomac Parkway, it is difficult to conclude whether converting this road to two-way operation during peak periods would improve safety along the corridor. A detailed analysis of accidents and volumes by time of day would be useful in determining whether accident rates are currently lower during one-way or two-way operation.

Effects on Vehicle Occupants. As described for Alternative A, speed is the major factor affecting the probability of injury or death in vehicle-only traffic accidents. By reducing speeds and traffic volumes on park roads and the parkway, the traffic management measures of Alternative C would have a long-term, moderate to major, beneficial effect in reducing the number and severity of motor-vehicle-only accidents. The reduced traffic levels and reduced speeds that would result from Alternative C would reduce both the number of accidents, and the number and severity of injuries to vehicle occupants. This would reduce the ratio of accidents to the number of visitors, the ratio of injury to non-injury accidents, and the frequency of fatal accidents. Monitoring would be needed to determine if Alternative C's closure of segments of Beach Drive and traffic-reducing measures, which would divert some traffic onto nearby city streets, was increasing the number of injury and fatal accidents outside of the park.

Effects on Pedestrians and Cyclists. Speed is also the primary factor affecting the outcome of collisions between motorized vehicles and pedestrians or cyclists. By slowing traffic speeds and reducing traffic volumes, the traffic management measures of Alternative C would have a long-term, moderate to major, beneficial effect in reducing the number and severity of collisions between automobiles and pedestrians or cyclists in the park and along the parkway.

Pedestrians and cyclists would have a continuous trail throughout the park and parkway that would be separated from motor vehicles. This would probably reduce the number of accidents involving automobiles and cyclists or pedestrians compared to Alternative B. However, because of the low number of this type of accident (average of fewer than 10 per year throughout the park and parkway), some year-to-year fluctuation in the number of collisions between cars and pedestrians or cyclists would be expected.

Some accidents involving cyclists, skaters, and/or pedestrians would occur in the segments of Beach Drive that would be closed to vehicular traffic. Some of the factors that could influence the number and severity of nonmotorized vehicle accidents are identified below. Both individually and collectively, these factors would have only a negligible to minor effect on the total number and ratio of accidents in the park and on the parkway.

The weekday use of the closed segments for recreation and nonmotorized commuting is expected to be about 30 percent of weekend use. However, the availability of a car-free route could increase the number of bicycle commuters. While this would probably increase the number of cycle accidents, it probably would not change the ratio of accidents to the number of cyclists.

As with automobiles, a difference in speed can cause accidents. On weekdays, the occasional presence of stopped or slow-moving recreationists may be more likely to result in an accident with a fast-moving cyclist than would occur on a weekend when many slow-moving visitors are present and tend to limit the speed of cyclists.

Bicycle commuters may travel at higher speeds than many recreationists. Also, the absence of motorized vehicles may encourage higher speeds among some cyclists and skaters. Both of these could increase the severity of bicycle injuries.

Commitment of Resources

There would be no irretrievable or irreversible commitment of resources with this alternative. Any management actions that altered traditional park character and visitor experience could be reversed.

Cumulative Impacts

The Maryland Office of Planning (1993) predicted that demand for bicycling, hiking, and picnicking facilities in the state would increase by 6 to 14 percent between the years 2000 and 2010. Rock Creek Park and the Rock Creek and Potomac Parkway would continue to contribute to the regional mix of recreational opportunities and would be compatible with regional recreational plans. Alternative C would provide a bicycling route through Rock Creek Park that would be relatively free from interference by automobiles and would provide an effective connection with regional bicycle trails.

Conclusions

The loss of the traditional visitor experience of automobile touring along the length of the park would be a major adverse impact of Alternative C. However, this alternative would also have substantial beneficial impacts associated with improved enjoyment by recreational visitors in areas where traffic was reduced or eliminated.

Moderate to major improvements in visitors' safety would occur under Alternative C, compared to Alternative B. Improvements to visitor facilities and facilities used for administration and operations would enhance educational and interpretive experiences.

There would be a change in the use of Beach Drive from the historic use of scenic driving to other uses. Because the roadbed would not be greatly altered, the historic use could be returned at some future date if management goals changed. Consequently, there would be no impairment of resources or values associated with traditional park character and visitor experience.

IMPACTS ON REGIONAL AND LOCAL TRANSPORTATION

Analysis

Average Daily Traffic. Compared to Alternative B, the predicted changes in weekday average daily traffic volumes on Beach Drive, the Rock Creek and Potomac Parkway, and other roadways in the park under Alternative C are summarized in table 25 and table G.1 in appendix G. Visual representations of estimated traffic levels are shown in the Alternative C Year 2020 Average Weekday Traffic Volumes map and the Alternative B Year 2020 Average Weekday Traffic Volumes map.

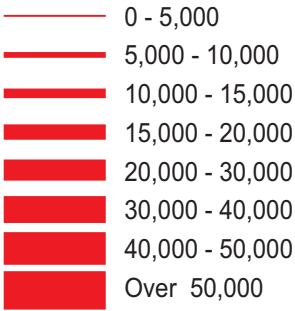
TABLE 25: AVERAGE DAILY TRAFFIC UNDER ALTERNATIVE C COMPARED TO AVERAGE DAILY TRAFFIC UNDER ALTERNATIVE B IN THE YEAR 2020

Road Segment	Alternative C	Alternative B	Change	Percent Change
Beach Drive – Wyndale to East Beach Drive	0	13,800	-13,800	-100
Beach Drive – Wise Road to Sherrill Drive	0	16,900	-16,900	-100
Beach Drive – Bingham Drive to Joyce Road	300	12,600	-12,300	-98
Beach Drive – Joyce Road to Broad Branch Road	0	11,700	-11,700	-100
Beach Drive – Blagden Avenue to Tilden/Park Road	20,000	26,700	-6,700	-25
Beach Drive – Porter Street to Zoo	27,900	33,800	-5,900	-17
Beach Drive – Zoo to 24 th /Cathedral	30,800	36,000	-5,200	-14
Rock Creek and Potomac Parkway – 24 th /Cathedral to Waterside	56,400	64,600	-8,200	-13
Rock Creek and Potomac Parkway – Waterside to P Street	71,600	77,900	-6,300	-8
Rock Creek and Potomac Parkway – K Street/Whitehurst to Virginia	71,100	75,200	-4,100	-5
Rock Creek and Potomac Parkway – Virginia to Teddy Roosevelt Bridge	56,100	55,100	+1,000	+2
West Beach – Wise Road	11,300 and 15,200	17,100 and 14,100	-5,800 and +1,100	-34 and +8
Bingham Drive – Sherrill Drive	1,900 and 1,600	1,800 and 7,700	+100 and -6,100	+6 and -79
Joyce Road – Morrow Drive	0 and 1,000	1,500 and 3,400	-1,500 and -2,400	-100 and -71
Broad Branch Road – Blagden Avenue	9,200 and 11,200	9,000 and 9,400	+200 and +1,800	+2 and +19
Tilden Street – Park Road	12,900 and 12,900	11,800 and 12,100	+1,100 and +800	+9 and +7
Piney Branch Parkway – Porter Street	14,000 and 19,100	13,300 and 18,700	+700 and +400	+5 and +2

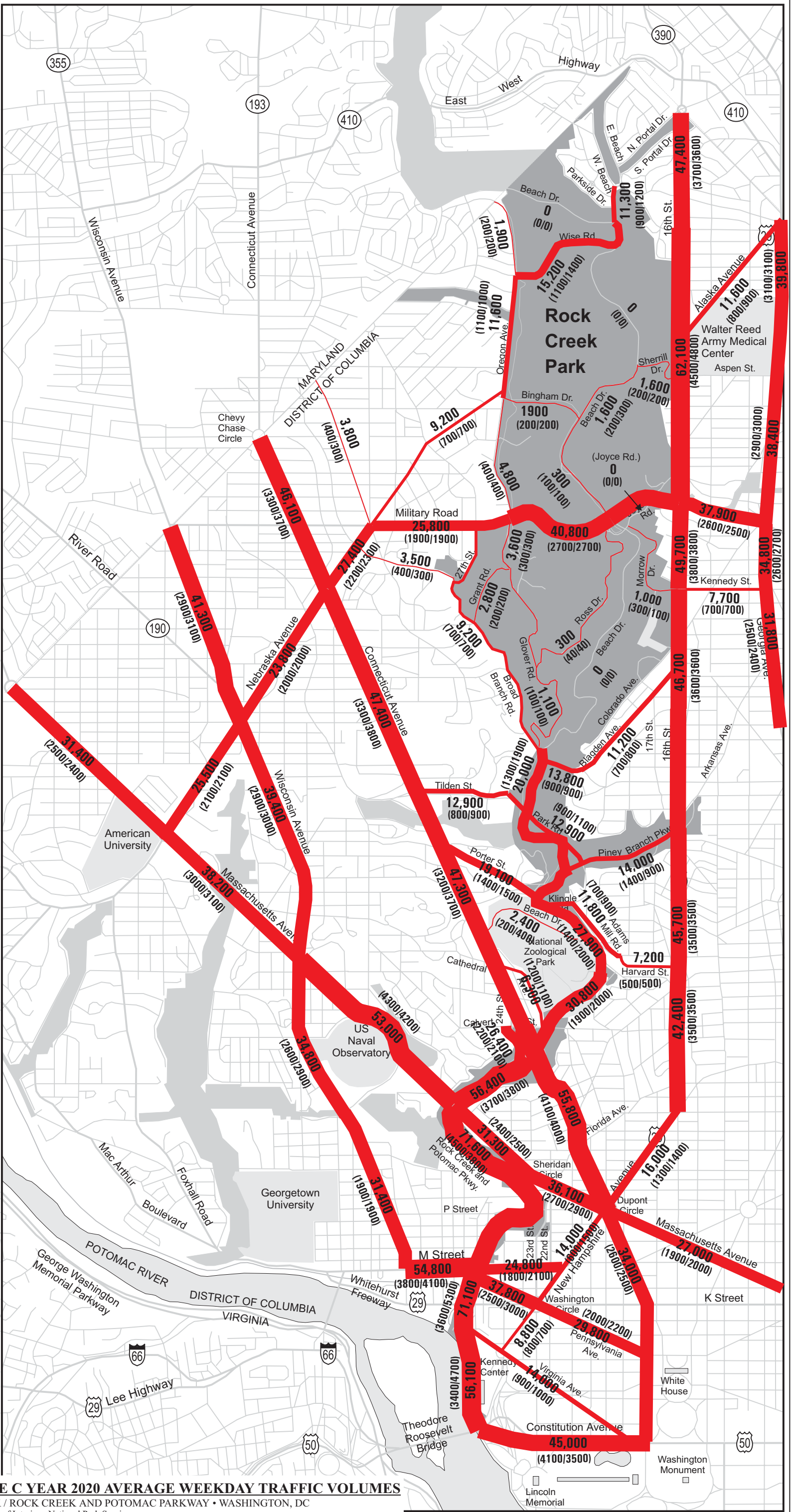


Map Scale: 1"= 0.5 Miles

Rock Creek Park



900 = ADT
(100/100) =
(AM Peak Hour/PM Peak Hour)



Alternative C would eliminate traffic along some sections of Beach Drive, would substantially reduce automobile traffic in other sections of the park and on the parkway, and would cause mixed changes in traffic flow from park roads onto the city's commuter corridors. Permanent full-time closure of sections of northern Beach Drive would transfer from 11,700 to 16,900 vehicles per day, compared to Alternative B, from park roads to city streets.

As shown in table 25, an estimated 4,100 to 8,200 vehicles per day, compared to Alternative B, would use other portions of the city grid rather than the southern portion of Beach Drive and the parkway. These shifts in the southern park and most of the parkway would result from HOV restrictions on portions of Beach Drive and the parkway during morning and evening peak periods, Beach Road closures to the north, and full-time, two-way traffic on the parkway. The only area of the park and parkway where traffic would increase would be at the southern end of the parkway, where traffic would increase by 1,000 vehicles (2 percent) per day.

Vehicles that would otherwise travel Beach Drive between the Maryland border and Broad Branch Road would have to find alternate routes. Single occupancy vehicles (SOV) currently using the southern portion Beach Drive and Rock Creek and Potomac Parkway would also have to use alternate routes during HOV restrictions. Some commuter vehicles carrying two or more people and currently using routes on the city street grid would likely re-route onto lower Beach Drive and the parkway.

Providing for two-way travel at all times on the parkway would allow new access to those wishing to travel against the rush-hour flow along the parkway. Since HOV restrictions would only be in effect for the predominant flow of commuter traffic on Beach Drive and the parkway, there would be no impact on vehicles traveling in the opposite direction during these times.

Road closures and HOV restrictions on Beach Drive would not restrict the cross flow of traffic between the east and west sides of the park on routes such as West Beach-Wise, Bingham-Sherrill, Joyce-Morrow, Broad Branch-Blagden, Tilden-Park, or Piney Branch-Porter. As shown in table 25, effects on these routes would vary, with traffic reductions of more than 70 percent on the Joyce-Morrow route and traffic increases of about 5 percent to 10 percent on most of the other routes, compared to Alternative B.

Traffic-calming measures applied to Beach Drive between Broad Branch Road and the parkway would reduce vehicle speeds. However, slower speeds are not anticipated to cause vehicles to re-route. Proposed safety modifications to the intersection of Beach Drive and the parkway near Connecticut would reduce vehicle conflicts and help minimize traffic congestion and delays.

HOV restrictions and changes in parkway management would not change the volume of vehicles going to and from the National Zoological Park. Zoo visitors riding alone in a vehicle would not be allowed to use Beach Drive in the direction of rush-hour flow during the morning and evening peak-hours. However, because most visits to the zoo are part of a social activity, vehicles with the zoo as a destination would usually have more than one occupant. HOV restrictions would not affect zoo visitors during the middle of the day from Monday through Friday, or at any time on weekends.

The decreases in traffic that would occur on Beach Drive, the Rock Creek and Potomac Parkway, and some cross-park roads would result in increases in traffic on other routes. In addition to those already identified on table 25, road segments where traffic would increase by 3 percent or more compared to Alternative B include the following:

Road Segment	Percent Increase
16th Street from Alaska to Florida	3 - 10
Alaska Avenue from Georgia to Morningside	6
Georgia Avenue from Alaska to Kennedy	3 - 8
Oregon Avenue from Chestnut to Nebraska	8
Broad Branch Road from Western to 27th Street	13 - 41
Connecticut Avenue from Columbia to DuPont Circle	4 - 6
Wisconsin Avenue from Albemarle to Newark	5
Massachusetts Avenue from the state line to 49th Street	3
Nebraska Avenue from Oregon to Utah	20
Harvard Street from Adams Mill to 16th Street	8
New Hampshire Avenue from 19th Street to Virginia	7 - 13
Constitution Avenue from 23rd Street to Henry Bacon	5

Goals of Alternative C include managing northern portions of the park as an exclusion zone from urban automobile traffic to promote nonmotorized recreation throughout the week, asserting more control over nonrecreational use of park roads, and improving visitor safety. To determine the effectiveness of Alternative C in meeting these goals, average daily traffic estimates in the year 2020 were compared to traffic counts in the year 1990. This analysis determined the following.

North of Broad Branch Road, traffic would be eliminated on Beach Drive, except for 300 vehicles per day on the segment between Bingham Drive and Joyce Road.

South of Broad Branch Road, traffic on Beach Drive would increase modestly over the 30-year period, by about 11 percent on the segment to Tilden/Park, 16 percent on the segment south to the zoo, and 25 percent from the zoo to 24th/Cathedral.

Based on these results, it is concluded that Alternative C would be very effective in reducing or excluding traffic from the northern portion of the park and limiting nonrecreational traffic on other park roads. In concert with reduced speeds that would result from the traffic restrictions and calming measures, Alternative C would also meet the objective of improving visitor safety south of the road closure area.

Morning Rush-Hour Traffic. During the weekday morning rush-hour, many road segments would have identical levels of service (LOS) in the year 2020 under Alternative C and Alternative B. Table 24, table 26 and the Alternative C Year 2020 A.M. Peak-Hour Volume Changes with Respect to Alternative B map show segments where the LOS between the two alternatives would vary by at least one step. Additional information on year 2020 peak-hour traffic volumes and LOSs for both the morning and evening are provided in tables G.2 and G.3 in appendix G.

TABLE 26: OTHER ROAD SEGMENTS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN TRAFFIC LEVELS BETWEEN ALTERNATIVE C AND ALTERNATIVE B

Road Segment	Peak-Hour Period	Alternative C LOS	Alternative B LOS	Change ^{a/}
Improved level of service				
Georgia Avenue - Arkansas to Upshur	A.M.	D	E	N
Georgia Avenue - Arkansas to Upshur	P.M.	D	E	N
Oregon Avenue – Chestnut to Nebraska	A.M.	C	D	N
West Beach Drive - Beach Drive to Portal	A.M.	C	E	C
West Beach Drive - Beach Drive to Portal	P.M.	E	F	N
Kennedy -14th to 13th	A.M.	B	C	N
Kennedy -14th to 13th	P.M.	B	C	N
Adams Mill Road - Park Street to Irving	A.M.	B	C	N
Cathedral Avenue – Calvert to Beach/24th	A.M.	D	E	N
Cathedral Avenue – Calvert to Beach/24th	P.M.	D	E	N
New Hampshire Avenue –21st to M Street	A.M.	B	C	N
Pennsylvania Avenue - M Street to L Street	A.M.	D	E	N
Pennsylvania Avenue - K Street to I Street	A.M.	D	E	N
Reduced level of service				
Georgia Avenue – Missouri to Kennedy	A.M.	E	D	N
Georgia Avenue – Missouri to Kennedy	P.M.	E	D	N
Oregon Avenue - Moreland to Military Road	P.M.	B	A	N
Wisconsin Avenue – Calvert to Reservoir	A.M.	E	D	N
Blagden Avenue - Upshur to Decatur	P.M.	C	B	N
Park Road - Beach Drive to Piney Branch Parkway	P.M.	E	D	N

TABLE 26: OTHER ROAD SEGMENTS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN TRAFFIC LEVELS BETWEEN ALTERNATIVE C AND ALTERNATIVE B (Continued)

Road Segment	Peak-Hour Period	Alternative C LOS	Alternative B LOS	Change ^{a/}
Military Road – 16th to 14th	A.M.	E	D	N
Military Road - 16th to 14th	P.M.	E	D	N
New Hampshire Avenue –19th to 20th	A.M.	E	C	C
New Hampshire Avenue – 19th to 20th	P.M.	E	D	N
New Hampshire Avenue - Washington Circle to Virginia	A.M.	C	B	N
M Street - New Hampshire to 22nd	P.M.	D	C	N
New Hampshire Avenue – 21st to M Street	P.M.	E	C	C

a/ N = noticeable. C = considerable. M = major.

There would be two major changes in weekday morning rush-hour traffic patterns associated with Alternative C compared to Alternative B.

Traffic on Beach Drive would be eliminated north of picnic grove 10, except for the short road segment between West Beach Drive and Wise Road.

Northbound traffic would be permitted on the Rock Creek and Potomac Parkway during morning rush-hour, where it is estimated to be substantial (LOS C) to heavy (LOS D). Under Alternative B, traffic on the Rock Creek and Potomac Parkway would be one-way southbound.

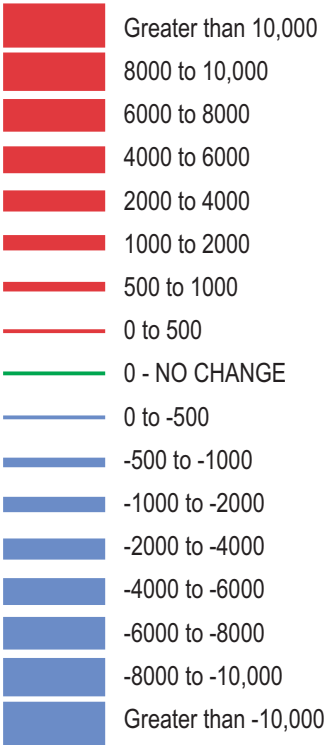
Fifteen road segments would have improved levels of service during the morning rush-hour with Alternative C, compared to Alternative B. Three of these would have considerable improvements (two LOS steps), including Beach Drive from Porter Street to the Zoo, the Rock Creek and Potomac Parkway southbound from K Street/Whitehurst Parkway to Virginia Avenue, and West Beach Drive from Beach Drive to Portal. The other 12 road segments would have noticeable improvements (one LOS step) compared to Alternative B. All 15 segments would have LOS D (heavy traffic) or better, compared to Alternative B, where six of the segments would experience very heavy traffic (LOS E).

Five road segments would have worse levels of service during the morning rush-hour with Alternative C, compared to Alternative B. One of these, New Hampshire Avenue from 19th Street to 20th Street, would have a considerable decline in service (two LOS steps). The other four road segments would have noticeable decreases in service (one LOS step) compared to Alternative B. Four of the five segments would have very heavy traffic (LOS E) with Alternative C, while all five segments would be LOS D or better under Alternative B.

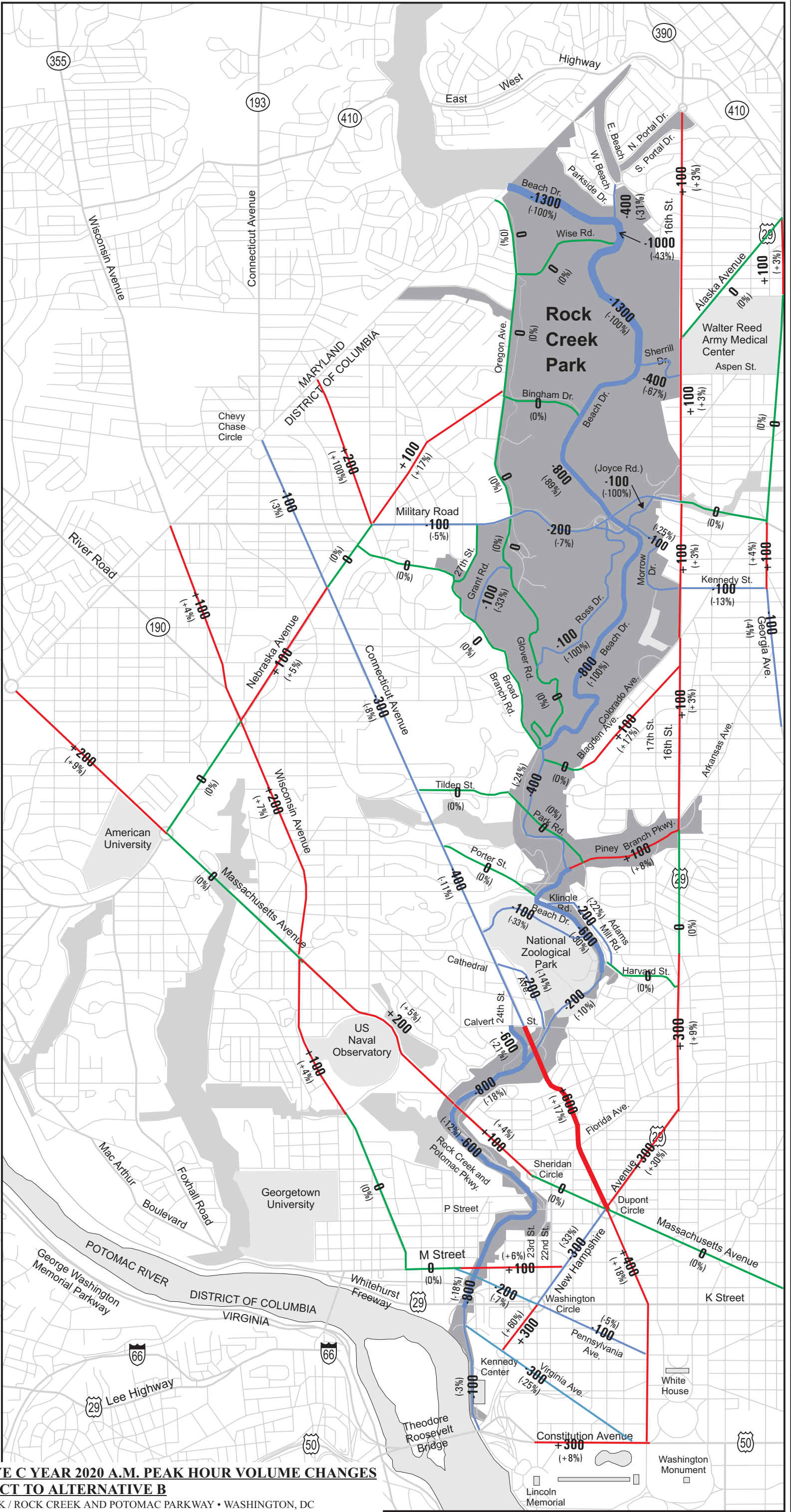


Map Scale: 1"= 0.5 Miles

Rock Creek Park



+900 = Volume Change With Respect to Alternative B in The Year 2020.
(+5%) = % Volume Change With Respect to Alternative B in The Year 2020.



ALTERNATIVE C YEAR 2020 A.M. PEAK HOUR VOLUME CHANGES WITH RESPECT TO ALTERNATIVE B

ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY • WASHINGTON, DC
United States Department of Interior • National Park Service
DCS • January 2002 • 821 / 20051

Evening Rush-Hour Traffic. During the weekday evening rush-hour, most road segments would have identical levels of service (LOS) in the year 2020 under Alternative C and Alternative B. Table 23, Table 26, and the Alternative C Year 2020 P.M. Peak-Hour Volume Changes with Respect to Alternative B map show segments where the level of service between the two alternatives would vary by at least one step.

There would be two major changes in weekday evening rush-hour traffic patterns associated with Alternative C compared to Alternative B.

Traffic on Beach Drive would be eliminated north of picnic grove 10, except for the short road segment between West Beach Drive and Wise Road.

Southbound traffic would be permitted on the Rock Creek and Potomac Parkway during evening rush-hour, where it is estimated to be substantial (LOS C) to very heavy (LOS E). Under Alternative B, traffic on the Rock Creek and Potomac Parkway would be one-way northbound.

Eleven road segments would have improved levels of service during the evening rush-hour with Alternative C, compared to Alternative B. One of these, the Rock Creek and Potomac Parkway northbound from K Street/Whitehurst Parkway to Virginia Avenue, would have a considerable improvement in service (two LOS steps). Four of the segments would have very heavy traffic (LOS E), compared to eight segments with very heavy or extremely heavy traffic (LOS F) under Alternative B.

Nine road segments would have worse levels of service during the morning rush-hour with Alternative C, compared to Alternative B. One of these, New Hampshire Avenue from 21st Street to M Street, would have a considerable decline in service (two LOS steps). The other eight road segments would have noticeable decreases in service (one LOS step) compared to Alternative B. Five of the nine segments would have very heavy traffic (LOS E) with Alternative C, while all nine segments would be LOS D or better under Alternative B.

Nonmotorized Travel. Alternative C would improve conditions for cyclists and pedestrians in the park, particularly north of Broad Branch Road. Permanent closure of three segments of Beach Drive, construction of a recreation trail between West Beach Drive and Wise Road, and improvements to existing recreation trails would provide an almost continuous automobile-free route the length of the park and parkway at all times.

Motor-vehicle-related safety problems on the closed sections of Beach Drive would be eliminated. The closed portions of Beach Drive would be available for recreational uses by park visitors, creating a corridor for such activities as bicycling, skating, walking, and jogging. The availability of this corridor would likely encourage some people to use bicycles and other nonmotorized modes for commuting and other purposes, which would reduce motor vehicle travel on other park roads and on other routes in the area.

Speed-related problems would be anticipated from some bicyclists and skaters. Some individuals or groups would use the corridor for high-speed travel that would endanger walkers, joggers, and other park users who travel at slower speeds. Cyclists who ran stop signs and refused to yield to pedestrians using crosswalks would also create safety hazards. These problems currently occur during the weekend road closures and probably would worsen during weekday closures when rec-

reational use was lighter and a greater proportion of cyclists were using the corridor as a commuting route or, possibly, a training route or race track.

Cumulative Impacts

Regional growth in the counties around the District of Columbia, especially to the north in Montgomery County, Maryland, is the primary reason for the projected increases in traffic volumes around the park. No matter which action is taken in Rock Creek Park or on the parkway, traffic in the region is expected to increase by at least 70 percent above 1990 levels by the year 2020 (Metropolitan Washington Council of Governments 1998). Growth-induced increases in traffic would have a detrimental impact on traffic on all of the roads in the area with or without Alternative C.

In addition to Beach Drive and the Rock Creek and Potomac Parkway, 70 road segments around the park were modeled (Robert Peccia & Associates 1997). Of these, compared to Alternative B

26 would have average daily traffic increases of between 3 percent and 10 percent

5 would have average daily traffic increases of greater than 10 percent

4 would have average daily traffic decreases of between 3 percent and 10 percent

10 would have average daily traffic decreases of greater than 10 percent

25 would be little affected by Alternative C, with an average daily traffic increase or decrease of 3 percent or less

The greatest effect of Alternative C on nonmotorized travel in the region would be associated with providing an almost automobile-free corridor for bicyclist and pedestrians from the Maryland state line to the core of the city. The corridor would improve the linkage within the Rock Creek Trail in the regional system. The Rock Creek corridor would become the route of choice for some bicycle commuters currently using other routes on city streets due to convenience and safety considerations.

Bicycling as a means of personal transportation, as well as a form of recreation, would likely to grow in the region with or without Alternative C. However, the presence of the automobile-traffic-free corridor may encourage more individuals to try bicycle or other nonmotorized commuting or travel.

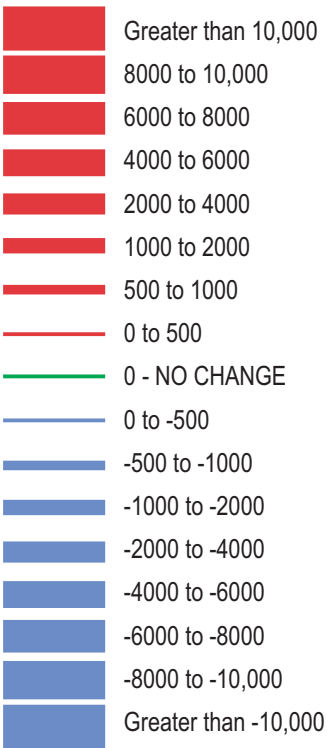
Conclusions

Alternative C would eliminate traffic on closed sections and would considerably curtail automobile traffic on open sections of Beach Drive north of Broad Branch Road. Traffic on Beach Drive south of Broad Branch Road would be noticeably to considerably reduced. Changes in traffic management on Beach Drive in combination with implementing two-way traffic on the Rock Creek and Potomac Parkway would have noticeable to considerable positive effects on most parkway levels of service. Conditions for nonmotorized travel through the park, particularly bicycling, would be substantially enhanced.

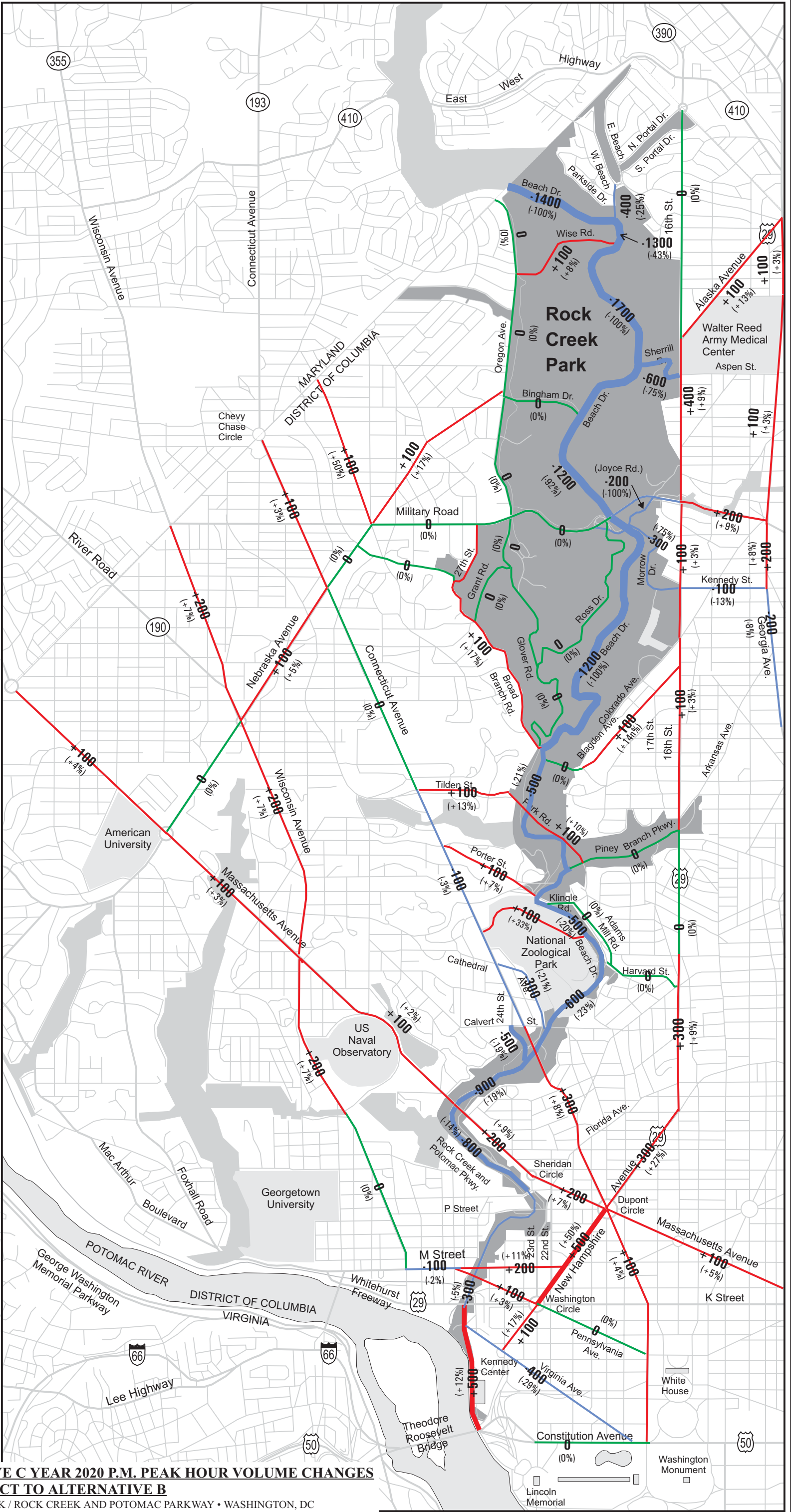


Map Scale: 1"= 0.5 Miles

Rock Creek Park



+900 = Volume Change With Respect to Alternative B in The Year 2020.
(+5%) = % Volume Change With Respect to Alternative B in The Year 2020.



ALTERNATIVE C YEAR 2020 P.M. PEAK HOUR VOLUME CHANGES WITH RESPECT TO ALTERNATIVE B

ROCK CREEK PARK / ROCK CREEK AND POTOMAC PARKWAY • WASHINGTON, DC
United States Department of Interior • National Park Service
DCS • January 2002 • 821 / 20052

Alternative C would cause mixed changes in traffic patterns on city streets. Some segments would improve noticeably while others would have noticeable declines in levels of service. Segments of three major arterials – Military Road, New Hampshire Avenue, and Wisconsin – would be negatively affected and major arterial, Pennsylvania Avenue, would be positively affected.

There would be a change in the use of Beach Drive from the historic use of scenic driving to other uses. Because the roadbed would not be greatly altered, the historic use could be returned at some future date if management goals changed. Consequently, there would be no impairment of resources or values associated with regional and local transportation.

IMPACTS ON COMMUNITY CHARACTER

Analysis

Traffic volume changes caused by Alternative C, and any associated changes in community character, would be minor compared to the substantial increased traffic volumes that are expected to result from continued regional population growth. For instance, MWCOC forecasts as much as a 70 percent increase in traffic in the region due to population growth by 2020 (Metropolitan Washington Council of Governments 1998). Residents adjacent to the park would be affected by this regional change regardless of traffic management actions in the park.

The closure of portions of Beach Drive to automobiles and the proposed recreation trail improvements in Alternative C would fill a void in the regional trail system. The trail improvements would make it easier for area residents to reach the valley, and would increase recreation opportunities such as walking, jogging, and biking through the valley. This would be a beneficial effect on all community citizens who use these park facilities.

The Alternative C Year 2020 A.M. and P.M. Peak-Hour Volume maps show the projected traffic changes for streets in the park vicinity. These projections were compared to projected traffic volumes that would occur without a change in traffic management (Alternative B).

Traffic modeling suggests that the closure of segments of Beach Drive and other traffic management restrictions in Alternative C would reinforce current commuter patterns. It is unlikely that traffic would be introduced onto streets where substantial commuter traffic does not currently exist.

Table 27 summarizes the roads outside of the park and parkway where the community would experience a noticeable or greater traffic change between Alternative C and Alternative B. As shown in the table, eight road segments would experience noticeably improved community characteristics associated with lower traffic levels during one or both of the peak-hours on weekdays. These include one segment in Ward 1, three segments in Ward 2, two segments in Ward 3, and two segments in Ward 4.

Nine road segments would experience a decline in traffic-related community quality characteristics because of higher traffic levels during one or both of the peak-hours on weekdays, compared to Alternative B. None of these road segments are within Ward 1. Five segments are in Ward 2, one segment is in Ward 3, and three segments are in Ward 4. The changes would be considerable on New Hampshire Avenue from 19th to 20th during the morning peak-hour, and on

**TABLE 27: WARDS EXPERIENCING NOTICEABLE OR GREATER CHANGES IN
COMMUNITY CHARACTERISTICS ASSOCIATED WITH TRAFFIC
BETWEEN ALTERNATIVE C AND ALTERNATIVE B**

Ward	Road Segment	Peak-Hour Period	Alt. C LOS	Alt. B LOS	Change ^{a/}
Improved level of service					
1	Adams Mill Road – Park Street to Irving	A.M.	B	C	N
2	New Hampshire Avenue – 21st to M	A.M.	B	C	N
2	Pennsylvania Avenue – K to I	A.M.	C	D	N
2	Pennsylvania Avenue – M to L	A.M.	D	E	N
3	Cathedral Ave. – Calvert to Beach/24th	A.M.	D	E	N
3	Cathedral Ave. – Calvert to Beach/24th	P.M.	D	E	N
3	Oregon Avenue – Chestnut to Nebraska	A.M.	C	D	N
4	Georgia Avenue – Arkansas to Upshur	A.M.	D	E	N
4	Georgia Avenue – Arkansas to Upshur	P.M.	D	E	N
4	Kennedy – 14th to 13th	A.M.	B	C	N
4	Kennedy – 14th to 13th	P.M.	B	C	N
Reduced level of service					
2	M Street – New Hampshire to 22nd	P.M.	D	C	N
2	New Hampshire Avenue – 19th to 20th	A.M.	E	C	C
2	New Hampshire Avenue – 19th to 20th	P.M.	E	D	N
2	New Hampshire Avenue – 21st to M	P.M.	E	C	C
2	New Hampshire Avenue – Washington Circle to Virginia	A.M.	C	B	N
2	Wisconsin Avenue – Calvert to Reservoir	A.M.	E	D	N
3	Oregon Ave – Moreland to Military Road	P.M.	B	A	N
4	Blagden Avenue – Upshur to Decatur	P.M.	C	B	N
4	Georgia Avenue – Missouri to Kennedy	A.M.	E	D	N
4	Georgia Avenue – Missouri to Kennedy	P.M.	E	D	N
4	Military Road – 16th to 14th	A.M.	E	D	N
4	Military Road – 16th to 14th	P.M.	E	D	N

a/ N = noticeable, C = considerable, M = major.

New Hampshire Avenue from 21st Street to M Street during the evening peak-hour. All other declines in community characteristics because of increased traffic would be noticeable.

The environmental justice evaluation did not show any inequitable distributions of adverse effects from declines in traffic levels of service (LOS) on ethnic or economically disadvantaged neighborhoods or groups. As shown in Table 27, nine road segments would experience noticeable declines in community characteristics related to traffic, relative to Alternative B.

None of these road segments would be located in Ward 1, which could be considered ethnically or economically disadvantaged based on the following characteristics from table 16:

- highest population density
- lowest median household income
- second lowest levels of education attainment
- lowest percentage of owner-occupied housing units

Six of the segments would be in Wards 2 or 3, each of which ranked first or second among the four wards in the following categories in table 16:

- highest percentage of white population
- smallest median household size
- lowest population density
- lowest percentage of citizens not completing high school and highest percentage of citizens with a college degree

Three of the segments would be in Ward 4, which could be considered ethnically or economically disadvantaged based on the following characteristics from table 16:

- highest percentage of non-white population
- greatest median household size
- highest percentage of citizens not completing high school and lowest percentage of citizens with a college degree

The distribution of adversely affected road segments predominantly in advantaged wards indicates an absence of ethnic or economic bias in the location of adverse effects.

Alternative C would not have substantial economic impacts on any neighboring communities. Locating a new NPS office or U.S. Park Police substation outside of the park would generate new lease income at the local level. However, this income would not have a sizeable effect on business income or economic diversity.

The closure of segments of Beach Drive to automobile traffic would not adversely affect police or emergency operations in the vicinity of the park. These services would be managed throughout the week in a similar manner to that currently associated with the weekend closures of Beach Drive, Sherrill Drive, and Bingham Drive.

There would be no irretrievable or irreversible commitment of resources with this alternative. Management actions that altered community character in association with traffic could be reversed.

Cumulative Impacts

Alternative C would contribute incremental increases in traffic volume on streets and highways that would receive traffic displaced from the park. However, this incremental increase would be masked by the cumulative effects of traffic volume increases of 70 percent that are expected throughout the Washington, D.C. metropolitan area (Metropolitan Washington Council of Governments 1998).

The HOV restrictions included in Alternative C would be consistent with the goals of the *Draft Vision Document* (Metropolitan Washington Council of Governments 1997) and the Strategic Transportation Plan (District of Columbia Government 1997) that propose reducing congestion problems in the region by reducing dependency on single occupancy vehicles.

Regional economic patterns would not be substantially affected by the scale of the changes proposed in Alternative C.

Expanded recreational opportunities would create benefits for area residents. The closure of sections of Beach Drive would complete an important link in the regional trail system and could substantially increase regional nonmotorized recreational opportunities throughout the week. Development of the trail would be consistent with goals and improvements advocated in the *Draft Vision Document* (Metropolitan Washington Council of Governments 1997) and the Strategic Transportation Plan for the District of Columbia (1997).

There would be no irretrievable or irreversible commitment of community character or visitor experiences with Alternative C. All of the proposed measures could be reversed or changed if future community perceptions concluded that the incremental changes in neighborhood traffic patterns and volume linked to park management were unacceptable.

Conclusions

Alternative C would produce noticeable beneficial changes in the community character associated with traffic along eight road segments, and detrimental changes along nine road segments. However, four of the nine adversely affected areas, including both segments with considerable effects, would be located on arterial roads in the Foggy Bottom neighborhood, and would have little effect on residential communities.

There would be a change in the use of Beach Drive from the historic use of scenic driving to other uses. Because the roadbed would not be greatly altered, the historic use could be returned at some future date if management goals changed. Consequently, there would be no impairment of resources or values associated with community character.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

The Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Actions associated with Alternative C would be consistent with a long-term management strategy for ensuring natural, archeological, and historic resources and improving park visitor experiences.

The closure of portions of Beach Drive to automobiles, and the implementation of traffic-reducing and traffic-calming measures elsewhere in the park, would inconvenience some motorists who use park roads as a commuter route. However, this inconvenience would be offset by an improved weekday visitor experience that is more compatible with the park's purpose and character.

Other relationships between local short-term uses of the environment and the maintenance and enhancement of long-term productivity would be identical to those described in Alternative A.

Any Irreversible or Irretrievable Commitments of Resources that Would Be Involved Should the Alternative Be Implemented

The irreversible or irretrievable commitments of resources under Alternative C would be identical to those described for Alternative A.

Any Adverse Impacts that Cannot Be Avoided Should the Action Be Implemented

Alternative C would result in the unavoidable adverse effect of reducing the traffic level of service on eleven road segments, two of which are within the park and parkway boundaries. This would be an unavoidable consequence of reducing commuter traffic through the park, a major goal of the alternative. Community characteristics associated with traffic also would be degraded along the nine road segments outside of the park that experienced reduced traffic levels of service.

ENVIRONMENTAL IMPACTS OF ALTERNATIVE D: MID-WEEKDAY RECREATION ENHANCEMENT

IMPACTS ON AIR QUALITY

Analysis

Table 18 summarizes the effects of Alternative D on air quality in the year 2020. As with the other alternatives, the area of Rock Creek Park and the Rock Creek and Potomac Parkway would be affected more by emissions throughout the regional airshed than by tailpipe emissions from vehicles using the park and parkway.

As discussed in the transportation section, traffic patterns and numbers during rush-hour periods would be similar to those occurring with Alternative B. Therefore, effects on air quality during the critical morning and evening rush-hour periods would be negligible compared to Alternative B. During the mid-day closure period, air emissions would be lower along the closed segments and higher in areas that accommodated the diverted traffic, compared to Alternative B. This redistribution of the same volume of traffic would have negligible effects on the regional air quality.

Alternative D would include some construction in the park that would not occur with Alternative B. This would include preserving historic structures, expanding the nature center and planetarium, and possibly constructing new buildings at the maintenance yard or the H-3 area. Best management practices and prompt revegetation would be applied in association with all construction to ensure that dust and construction-vehicle emissions associated with these activities would not be substantially greater than those that would occur with Alternative B.

There would not be any irretrievable or irreversible commitment of air quality resources with this alternative.

Cumulative Impacts

No changes would occur in air emissions from vehicles in the region because of Alternative D's management actions at Rock Creek Park and the Rock Creek and Potomac Parkway. Instead, Alternative D would redistribute the same traffic volume onto different roadways, compared to Alternative B. This redirection of the same volume of traffic would have negligible effects on the regional air quality.

Provisions of Alternative D to reduce traffic speeds in the park and on the parkway, and to provide an automobile-free corridor during the mid-weekday period may encourage some commuters to use bicycles rather than automobiles. This change in transportation mode would result in a beneficial but negligible effect on the regional air quality.

Conclusions

Alternative D would result in negligible effects on air quality compared to Alternative B. It would not result in the exceedence of the 1-hour or 8-hour NAAQS for carbon monoxide. In addition, it would not cause any impairment of resources or values associated with air quality.

There would be no major adverse impacts on resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of park or parkway, (2) key to the natural or cultural integrity of the park and parkway or opportunities for enjoyment of these units, or (3) identified as a goal in this general management plan or other NPS planning documents. Consequently, there would be no impairment of resources or values associated with air quality.

IMPACTS ON ROCK CREEK AND ITS TRIBUTARIES

As described in the section “Impacts on Local and Regional Transportation,” automobile traffic volumes on park roads for Alternative D would be similar to those of Alternative B whenever Beach Drive was open to motorized vehicles. When closures were implemented during the middle of each workday, traffic would be eliminated on the closed portions of Beach Drive, would be reduced by about 25 percent on Beach Drive between Joyce Road and the north end of the parkway, and would be reduced by about 10 percent on the parkway. These decreases in traffic would result in slight reductions of the pollutant loadings (sediments, oils and grease, and metals from the road surface) washed into Rock Creek and its tributaries during and after storm events. The reduced loadings would produce negligible to measurable, beneficial, long-term effects on water quality.

There would be no irretrievable or irreversible commitment of resources with this alternative. All actions could be replaced or reversed.

Aside from roadway runoff, Alternative D would have the same effects as Alternative A to Rock Creek and its tributaries. This would include identical cumulative impacts and conclusions.

IMPACTS ON WETLANDS AND FLOODPLAINS

Alternative D would have the same effects as Alternative A to wetlands and floodplains. This would include identical cumulative impacts and conclusions.

IMPACTS ON DECIDUOUS FORESTS

Alternative D would have the same effects as Alternative A to deciduous forests. This would include identical cumulative impacts and conclusions.

IMPACTS ON PROTECTED AND RARE SPECIES

Alternative D would have the same effects as Alternative A to protected and rare species. This would include identical cumulative impacts and conclusions.

IMPACTS ON OTHER NATIVE WILDLIFE

Except as noted below, Alternative D would have the same effects as Alternative A to native wildlife. This would include identical cumulative impacts and conclusions.

Midday closures of segments of Beach Drive during workdays, and other actions to reduce traffic speeds and volumes on park roads and the parkway, would reduce the number of wildlife killed or injured by motor vehicles. The greatest reduction would occur among groups that are active during the day, including reptiles such as box turtles and black rat snakes. Compared to Alternative B, this would produce long-term, beneficial effects on the park's native wildlife.

For all park species, the reductions in mortality from closing segments of Beach Drive would be negligible. As shown in table 9, only two box turtles and four black rat snakes were recorded as roadkill along the entire length of Beach Drive in the 10-year period from 1991 through 2000. Neither of these species was recorded as killed on the Rock Creek and Potomac Parkway during this period.

Measures to reduce traffic speeds would reduce roadkill throughout the park compared to Alternative B, but would have little effect on the populations of most park species because their populations are stable or expanding. As with Alternative A, the effects on box turtles would be moderate, long-term, and beneficial. Effects on gray foxes would be major, long-term, and beneficial.

IMPACTS ON ARCHEOLOGICAL RESOURCES

Alternative D would have the same effects as Alternative A to archeological resources. This would include identical cumulative impacts and conclusions.

IMPACTS ON HISTORIC STRUCTURES AND CULTURAL LANDSCAPES

Alternative D would have the same effects as Alternative A to historic structures and cultural landscapes. This would include identical cumulative impacts and conclusions.

IMPACTS ON TRADITIONAL PARK CHARACTER AND VISITOR EXPERIENCE

Analysis of Effects on Traditional Character and Experiences

The traditional character of the park would not change under Alternative D. Recognition of cultural landscape values and management for those values would help maintain the traditional appearance of the park. As under Alternative A, the appearance of park historic structures, grounds, and roadways would be preserved or enhanced, maintaining the traditional ambiance of the park setting. Development of design standards for park facilities and signs would also enhance the traditional ambiance.

As described under "Impacts on Regional and Local Transportation," Alternative D would not have noticeable effects on rush-hour traffic volumes compared to Alternative B. Rush-hour traffic volumes for Alternative D would be higher than those occurring under either Alternative A or Alternative C. However, new traffic-control structures and traffic-calming measures would reduce the speed of traffic in the park and on the parkway.

The experience of automobile touring throughout the length of the park on workdays would be maintained under Alternative D during the evening, throughout the night, and during both rush-hour periods. This would allow continued use of the park by commuters who chose to drive park roads because they enjoyed the slower pace and scenery.

Auto touring on northern segments of Beach Drive would cease during the mid-day closure period. Between 9:30 A.M. and 3:30 P.M. on workdays, the driving experience in the Rock Creek valley north of Broad Branch Road would be replaced by enhanced opportunities for nonmotorized use. If current patterns continued, more than two-thirds of weekday visits would be nonrecreational commuter cyclists. The remainder would be recreational visitors such as picnickers, joggers, hikers, in-line skaters, and birders. Both of these groups would exceed the number of workday visitors that would occur under Alternatives A or B, but would be smaller than those under Alternative C. Weekday use would be expected to be about 30 percent of weekend use.

During the closure period, traffic noise would be eliminated along most of northern Beach Drive, except for cross-park traffic noise. Natural sounds and the sounds of people recreating would be dominant, similar to the condition that currently occurs on weekends. When Beach Drive was open to traffic, noise levels would follow the existing pattern, where noise levels within 60 feet of Beach Drive and within 125 feet of the parkway exceed the Federal Highway Administration's noise abatement criteria during high-traffic periods.

Visitors would continue to have access to all of the traditional activities in the park that were described in the "Affected Environment" section. Even with the mid-day closure of segments of Beach Drive, visitor-use facilities such as picnic grounds and trailheads would continue to be accessible via motorized vehicle. However, visitors would have to drive around the closed sections via city streets to access other portions of the park. This could be confusing, particularly to out-of-town visitors.

Weekday visitation to the northern portion of the park would be substantially reduced. As described under "Impacts on Regional and Local Transportation," up to 1,400 vehicles per hour that would use Beach Drive under Alternative B would have to use an alternate route under Alternative D. South of Broad Branch Road and on the Rock Creek and Potomac Parkway, use would decrease by about 10 percent during the mid-day closure period. Most of the traffic reductions in the park under Alternative D would be in nonrecreational visits.

Opening and closing Beach Drive each day would pose a labor and logistical challenge to the U.S. Park Police that would not occur with any of the other alternatives. The closing and opening of barriers would have to occur nearly simultaneously at six points to accommodate traffic entering both from the north and south ends of Beach Drive and from east-west roads that cross the park. Typically, there are only three officers on any shift, and two of them would have to be dedicated to barrier placement twice each weekday. The commitment of officers to barrier placement would limit their availability for other activities, such as patrolling other areas of the park. This would be a minor, adverse effect on U.S. Park Police resources.

The installation of automated barriers would reduce labor commitments by the U.S. Park Police. However, enforcement activities such as patrolling "no waiting" zones would continue to make demands on officers that would not occur with any of the other alternatives.

Weekend road closures would continue current opportunities for nonmotorized recreation in the valley. Alternative D would have similar use levels as Alternative B, since weekend traffic management would be similar for both alternatives.

Compared to Alternative B, upgraded recreation trails, bridle trails, and foot trails throughout the park would increase visitor safety and provide a more pleasant recreational experience for most

trail users. Rehabilitated trails and better directional and information signs would enhance visitor access, safety, and orientation to park areas and facilities.

Alternative D traffic management measures would result in rush-hour traffic levels on Beach Drive and the Rock Creek and Potomac Parkway that would be similar to those occurring in Alternative B. Therefore, there would be negligible differences in the levels of service (LOSs) occurring under Alternative D and Alternative B.

With Alternative D, effects on traditional park character and visitor experience that are not related to traffic would be identical to those described for Alternative A. These would include improved opportunities at Peirce Mill Barn, the Lodge House, and the nature center and planetarium.

Analysis of Effects on Safety along Roadways

Traffic management measures associated with Alternative D would include

- enhanced enforcement

- use of traffic-calming measures, such as speed humps, all-way stops, rumble strips, or raised intersections

- reconfiguration of the intersection of the parkway with Beach Drive near Connecticut Avenue to improve safety

- closure of segments of Beach Drive to motorized vehicles during mid-weekday periods.

Mid-Weekday Beach Drive Closures. Mid-day closure of segments of Beach Drive would have negligible to minor effects on traffic safety. These stretches of Beach Drive were the site of 57 accidents between 1993 and 1995 (Robert Peccia & Associates 1997), for an average of about 20 accidents per year. The same report indicates that just under half of all accidents in the park and parkway occur between 9:00 A.M. and 4:00 P.M. The prevention of about 10 accidents annually along these segments would not change any of the accident ratios occurring in the park and parkway, and may not be measurable, based on year-to-year fluctuation in the number of accidents (negligible to minor effect).

Mid-workday closures of portions of Beach Drive may move accidents to other nearby areas. However, because of the low levels of traffic on roads around the park during this period, the change in number of accidents outside of the park probably would be negligible.

Enhanced Enforcement. The effectiveness of the improved speed enforcement measures was described for Alternative A. The enhanced enforcement elements of Alternative D would have a minor to moderate beneficial effect on visitor safety. However, if traffic enforcement levels were reduced because of budget cuts or the need to assign U.S. Park Police staff to other duties, the beneficial effects would not be expected to continue for very long.

Traffic Calming Devices. The use of traffic-calming techniques to reduce speeds and enhance safety was described in the analysis of Alternative A. The use of traffic-calming devices in Alternative D would have a moderate to major beneficial effect on visitor safety in the park and parkway compared to Alternative B. If these measures were successful in reducing the frequency and severity of crashes by the levels indicated in studies reviewed by the Federal Highway Administration (1998) and National Highway Traffic Safety Administration (1999), they would have moderate beneficial effects by substantially altering both the ratio of accidents to the number of visitors and the ratio of injury to non-injury accidents. A major beneficial effect would occur if they reduced fatalities by a similar amount. As long as the traffic-calming devices were maintained, these would be long-term effects.

Effects on Vehicle Occupants. As described for Alternative A, speed is the major contributing factor to the probability of injury or death in vehicle-only traffic accidents. By reducing speeds on park roads and the parkway, the traffic management measures of Alternative D would have a long-term, moderate to major, beneficial effect in reducing the number and severity of motor-vehicle-only accidents. The reduced speeds that would result from Alternative D would reduce both the number of accidents, and the number and severity of injuries to vehicle occupants. This would reduce the ratio of accidents to the number of visitors, the ratio of injury to non-injury accidents, and the frequency of fatal accidents.

Effects on Pedestrians and Cyclists. Speed is also the primary factor affecting the outcome of collisions between motorized vehicles and pedestrians or cyclists. By slowing traffic speeds, the traffic management measures of Alternative D would have a long-term, moderate to major, beneficial effect in reducing the number and severity of collisions between automobiles and pedestrians or cyclists in the park and along the parkway.

During the mid-workday closures, pedestrians and cyclists would have a continuous trail throughout the park and parkway that would be separated from motor vehicles. This would probably reduce the number of accidents involving automobiles and pedestrians or cyclists compared to Alternative B. However, because of the low number of this type of accident (average of fewer than 10 per year throughout the park and parkway), these effects may not be measurable, based on year-to-year fluctuation in the number of accidents.

Alternative D would have unique safety concerns for visitors who may not be familiar with the concept of reopening Beach Drive each weekday mid-afternoon or may have lost track of time. Rush-hour traffic along narrow stretches that do not have a recreation trail and little or no shoulder may hinder the ability of these visitors to exit the park. This may be of particular concern for visitors with limited mobility and those accompanied by small children. Possible mitigation could include having park staff travel each segment before it reopened and warn nonmotorized recreationists using Beach Drive that the road was about to become a commuter highway. However, this approach would require a commitment of time and would limit the availability of park staff for other activities.

Some accidents involving cyclists, skaters, and/or pedestrians would occur in the segments of Beach Drive that would be closed to vehicular traffic during the mid-day period. Some of the factors that could influence the number and severity of nonmotorized vehicle accidents were described in the Alternative C analysis. For Alternative D, these factors would have a negligible to minor effect on the total number and ratio of accidents in the park and on the parkway.

Commitment of Resources

There would be no irretrievable or irreversible commitment of resources with Alternative D. Any management actions that altered traditional park character and visitor experience could be reversed.

Cumulative Impacts

The Maryland Office of Planning (1993) predicted that demand for bicycling, hiking, and picnicking facilities in the state would increase by 6 to 14 percent between the years 2000 and 2010. Rock Creek Park and the parkway would continue to contribute to the regional mix of recreational opportunities and would be compatible with regional recreational plans. During the middle part of weekdays, on weekends, and on holidays, Alternative D would provide a bicycling route through Rock Creek Park that would be relatively free from interference by automobiles and would provide an effective connection with regional bicycle trails.

Conclusions

The traditional character of the park would be maintained under Alternative D. There would be moderate to major improvements in visitors' safety compared to Alternative B, primarily because of the effectiveness of this alternative's traffic-calming measures. Mid-workday closures of portions of Beach Drive would have a negligible to minor effect on safety, but would improve nonmotorized recreationists' esthetic enjoyment and would provide a more relaxing experience for pedestrians and cyclists. It would also maintain the traditional activity of driving the length of the park during commuting periods, evenings, and nights. Improvements to visitor and administration/operations facilities would enhance educational and interpretive experiences and options. There would be no impairment of resources or values associated with traditional park character and visitor experience.

IMPACTS ON REGIONAL AND LOCAL TRANSPORTATION

Analysis

Morning and Evening Rush-Hour Traffic. Alternative D was developed in response to a letter from the mayor of Washington, D.C. The mayor asked the National Park Service to consider "weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush-hour periods." As a result, Alternative D was designed so that all of its management actions that would change traffic volumes or patterns would be applied only during periods outside of rush hours.

Alternative D would incorporate the same types of traffic-calming measures as Alternative A. As described in the transportation analysis for Alternative A, these measures would reduce vehicle speeds through the park but would cause relatively few vehicles to re-route. Most of the traffic

volume changes in the park and nearby roads that were summarized in table 19 and table 22 would result from Alternative A's high-occupancy vehicle (HOV) requirements on Beach Drive during rush-hour periods. As explained previously, Alternative D was designed to conform with the mayor's request to continue current rush-hour traffic patterns. As a result, it does not include HOV requirements and, therefore, would not produce the traffic shifts that would occur with Alternative A.

Because of these conditions, Alternative D would have negligible traffic differences from Alternative B during weekday peak-travel periods. Alternative D would have same levels of service summarized for Alternative B in table 19 and table 22. The entire length of Beach Drive and all of the east-west connecting routes through the park would continue to be available to the driving public during the typical weekday commuting times.

Weekday Non-Rush-Hour Traffic. East-west flow of traffic through the park would not be affected by the mid-day road closures proposed in Alternative D. The traffic impacts primarily would be associated with the north-south traffic flow that, under Alternative B, would use Beach Drive and the parkway during the non-peak hours of weekdays.

Changes in the year 2020 are quantified in table 28 for the weekday, off-peak, maximum-hour, traffic volume. The values in the table were estimated using the projected 2020 average weekday traffic volume for each road segment for Alternative B and factoring it to represent the maximum off-peak hour. According to traffic count data, the maximum off-peak hour of the day occurs between 10:00 A.M. and 11:00 A.M. and accounts for approximately 8.3 percent of the weekday total traffic volume.

TABLE 28: MAXIMUM HOURLY VOLUME OF TRAFFIC THAT WOULD BE DIVERTED BY ALTERNATIVE D ROAD CLOSURES BY ROAD SEGMENT IN THE YEAR 2020

Road Segment	Alternative B Maximum Hourly Volume between 9:30 A.M. and 3:30 P.M.	Maximum Estimated Hourly Traffic that Would Use Another Route under Alternative D
Beach Drive – Maryland Line to West Beach Drive	1,150 vehicles	1,150 vehicles
Beach Drive – Wise Road to Joyce Road	1,400 vehicles	1,400 vehicles
Beach Drive – Joyce Road to Broad Branch Road	970 vehicles	970 vehicles
Beach Drive – Broad Branch Road to Parkway	3,000 vehicles	750 vehicles
Parkway – Beach Drive to P Street	6,500 vehicles	650 vehicles
Parkway – P Street to Constitution Avenue	6,250 vehicles	625 vehicles

On non-holiday weekdays between 9:30 A.M. and 3:30 P.M., Alternative D would eliminate all motorized traffic on the closed sections of Beach Drive in the northern part of the park. This traffic would reroute itself to other north-south corridors.

About 25 percent of the traffic that would use Beach Drive between Broad Branch Road and the north end of the parkway under Alternative B would choose another route during the closure period of Alternative D.

Closure of the north end of Beach Drive would cause as much as 10 percent of the Alternative B traffic on the Rock Creek and Potomac Parkway to choose another route.

Table 29 shows the likely selection of alternate routes by diverted traffic. The most likely corridors would include 16th Street NW, Georgia Avenue, Connecticut Avenue, Wisconsin Avenue, Broad Branch Road, and Oregon Avenue.

TABLE 29: TRAFFIC IMPACT SUMMARY FOR ALTERNATIVE D IN THE YEAR 2020

Alternate Route	Maximum Non-Peak Hourly Traffic Increase	Estimated Traffic Impact
Connecticut Avenue north of Tilden	500 vehicles	Would result in a perceptible increase in traffic. Would increase traffic congestion at several intersections. Would not cause any intersections to fail.
Wisconsin Avenue north of Massachusetts Ave.	140 vehicles	No noticeable impact.
16th Street NW north of Blagden	560 vehicles	Would result in a minor increase in traffic. Would not cause any intersections to fail.
Georgia Avenue	140 vehicles	No noticeable impact.
Broad Branch Road	500 vehicles	Would result in a minor increase in traffic. Would not cause any intersections to fail. Would increase traffic related noise.
Oregon Avenue	140 vehicles	Would result in a minor increase in traffic.
Blagden Avenue	500 vehicles	Would result in a minor increase in traffic. Would not cause any intersections to fail. Would increase traffic related noise.
Porter Street	250 vehicles	Would result in a minor increase in traffic.
Piney Branch	250 vehicles	Would result in a minor increase in traffic.

On all of these routes, mid-day closure of Beach Drive would increase traffic volumes by fewer than 10 vehicles per minute. On the roadways where traffic increased by two or three vehicles per minute, this change probably would not be noticeable. Little effect also would occur on high-capacity streets such as Connecticut Avenue, which routinely handles more than 50 vehicles per minute during rush hours. The most obvious changes would occur on Broad Branch Road and Blagden Avenue, where the mid-day traffic volumes would more than double. However, on both of these streets, this doubling would represent only about eight vehicles per minute (four in each direction).

During weekday non-peak hours, the roads shown in table 29 and most other north-south corridors in the vicinity of the park and parkway would be operating well below their capacities. Therefore, none of the routes onto which traffic would divert would experience a change in the level of service (LOS) compared to Alternative B, as defined in the “Methodology” section for

“Impacts on Regional and Local Transportation.” Little if any of rerouted traffic would use local neighborhood streets.

Increased traffic outside of the park would increase noise and decrease the safety of pedestrians and cyclists using the alternate routes. However, traffic volumes would be lower than the volumes typically handled by these roads during rush-hour periods. The estimated traffic increase would not cause any of the intersections on these routes to fail.

Some localized, minor traffic effects could occur shortly before 3:30 P.M. if drivers blocked a traffic lane or pulled their vehicles to the side of the road and waited at the closure points for Beach Drive to open. This could be mitigated by creating and enforcing “no waiting” zones in areas where this activity would create a safety hazard.

As discussed in the “Impacts on Traditional Park Character and Visitor Experience” section, Alternative D would require increased U.S. Park Police resources to implement the road closures. The road closures also would require some modifications to maintenance and law enforcement practices in the northern portion of the park.

Alternative D would include traffic-calming measures such as speed humps, raised intersections, and four-way stop control at selected intersections. Some of these traffic-calming measures may create minor traffic congestion within its local vicinity. These measures would help reduce speeding along Beach Drive. They also would help to regulate the bicycle speeds during times when the road was closed to motorized vehicle traffic.

Nonmotorized Travel. During mid-weekday closures, motor-vehicle-related safety problems on the closed sections of Beach Drive would be eliminated. The closed portions of Beach Drive would be available for recreational uses by park visitors, creating a corridor for such activities as bicycling, skating, walking, and jogging. The availability of this corridor would likely encourage some people to use bicycles and other nonmotorized modes for commuting and other purposes, which would slightly reduce motor vehicle travel on other park roads and on other routes in the area.

Speed-related problems would be anticipated from some bicyclists and skaters. Some individuals or groups would use the corridor for high-speed travel that would endanger walkers, joggers, and other park users who travel at slower speeds. Cyclists who ran stop signs and refused to yield to pedestrians using crosswalks would also create safety hazards. These problems currently occur during the weekend road closures and probably would worsen during weekday closures when recreational use was lighter and a greater proportion of cyclists were using the corridor as a commuting route or, possibly, a training route or race track.

Cumulative Impacts

Regional growth in the counties around the District of Columbia, especially to the north in Montgomery County, Maryland, is the primary reason for the projected increases in traffic volumes around the park. No matter which action is taken in Rock Creek Park or on the parkway, traffic in the region is expected to increase by at least 70 percent above 1990 levels by the year 2020 (Metropolitan Washington Council of Governments 1998). Growth-induced increases in traffic would have a detrimental impact on traffic on all of the roads in the area with or without Alternative D.

During the middle portion of each weekday, Alternative D would provide an almost automobile-free corridor for bicyclist and pedestrians from the Maryland state line to the core of the city. However, because it would not be automobile-free during rush hours, it would do little to encourage people who worked during traditional office hours to commute by nonmotorized modes such as bicycles.

Conclusions

Alternative D would have little effect on rush-hour traffic volumes or patterns compared to Alternative B. However, on non-holiday weekdays between 9:30 A.M. and 3:30 P.M., Alternative D would eliminate all motorized traffic on the closed sections of Beach Drive in the northern part of the park, and would reduce traffic on other park roads. This would provide an almost automobile-free corridor for bicyclist and pedestrians from the Maryland state line to the core of the city. During this non-peak period, traffic diverted from the park would be noticeable on some of the alternate routes motorists would choose, but would not adversely affect the level of service on any roads.

The availability of this corridor would likely encourage some people to use bicycles and other nonmotorized travel modes, which would reduce motor vehicle travel on other park roads and on other routes in the area. Problems would be anticipated from some bicyclists and skaters who would run stop signs, travel at excessive speeds, and refuse to yield to pedestrians. There would be no impairment of resources or values associated with regional and local transportation.

IMPACTS ON COMMUNITY CHARACTER

As described in the “Methodology” section under Alternative A, changes in community character were assumed to be related to changes in traffic management during peak-travel periods (rush-hours). Alternative D was designed so that all of its management actions that would change traffic volumes or patterns would be applied only during periods outside of rush hours. Therefore, the impacts of Alternative D on community character would be identical to those described for Alternative B.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

The Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Actions associated with Alternative D would be consistent with a long-term management strategy for ensuring natural, archeological, and historic resources and improving park visitor experiences.

The closure of portions of Beach Drive to automobiles during the middle portion of weekdays, and the implementation of traffic-calming measures elsewhere in the park, would inconvenience some motorists who use park roads during this period. However, this inconvenience would be offset by an improved weekday visitor experience that was more compatible with the character of the park.

Other relationships between local short-term uses of the environment and the maintenance and enhancement of long-term productivity would be identical to those described in Alternative A.

Any Irreversible or Irretrievable Commitments of Resources that Would Be Involved Should the Alternative Be Implemented

The irreversible or irretrievable commitments of resources under Alternative D would be identical to those described for Alternative A.

Any Adverse Impacts that Cannot Be Avoided Should the Action Be Implemented

Alternative D would result in steadily increasing traffic volumes on park roads during rush hours, with deteriorating levels of service on Beach Drive and the Rock Creek and Potomac Parkway. Conflicts and safety problems among nonmotorized travelers and automobile users during rush hours would likely increase on park roads. Visitors' esthetic and recreational enjoyment of the park also would decline during these periods because of high traffic volumes.

CONSULTATION AND COORDINATION

HISTORY OF PUBLIC INVOLVEMENT

A notice of intent to prepare a general management plan and environmental impact statement was published on July 18, 1996, in the *Federal Register* (volume 61, number 139, page 37494). At that time, a press release was distributed to local media, and newsletter 1 was published and distributed to the park mailing list. The newsletter contained information on the function of a general management plan, draft statements of the park purpose and significance, information on the planning team and the process for planning, and methods available to the public for communicating with the team and participating in the planning effort.

A public scoping meeting was held July 24, 1996, in the auditorium at the National Zoo. About 100 people attended and 35 spoke.

Based on discussions at the scoping meeting, the planning team hosted two focus group meetings at the Rock Creek Nature Center and Planetarium. One was on September 17, 1996, with representatives of three area bicycling organizations. The second was on September 18 with representatives of seven environmental organizations. In October 1996, members of the planning team attended a presentation on the history of planning and design for Rock Creek Park hosted by the Committee of 100 for the Capital City, an organization of professional planners and designers in Washington, D.C.

During early scoping, the superintendent and park staff met with District of Columbia congressional representatives Norton and Morella, the Mayor's Office, and 15 Advisory Neighborhood Commissions (ANC) to inform them of the planning project and to discuss their concerns for the future of the park.

Focus group meetings were held on October 22, 1996, at the Metropolitan Washington Council of Governments headquarters with representatives of regional transportation and air quality agencies. A second set of meetings was held on February 2, 1997, with air quality and transportation agencies. The purposes of the meetings were to inform the agencies of the planning effort, inquire about sources of information pertinent to planning, share public scoping comments received to date, and discuss the insights and concerns of the agencies regarding their fields of expertise and potential environmental effects.

Public comments received during early scoping tended to focus on management of traffic through the park and the idea of returning the park to more natural conditions. In response, the NPS planning team prepared a range of four "preliminary alternative scenarios," characterizing four potential management directions for the park for public comment. The scenarios ranged from continuing current management to extensive closures of roads and removal of recreation facilities to return the park to a more wilderness-like state. The scenarios were published in newsletter 3, which also included a postage-free response form. The newsletter was distributed to about 1,500 agencies, organizations, and individuals; area libraries; and internet (<http://www.nps.gov/rocr/gmpnewsletter3>).

Public open house meetings were held in conjunction with newsletter 3 at the Rock Creek Nature Center and Planetarium on June 25 and June 28, 1997. About 800 people attended the open houses. Planning team members and other park staff hosted the open house meetings to talk directly with people about the planning project and to hear their ideas and concerns. Comments were recorded on response forms, flip charts, and through interviews. A court reporter was provided at the open houses.

Approximately 1,000 comments on the preliminary alternative scenarios were received during the official review period that ended August 1, 1997. The range of comments was summarized in newsletter 4 (<http://www.nps.gov/rocr/gmpnewsletter4>) published in January 1998. Public views varied widely about the management of park roads, but there was nearly universal opposition to closing the community gardens, the public horse stables, and the golf course in the park.

After the official review period ended, additional letters, email, and post cards were received. The large majority of these supported “Alternative 2½,” a recommendation developed by a new coalition of organizations entitled People’s Alliance for Rock Creek (see Alternative C in this document).

Newsletter 5 was published in June 1998 to inform the public of a schedule extension for producing the plan. The newsletter also announced that new alternatives were being developed that did not include closing traditional recreation facilities. The recent discovery in the park of a federally endangered amphipod was also announced.

In November 1998, a letter was sent to everyone on the mailing list announcing an indefinite delay in the production of the draft general management plan and environmental impact statement. The delay was caused by a congressionally directed reorganization and downsizing of NPS planning, design, and construction programs and personnel.

In January 2001, the mayor of Washington, D.C. sent a letter to the National Park Service suggesting that a new alternative be developed to implement weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush hour periods. A copy of this letter is included in appendix D. As described in the “Formulation of Alternatives” section, this led to the development of Alternative D, Mid-Weekday Recreation Enhancement.

///Jan Snyder note: Delete next paragraph and add “Next Steps”?

Work on the plan was restarted in early 2001. This document, *Rock Creek Park/Rock Creek and Potomac Parkway General Management Plan/Environmental Impact Statement*, is on review for 90 days following publication of notification in the *Federal Register*. This review period will include open houses to obtain public comments and concerns. Comments can also be made in writing to the street address or e-mail address provided on the inside front cover. A final general management plan and environmental impact statement will then be prepared and a record of decision will be issued.

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Accokeek Foundation	Law Offices	Washington DC, Inc.
Adler & Robin Books, Inc.	Carter Barron Community	D.C Historic Preservation
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American Rivers	Chesapeake Bay Program	D.C. Dept. of Recreation
Arnold & Porter	Office, NPS	Office of Planning &
Art Barn Association	Chevy Chase Citizens	Policy
Audubon Naturalist Society	Assoc.	D.C. Engineering Ser-
Audubon Naturalist Society	Chronicle of Higher Educa-	vices.
of Central Atlantic States	tion, The	D.C. Natural Heritage
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Boy Scouts of America (80)	Board	D.C., Dept of Planning

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DC Dept. of Public Works, OPP	Izaak Walton League of America	NASA Goddard Space- flight Center
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Exotic Pest Plant Council	Mamie D. Lee Garden Association	National Trust for Historic Preservation
Federal Highway Administra- tion	Maryland Dept. of Natural Resources	National Wildlife Federa- tion
Fillmore Art Center	Maryland Native Plant Soci- ety	National Zoological Park
Fine Arts Commission	MD Dept. of Housing & Comm. Dev., MD Hist. Trust	Nature Conservancy, The
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Fort Stevens Garden Associa- tion	MD Dept. of Transportation	New Columbia Coalition, MD Native Plant Soci- ety
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Friends of Peirce Mill	MD. National Capital Park & Planning Comm.	NOVA Lighting Co., Inc.
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Glover Park Citizens' Assoc., Inc.	Montgomery County Parks- Eastern Area	Rivendell Assoc.
Golf Course Specialists Inc. E. Potomac Park	Montgomery Cty. Dept. of Env. Protection	Robert & Quigg Attorneys & Counselors
Green Peace	Montgomery Cty. Dept. of Park & Planning	Rock Creek Garden Assoc.
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Honorable Constance Mo- rella		Sierra Club Legal Defense Fund
Honorable Eleanor Holmes Norton		State Resource Strategies Committee of 100
Humane Society of D.C.		Temple Shalom
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Trail Riders of Tomorrow
(TROT) - 50
U.S. Naval Observatory
U.S. Secret Service
University of the D.C., Water
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US Environmental Protection
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(NRCS)
USGS, Biological Res. Div.

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Whitehaven Garden
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EMBASSIES

Embassy of Algeria
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Embassy of Burkina Faso
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Embassy of Guyana
Embassy of Haiti
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Embassy of Kenya
Embassy of Kuwait
Embassy of Latvia
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Embassy of Rwanda
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Embassy of South Africa
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Embassy of Sri Lanka
Embassy of Sudan
Embassy of Sweden
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Embassy of Tanzania
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Embassy of Dominican
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Federated States of
Micronesia
Embassy of The Gambia
Islamic Republic of
Mauritania
Embassy of Kingdom of
Swaziland
Lao People's Dem. Repub-
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Embassy of The Nether-
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Peoples Republic of
Mozambique
Embassy of The Philip-
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Embassy of Republic of
Benin
Embassy of Republic of
Cameroon

Embassy Republic of Cape Verde
Embassy Republic of Hungary
Embassy of Republic of Mali

Embassy of Republic of Namibia
Embassy of Russian Federation
Embassy of State of Bahrain
Embassy of Togo

Embassy of Tunisia
Embassy of Turkey
Embassy of Uruguay
Embassy of Venezuela
Embassy of Zimbabwe

LIBRARIES

Chevy Chase Library
Cleveland Park Library
Georgetown Library
Juanita E. Thornton-Shepherd Park Library
Langston Community Library

Library of Congress
Martin Luther King, Jr. Memorial Library
Mt. Pleasant Library
Northeast Library
Petworth Library

Tenley-Friendship Library
Watha T. Daniel/Shaw Library
Woodridge Library

SCHOOLS

Adams Elementary School
Annuciation School
Bancroft Elementary School
Banneker Senior High School
Barnard Elementary School
Bell Multicultural High School
Blessed Sacrament School
Brightwood Elementary School
Bruce-Monroe Elementary School
Capitol Hill Day School
Cardozo Elementary School
Clark Elementary School
Clayton Singleton, Principal
Cook J.F. Elementary School
Cooke, H.D. Elementary School
Coolidge Community School
Coolidge Elementary School
Deal Junior High School
Discovery Creek Children's Museum of Washington
Dunbar Elementary School
Eaton Elementary School
Edmond Burke School
Edmund Burke School
Ellington School of the Arts
Env. Awareness Group, Nat'l Cathedral School
Francis Junior High School

Gage-Eckington Elementary School
Garnet-Patterson Middle School
Georgetown Day School
Georgetown Univ. Law Ctr./Inst. for Public Rep.
Georgetown Visitation Preparation School G
Gonzaga College High School
Hardy Middle School
Holton Arms School
Holy Redeemer School
House of Rep. Page School
Hurst Elementary School
Hyde Elementary School
Sr. Donna Marie Coward, RSM
Janney Elementary School
Key Elementary School
Lafayette Elementary School
Lewis Elementary School
Lincoln Junior High School
Lowell School
MacFarland Junior High School
Mann Elementary School
Maret School
Meyer Elementary School
Montgomery Elementary School
Murch Elementary School

Nannie Helen Burroughs School
National Cathedral School
National Presbyterian School
Nativity Catholic Academy
Nat'l. Cathedral Elem. School/Beauvoir
Northwestern University
Our Lady of Victory School
Oyster Elementary School
Park View Elementary School
Parkmont School
Paul Junior High School
Powell Elementary School
Rabaut Junior High School
Raymond Elementary School
Reed Community School
Reed L.C. Elementary School
Roosevelt Adult Ed. Ctr.
Roosevelt Elementary School
Ross Elementary School
Rudolph Elementary School
Sacred Heart School
School Without Walls
Seaton Elementary School

Sharpe Health School	Stevens Elementary School	Walker-Jones Elementary School
Shaw Community School	Stoddert Elementary School	Washington Ethical High School
Shaw Junior High School	Takoma Community School	Washington International School
Shepherd Elementary School	Takoma Elementary School	Washington International School
Sheridan School	Terrell, R.H. Junior High School	Washington International School
Sidwell Friends School	The Field School	Washington International School
Sidwell Friends School	The Kingsbury Day School	Washington M.M. Elementary School
Slater-Langston Elementary School	The Lab School of Washington	West Elementary School
St. Ann's Academy	Thompson Elementary School	Whittier Elementary School
St. Augustine School	Truesdell Elementary School	Wilson W. Elementary School
St. Gabriel's School	Tubman Elementary School	
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St. John's Collee Middle School		

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APPENDIX A: LEGISLATION

THE ROCK CREEK PARK AUTHORIZATION

FIFTY-FIRST CONGRESS. SESS. I. CH. 1001. 1890.

September 27, 1890.	CHAP. 1001. —An act authorizing the establishing of a public park in the District of Columbia.
District of Columbia.	<i>Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,</i> That a tract of land
Rock Creek Park established.	lying on both sides of Rock Creek, beginning at Klinge Ford Bridge, and running northwardly, following the course of said creek, of a
Location.	width not less at any point than six hundred feet, nor more than
Description.	twelve hundred feet, including the bed of the creek, of which not less than two hundred feet shall be on either side of said creek, south of
	Broad Branch road and Blagden Mill road and of such greater width north of said roads as the commissioners designated in this act may
Dedication.	select, shall be secured, as hereinafter set out, and be perpetually
Proviso.	dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States, to be known by the name of Rock Creek Park: <i>Provided, however,</i> That the
Maximum size and cost.	whole tract so to be selected and condemned under the provisions of this act shall not exceed two thousand acres nor the total cost thereof
Commission to be appointed.	exceed the amount of money herein appropriated.
	SEC. 2. That the Chief of Engineers of the United States Army, the Engineer Commissioner of the District of Columbia, and three
Duties.	citizens to be appointed by the President, by and with the advice and consent of the Senate, be, and they are hereby, created a commission
Executive officer.	to select the land for said park, of the quantity and within the limits aforesaid, and to have the same surveyed by the assistant to the said Engineer Commissioner of the District of Columbia in charge of
	public highways, which said assistant shall also act as executive officer to the said commission.
	SEC. 3. That the said commission shall cause to be made an accurate map of said Rock Creek Park, showing the location, quantity, and character of each parcel of private property to be taken for such
Map to be filed.	purpose, with the names of the respective owners inscribed thereon, which map shall be filed and recorded in the public records of the
Condemnation.	District of Columbia, and from and after the date of filing said map the several tracts and parcels of land embraced in said Rock Creek
Title.	Park shall be held as condemned for public uses, and the title thereof vested in the United States, subject to the payment of just compensation,
Compensation.	to be determined by said commission, and approved by the President of the United States: <i>Provided,</i> That such compensation
Proviso.	be accepted by the owner or owners of the several parcels of land.
Acceptance by owners.	That if the said commission shall be unable by agreement with the respective owners to purchase all of the land so selected and
Failure to agree.	condemned within thirty days after such condemnation, at the price approved by the President of the United States, it shall, at the expiration of such period of thirty days, make application to the supreme
Judicial procedure.	court of the District of Columbia, by petition, at a general or special term, for an assessment of the value of such land as it has been
Application for assessment.	unable to purchase.
Petition and map.	Said petition shall contain a particular description of the property selected and condemned, with the name of the owner or owners
	thereof, if known, and their residences, as far as the same may be ascertained, together with a copy of the recorded map of the park;
Notification.	and the said court is hereby authorized and required, upon such application, without delay, to notify the owners and occupants of the
	land, if known, by personal service, and if unknown, by service by publication, and to ascertain and assess the value of the land so
Appraisal commission.	selected and condemned, by appointing three competent and disinterested commissioners to appraise the value or values thereof, and
Ascertainment of value.	to return the appraisement to the court; and when the value or values of such land are thus ascertained, and the President of the
Payment.	United States shall decide the same to be reasonable, said value or values shall be paid to the owner or owners, and the United States
Title.	shall be deemed to have a valid title to said land; and if in any case

the owner or owners of any portion of said land shall refuse or neglect, after the appraisalment of the cash value of said lands and improvements, to demand or receive the same from said court, upon depositing the appraised value in said court to the credit of such owner or owners, respectively, the fee-simple shall in like manner be vested in the United States.

SEC. 4. That said court may direct the time and manner in which possession of the property condemned shall be taken or delivered, and may, if necessary, enforce any order or issue any process for giving possession.

SEC. 5. That no delay in making an assessment of compensation, or in taking possession, shall be occasioned by any doubt which may arise as to the ownership of the property, or any part thereof, or as to the interests of the respective owners. In such cases the court shall require a deposit of the money allowed as compensation for the whole property or the part in dispute. In all cases as soon as the said commission shall have paid the compensation assessed, or secured its payment by a deposit of money under the order of the court, possession of the property may be taken. All proceedings hereunder shall be in the name of the United States of America and managed by the commission.

SEC. 6. That the commission having ascertained the cost of the land, including expenses, shall assess such proportion of such cost and expenses upon the lands, lots, and blocks situated in the District of Columbia specially benefited by reason of the location and improvement of said park, as nearly as may be, in proportion to the benefits resulting to such real estate.

If said commission shall find that the real estate in said District directly benefited by reason of the location of the park is not benefited to the full extent of the estimated cost and expenses, then they shall assess each tract or parcel of land specially benefited to the extent of such benefits as they shall deem the said real estate specially benefited. The commission shall give at least ten days' notice, in one daily newspaper published in the city of Washington, of the time and place of their meeting for the purpose of making such assessment and may adjourn from time to time till the same be completed. In making the assessment the real estate benefited shall be assessed by the description as appears of record in the District on the day of the first meeting; but no error in description shall vitiate the assessment: *Provided*, That the premises are described with substantial accuracy. The commission shall estimate the value of the different parcels of real estate benefited as aforesaid and the amount assessed against each tract or parcel, and enter all in an assessment book. All persons interested may appear and be heard. When the assessment shall be completed it shall be signed by the commission, or a majority (which majority shall have power always to act), and be filed in the office of the clerk of the supreme court of the District of Columbia. The commission shall apply to the court for a confirmation of said assessment, giving at least ten days' notice of the time thereof by publication in one daily newspaper published in the city of Washington, which notice shall state in general terms the subject and the object of the application.

The said court shall have power, after said notice shall have been duly given, to hear and determine all matters connected with said assessment; and may revise, correct, amend, and confirm said assessment, in whole or in part, or order a new assessment, in whole or in part, with or without further notice or on such notice as it shall prescribe; but no order for a new assessment in part, or any partial adverse action, shall hinder or delay confirmation of the residue, or collection of the assessment thereon. Confirmation of any part of the assessment shall make the same a lien on the real estate assessed.

Possession.
Process.

No delay in assessment, etc.

Disputed claims.

Possession.

Proceedings.

Proportionate assessment of cost, etc., on benefited lands.

Notice by publication.

Adjournments of commission.

Record description.

Errors.

Provided.

Substantial accuracy.

Entries in assessment book.
Hearings.
Commission to file assessment.

Application for confirmation.

Notice.

Powers of court in determining, etc.

Confirmation.

Lien.

Payment of assessment by installments, etc.	The assessment, when confirmed, shall be divided into four equal installments, and may be paid by any party interested in full or in one, two, three, and four years, on or before which times all shall be payable, with six per centum annual interest on all deferred payments. All payments shall be made to the Treasurer of the United States, who shall keep the account as a separate fund. The orders of the court shall be conclusive evidence of the regularity of all previous proceedings necessary to the validity thereof, and of all matters recited in said orders. The clerk of said court shall keep a record of all proceedings in regard to said assessment and confirmation. The commission shall furnish the said clerk with a duplicate of its assessment book, and in both shall be entered any change made or ordered by the court as to any real estate. Such book filed with the clerk when completed and certified shall be prima facie evidence of all facts recited therein. In case assessments are not paid as aforesaid the book of assessments certified by the clerk of the court shall be delivered to the officer charged by law with the duty of collecting delinquent taxes in the District of Columbia, who shall proceed to collect the same as delinquent real estate taxes are collected. No sale for any installment of assessment shall discharge the real estate from any subsequent installment; and proceedings for subsequent installments shall be as if no default had been made in prior ones.
Interest.	
Separate Treasury fund.	
Validity of proceedings.	
Court record.	
Duplicate assessment book to be filed.	
Evidence of recited facts.	
Delinquent assessments.	
Collection.	
Payment of compensation by Treasurer.	All money so collected may be paid by the Treasurer on the order of the commission to any persons entitled thereto as compensation for land or services. Such order on the Treasurer shall be signed by a majority of the commission and shall specify fully the purpose for which it is drawn. If the proceeds of assessment exceed the cost of the park the excess shall be used in its improvement, under the direction of the officers named in section eight, if such excess shall not exceed the amount of ten thousand dollars. If it shall exceed that amount that part above ten thousand dollars shall be refunded ratably. Public officers performing any duty hereunder shall be allowed such fees and compensation as they would be entitled to in like cases of collecting taxes. The civilian members of the commission shall be allowed ten dollars per day each for each day of actual service. Deeds made to purchasers at sales for delinquent assessments hereunder shall be prima facie evidence of the right of the purchaser, and any one claiming under him, that the real estate was subject to assessment and directly benefited, and that the assessment was regularly made; that the assessment was not paid; that due advertisement had been made; that the grantee in the deed was the purchaser or assignee of the purchaser, and that the sale was conducted legally.
Commission orders.	
Proceeds in excess of cost.	
Compensation of public officers.	
Compensation of civilian commissioners.	
Delinquent assessment sale deeds.	
Evidence of.	
Judgment of sale.	Any judgment for the sale of any real estate for unpaid assessments shall be conclusive evidence of its regularity and validity in all collateral proceedings except when the assessment was actually paid, and the judgment shall estop all persons from raising any objection thereto, or to any sale or deed based thereon, which existed at the date of its rendition, and could have been presented as a defense to the application for such judgment.
Estoppel, etc.	
Appropriation. For total cost, etc.	To pay the expenses of inquiry, survey, assessment, cost of lands taken, and all other necessary expenses incidental thereto, the sum of one million two hundred thousand dollars, or so much thereof as may be necessary, is hereby appropriated out of any money in the Treasury not otherwise appropriated: <i>Provided</i> , That one-half of said sum of one million two hundred thousand dollars, or so much thereof as may be expended, shall be re-imbursed to the Treasury of the United States out of the revenues of the District of Columbia, in four equal annual installments, with interest at the rate of three per centum per annum upon the deferred payments: <i>And provided further</i> , That one-half of the sum which shall be annually appropriated and expended for the maintenance and improvement of said
<i>Proviso.</i> Half from the District revenues.	
Reimbursed in installments.	
Interest.	
Maintenance, etc. Half from District revenues.	

lands as a public park shall be charged against and paid out of the revenues of the District of Columbia, in the manner now provided by law in respect to other appropriations for the District of Columbia, and the other half shall be appropriated out of the Treasury of the United States.

SEC. 7. That the public park authorized and established by this act shall be under the joint control of the Commissioners of the District of Columbia and the Chief of Engineers of the United States Army, whose duty it shall be, as soon as practicable, to lay out and prepare roadways and bridle paths, to be used for driving and for horseback riding, respectively, and footways for pedestrians; and whose duty it shall also be to make and publish such regulations as they deem necessary or proper for the care and management of the same. Such regulations shall provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible.

Control, etc., of park.

Regulations, etc.

Approved, September 27, 1890.

THE ROCK CREEK AND POTOMAC PARKWAY AUTHORIZATION

(From the Public Buildings Act of March 4, 1913)

SEC. 22. That for the purpose of preventing the pollution and obstruction of Rock Creek and of connecting Potomac Park with the Zoological Park and Rock Creek Park, a commission, to be composed of the Secretary of the Treasury, the Secretary of War, and the Secretary of Agriculture, is hereby authorized and directed to acquire, by purchase, condemnation, or otherwise, such land and premises as are not now the property of the United States in the District of Columbia shown on the map on file in the office of the Engineer Commissioner of the District of Columbia, dated May seventeenth, nineteen hundred and eleven, and lying on both sides of Rock Creek, including such portion of the creek bed as may be in private ownership, between the Zoological Park and Potomac Park; and the sum of \$1,300,000 is hereby authorized to be expended toward the requirement of such land. That all lands now belonging to the United States or to the District of Columbia lying within the exterior boundaries of the land to be acquired by this act as shown and designated on said map are hereby appropriated to and made a part of the parkway herein authorized to be acquired. One-half of the cost of the said lands shall be reimbursed to the Treasury of the United States out of the revenues of the District of Columbia in eight equal annual installments, with interest at the rate of three per centum per annum upon the deferred payments. That should the commission decide to institute condemnation proceedings in order to secure any or all of the land herein authorized to be acquired, such proceedings shall be in accordance with the provisions of the act of Congress approved August thirtieth, eighteen hundred and ninety, providing a site for the enlargement of the Government Printing Office (United States Statutes at Large, volume twenty-six, chapter eight hundred and thirty-seven).

Washington, D. C.
Commission to acquire land adjoining Rock Creek to connect Zoological and Potomac Parks.

Amount authorized.

Public lands added.

One-half of cost from District revenue, in installments.

Condemnation proceedings.

Vol. 26, p. 412.

APPENDIX B: LAWS AND EXECUTIVE ORDERS

Laws and executive orders that apply to the management of Rock Creek Park and the Rock Creek and Potomac Parkway are provided below.

NATIONAL PARK SERVICE ENABLING LEGISLATION

Act of August 25, 1916 (National Park Service Organic Act), Public Law (P.L.) 64-235, 16 United States Code (U.S.C.) Section (§)1 *et sequens (et seq.* (and the following ones)) as amended

Reorganization Act of March 3, 1933, 47 Statute (Stat.) 1517

General Authorities Act, October 7, 1976, P.L. 94-458, 90 Stat. 1939, 16 U.S.C. §1a-1 *et seq.*

Act amending the Act of October 2, 1968 (commonly called Redwoods Act), March 27, 1978, P.L. 95-250, 92 Stat. 163, 16 U.S.C. Subsection(s) (§§) 1a-1, 79a-q

National Parks and Recreation Act, November 10, 1978, P.L. 95-625, 92 Stat. 3467; 16 U.S.C. §1 *et seq.*

OTHER LAWS AFFECTING NPS OPERATIONS

Accessibility

Americans with Disabilities Act, P.L. 101-336, 104 Stat. 327, 42 U.S.C. §12101

Architectural Barriers Act of 1968, P.L. 90-480, 82 Stat. 718, 42 U.S.C. §4151 *et seq.*

Rehabilitation Act of 1973, P.L. 93-112, 87 Stat. 357, 29 U.S.C. §701 *et seq.* as amended by the Rehabilitation Act Amendments of 1974, 88 Stat. 1617

Cultural Resources

American Indian Religious Freedom Act, P.L. 95-341, 92 Stat. 469, 42 U.S.C. §1996

Antiquities Act of 1906, P.L. 59-209, 34 Stat. 225, 16 U.S.C. §432 and 43 Code of Federal Regulations (CFR) 3

Archeological and Historic Preservation Act of 1974, P.L. 93-291, 88 Stat. 174, 16 U.S.C. §469

Archeological Resources Protection Act of 1979, P.L. 96-95, 93 Stat. 712, 16 U.S.C. §470aa *et seq.* and 43 CFR 7, subparts A and B, 36 CFR 79

National Historic Preservation Act as amended, P.L. 89-665, 80 Stat. 915, 16 U.S.C. §470 *et seq.* and 36 CFR 18, 60, 61, 63, 68, 79, 800

Protection of Historic and Cultural Properties, Executive Order (E.O.) 11593; 36 CFR 60, 61, 63, 800; 44 Federal Register (FR) 6068

Public Buildings Cooperative Use Act of 1976, P.L. 94-541, 90 Stat. 2505, 42 U.S.C. §4151-4156

Natural Resources

Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act, Environmental Statement Memorandum (E.S.) 80-3, 08/11/80, 45 FR 59109

Clean Air Act as amended, P.L. Chapter 360, 69 Stat. 322, 42 U.S.C. §7401 *et seq.*

Coastal Zone Management Act of 1972 as amended, P.L. 92-583, 86 Stat. 1280, 16 U.S.C. §1451 *et seq.*

Endangered Species Act of 1973, as amended, P.L. 93-205, 87 Stat. 884, 16 U.S.C. §1531 *et seq.*

Executive Order 11988: Floodplain Management, 42 FR 26951, 3 CFR 121 (Supplement (Supp) 177)

Executive Order 11990: Protection of Wetlands, 42 FR 26961, 3 CFR 121 (Supp 177)

Executive Order 11991: Protection and Enhancement of Environmental Quality

Federal Insecticide, Fungicide, and Rodenticide Act, P.L. 92-516, 86 Stat. 973, 7 U.S.C. §136 *et seq.*

Federal Water Pollution Control Act (commonly referred to as Clean Water Act), P.L. 92-500, 33 U.S.C. §1251 *et seq.* as amended by the Clean Water Act, P.L. 95-217

Fish and Wildlife Coordination Act of 1958 as amended, P.L. 85-624, 72 Stat. 563, 16 U.S.C. §661 *et seq.*

Manguson Fishery Conservation and Management Act of 1976, P.L. 94-625, 90 Stat. 331m 16 U.S.C. §1801 *et seq.*

Migratory Bird Conservation Act, P.L. Chapter 257, 45 Stat. 1222, 16 U.S.C. §715 *et seq.*

Migratory Bird Treaty Act of 1918, P.L. 186, 40 Stat. 755

National Environmental Policy Act of 1969, P.L. 91-190, 83 Stat. 852, 42 U.S.C. §4321 *et seq.*

National Park System Final Procedures for Implementing E.O. 11988 and 11990 (45 FR 35916 as revised by 47 FR 36718)

Protection and Enhancement of Environmental Quality, E.O. 11514 as amended, 1970, E.O. 11991, 35 FR 4247; 1977, 42 FR 26967)

Resource Conservation and Recovery Act, P.L. 94-580, 30 Stat. 1148, 42 U.S.C. §6901 *et seq.*

Rivers and Harbors Act of 1899, 33 U.S.C. Chapter 425, as amended by P.L. 97-332, October 15, 1982 and P.L. 97-449, 33 U.S.C. §§401-403

Water Resources Planning Act of 1965 (P.L. 89-80, 42 U.S.C. § 1962 *et seq.*) and Water Resource Council's Principles and Standards, 44 FR 723977

Watershed Protection and Flood Prevention Act, P.L. 92-419, 68 Stat. 666, 16 U.S.C. §100186

Other

Administrative Procedures Act, 5 U.S.C. § 551-559, §§701-706

Concessions Policy Act of 1965, P.L. 89-249, 79 Stat. 969, 16 U.S.C. § 20 *et seq.*

Department of Transportation Act of 1966, P.L. 89-670, 80 Stat. 931, 49 U.S.C. § 303

Energy Supply and Environmental Coordination Act of 1974

Executive Order 12003: Energy Policy and Conservation, 3 CFR 134 (Supp 1977), 42 U.S.C. § 2601

Executive Order 12008: Federal Compliance with Pollution Control Standards

Executive Order 12372: Intergovernmental Review of Federal Programs, 47 FR 30959

Forest and Rangeland Renewable Resources Planning Act, P.L. 95-307, 92 Stat. 353, 16 U.S.C. §1600 *et seq.*

Freedom of Information Act, P.L. 93-502, 5 U.S.C. §552 *et seq.*

Intergovernmental Cooperation Act of 1968, P.L. 90-577, 40 U.S.C. §§ 531-535 and 31 U.S.C. §§6501-6508

Intergovernmental Coordination Act of 1969, 42 U.S.C. §§4101, 4231, 4233

Noise Control Act of 1972 as amended, P.L. 92-574, 42 U.S.C. §4901 *et seq.*

Outdoor Recreation Coordination Act of 1963, P.L. 88-29, 77 Stat. 49

Payment in Lieu of Taxes Act, P.L. 94-565, 90 Stat. 2662, 31 U.S.C. §6901 *et seq.*

Surface Transportation Assistance Act of 1982, 96 Stat. 2097, 23 U.S.C. §§101 and many others

Wildfire Disaster Recovery Act, P.L. 101-286

APPENDIX C: RELATIONSHIP OF THE GENERAL MANAGEMENT PLAN TO OTHER PLANNING EFFORTS

OTHER NPS PLANNING EFFORTS

Rock Creek Park: A Report by Olmsted Brothers

The first and only previous comprehensive plan for the park was completed in 1918. The Olmsted Brothers firm, headed by landscape architect Frederick Law Olmsted, jr., was commissioned to prepare a report focusing on development and expansion of the park. The report supports protection of the park's natural values, analyzes the scenery, and includes an approach to divide the park into defined landscape units, based on native vegetation. While the report also proposed a system of park drives and thoroughfares as well as landscape treatments, most of the proposals were never implemented. However the plan provided an eloquent vision and philosophy for the management of the park which continue to guide the park today. The Olmsted report set the tone for the park in the opening sentences, stating:

The dominant consideration, never to be subordinated to any other purpose in dealing with Rock Creek Park, is the permanent preservation of its wonderful natural beauty and the making of that beauty accessible to the people without spoiling the scenery in the process.

This general management plan is intended to build on these early ideals and incorporate the direction of its philosophy, while adjusting for current park needs. For instance, some proposals by the Olmsted brothers were never implemented and are recognized today as designs for an earlier generation, not necessarily applicable for the contemporary needs of the public. Many issues facing the park today are not addressed in the 1918 plan. Nevertheless, this general management plan represents an approach based on the Olmsted philosophy of scenic preservation while integrating appropriate management measures to address the pressures and issues that have and will continue to arise in the park.

Rock Creek Tennis Stadium Management Plan

A separate plan and environmental impact statement was prepared in 1993 to address long-term management of the Rock Creek Park tennis center and associated recreation fields at Brightwood. Because the planning for the area was so recently completed, this Rock Creek Park and Rock Creek and Potomac Parkway general management plan did not revisit issues or propose alternatives related to the tennis stadium.

Park Comprehensive Interpretive Plan

A comprehensive interpretive plan is underway for the park to identify interpretive themes and strategies for interpretive programs. The plan is being prepared in concert with the general management plan and will complement the management direction of the final general management plan.

Civil War Defenses of Washington Management Plan

A separate management plan is being prepared for the Civil War Defenses of Washington, the city's circle of earthworks which includes Fort DeRussy. The long-term management of the fort will be developed in this Rock Creek Park general management plan and coordinated with the Civil War Defenses plan.

Park Studies and Action Plans

Several studies and plans have been completed for the park and are periodically updated. These include the

Historic Resource Study for Rock Creek (1990)

Park Resources Management Plan (draft 1996)

Statement for Management (1985)

Several cultural/historic properties administered by the staff of Rock Creek Park are outside of the geographical area of this general management plan (see "Geographic Area Covered by the General Management Plan"). Management objectives for these properties will continue to be developed on a site-by-site basis. Separate management plans may be developed for these properties at a future date. During 1996-1997, the following major studies were initiated relevant to these cultural/historic properties:

Historic Resource Study for Civil War Defenses of Washington.-This study will document the history of the Civil War forts and related sites that are within the administrative boundaries of Rock Creek Park and within other NPS jurisdictions in the National Capital Region. To be completed in 2002.

Cultural Landscape Report for Meridian Hill Park. Completed in 2001.

Cultural Landscape Report for Dumbarton Oaks Park. Completed in 2001.

Preservation Maintenance Plan for Dumbarton Oaks Park. Completed in 1997.

Other project requests are currently being developed, principal of which is a Historic Structures Report and Preservation Needs Assessment for Battleground National Cemetery.

Rock Creek Park Transportation/Safety Study

A special study of transportation in the park and surrounding streets was prepared as part of the planning process (Robert Peccia & Associates 1997; Robert Peccia & Associates *et al.* 1997). The study documented traffic patterns, examined safety, and measured air pollution and noise. As part of the process to thoroughly investigate traffic-related aspects of the park, a traffic model was developed to forecast traffic conditions in the area. Robert Peccia & Associates, a traffic engineering firm contracted by the park service, adapted and refined the MWCOC regional data to build the Rock Creek Park transportation model for the network of streets and roads around the park.

Traffic modeling was conducted for the alternatives considered in the draft general management plan. The environmental consequences section incorporates the findings of this study.

Implementation Plans

Listed below are plans and studies that would be developed or updated to implement the general management plan. Many of these plans and studies could occur as part of a park-wide resources management plan. This list is not exclusive or complete. It is intended to indicate work yet to occur over the 10 to 15 year life of the general management plan.

- Air quality monitoring plan
- Water resource management plan
- Integrated pest management plan
- Wildlife management plan
- Vegetation management plan
- Fire management plan
- Inventory of vegetation and wildlife
- Park-wide soils survey
- Cultural resource studies
 - Historic structure report, Pierce Mill Barn (Art Barn)
 - Historic structure report, Nature Center
 - Collections management plan for Pierce Mill
 - Cultural landscape report, Pierce Mill area
 - Cultural landscape report, Peirce-Klingling Mansion and the Linnaean Hill area
 - Cultural landscape report, historic trails
 - Design guidelines for Civil War fortifications (called for in the Fort Circle Parks Management Plan)
 - Park-wide archeological overview and assessment

NON-NPS PLANNING EFFORTS

District of Columbia Scenic Byways Program

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) authorized the National Scenic Byways Program. This program recognizes roads passing through corridors that are of great interest because they are "representative, unique, or irreplaceable" in regard to scenic, historic, natural, cultural, recreational, or archeological qualities. To be designated as a national scenic byway, a road must

- be a state-designated scenic byway (or federal land management agency designated with state concurrence)
- possess at least one of the six intrinsic qualities listed above
- have a completed corridor management plan
- accommodate two-wheel-drive passenger vehicles with standard clearances

where feasible, accommodate bicycles and pedestrians

National designation allows access to ISTEA funds for protection of the intrinsic qualities of the road and enhancement of the use of the road by visitors. This is beneficial to many communities and regions for economic development, encouragement of regional pride, and protection of the resources.

The first step toward national designation is designation as a scenic byway by the state or federal agency that manages the road. Beach Drive and the Rock Creek and Potomac Parkway were designated by the District of Columbia and National Park Service jointly in 1994. The National Park Service has been asked by the District of Columbia to seek national designation for these federally managed roads. However, the decision to seek national designation should follow logically from the overall vision and plan for the park. Therefore, the National Park Service will not take action toward national scenic byway designation pending the conclusion of the general management plan process.

Metropolitan Washington Council of Government, Department of Transportation Planning Vision Document

This document is being prepared by the MWCOG and is currently in draft form. The document outlines regional transportation policies, objectives, and strategies for metropolitan Washington, D.C. The policies advocate an intermodal transportation system that includes rail, bus, ridesharing, and bicycle and pedestrian improvements to reduce reliance on the single-occupant automobile. A complete description of the draft Vision Document is available on the internet at <http://www.mwcog.org/trans/newsdec.html>.

Bicycle Plan for the National Capital Region

The Metropolitan Washington Council of Governments' National Capital Regional Transportation Planning Board adopted the National Capital Region Bicycle Plan in July 1995. Although the plan does not call for bicycle improvements within Rock Creek Park, it does advocate improving major corridors near the park and extending the bike trail along Beach Drive from the district line to Maryland State Route 410 (East-West Highway).

Chesapeake Bay Program

Rock Creek is in the larger Chesapeake Bay watershed. On October 29, 1993, the National Park Service signed a memorandum of understanding with the Environmental Protection Agency and became a formal participant in the Chesapeake Bay Program, along with the District of Columbia and the states of Virginia, Maryland, and Pennsylvania. In part, this agreement calls for a commitment to implement a basin-wide plan or strategy to reduce nutrient inputs to the bay by 40 percent by the year 2000. In joining the program, the National Park Service agreed to contribute to the restoration, interpretation, and conservation of the many valuable resources of the Chesapeake Bay.

Comprehensive Plan for the National Capital

The District of Columbia Self-Government and Governmental Reorganization (Home Rule) Act of 1973 called for the District of Columbia and the National Capital Planning Commission (NCPC) to develop a comprehensive plan. The plan elements were adopted in 1984 and 1985 and address all aspects of governing the district. These include parks, open space, and natural features; economic development; housing; environmental protection; transportation; human services; and land use.

Extending the Legacy: Planning America's Capital for the 21st Century

The NCPC has released its new plan for Washington's Monumental Core. The plan presents a vision of what the National Mall and surrounding areas may look like in 50 to 100 years. While the plan does not address Rock Creek Park or surrounding neighborhoods, many of the areas along the Rock Creek and Potomac Parkway would be affected. The plan emphasizes providing access to the Potomac River waterfront, developing public open places, expanding public transportation opportunities, and redefining the network of roadways around the monumental core.

Montgomery County Master Plans and Maps

The master plans establish specific policy guidelines for land use, transportation, conservation, and open space and parks. The plans include Montgomery County and the Silver Spring and Bethesda/Chevy Chase planning areas adjacent to Rock Creek Park.

Strategic Transportation Plan for the District of Columbia (1997)

The Strategic Transportation Plan presents the district's vision for the city's transportation system. The plan advocates strategies to improve the efficiency of the current transportation system, reduce dependency on single occupancy vehicle use, intercept automobile traffic at the edges of the city, and provide residents and tourists alternatives to the automobile. The plan calls for bicycle paths along Beach Drive and Rock Creek and Potomac Parkway and identifies portions of the park as "gateway" areas.

District of Columbia Water and Sewer Authority Combined Sewer Area Stormwater Overflow Plan

In June 2001, the D.C. water and Sewer Authority presented a draft plan for a \$1-billion stormwater overflow system. The plan, which includes the area of combined sanitary/storm sewers east and south of Rock Creek Park (see the Sewerlines and Outfalls map) would reduce overflow discharges by more than 90 percent. The plan, which still needs financing and environmental approvals, would include half-mile-long tunnel along Rock Creek that would be able to store up to 5 million gallons of combined storm runoff and sewage for treatment. A formal hearing is tentatively scheduled for autumn 2001, and a final plan may be submitted to the U.S. Environmental Protection Agency in late 2001 or early 2002 (Engineering News-Record 2001).

**APPENDIX D: LETTER FROM THE MAYOR OF WASHINGTON, D.C.
REQUESTING ANOTHER ALTERNATIVE**

**APPENDIX D: LETTER FROM THE MAYOR OF WASHINGTON, D.C. REQUESTING
ANOTHER ALTERNATIVE**



ANTHONY A. WILLIAMS
MAYOR

Mr. Terry Carlstrom
Director, National Capital Region
National Park Service
1100 Ohio Drive
Washington, DC 20242

Dear Mr. Carlstrom:

The District is fortunate to have Rock Creek Park, one of the world's finest urban parks, located in the middle of our city. The park provides a welcome respite from the pressures of city life that in turn greatly enhances the livability of our city.

The value of Rock Creek Park to the residents of the Greater Washington region has been significantly improved by the National Park Service's decision in the 1980's to close portions of upper Beach Drive to automobile traffic on weekends. The weekend closure has allowed recreational use to flourish while maintaining adequate transportation needs to automobile drivers.

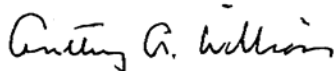
With a general management plan for Rock Creek Park currently under development, the Park Service now has an opportunity to make this park an even better resource for recreational opportunities and habitat protection. The District of Columbia government has been discussing with various citizen groups regarding the possibility of reducing automobile traffic in the most sensitive portions of Rock Creek Park, while minimizing any impact on surrounding neighborhoods and commuters.

I encourage the National Park Service to work with the surrounding neighborhoods to study the possibility of implementing weekday vehicular traffic restrictions on sections of upper Beach Drive in non-rush hour periods and to start a dialogue with the community to determine the best possible use for the park. It is of vital importance that any restrictions would need to be carefully coordinated between the National Park Service, the District government, and surrounding local governments and neighborhoods.

Mr. Terry Carlstrom
Page Two

The entire project would need to be carefully monitored by the National Park Service and the District government to assess the impacts of this program. If possible, such measures could be incorporated into the forthcoming Rock Creek Park General Management Plan. I have asked Mr. Dan Tangherlini, Acting Director of the Division of Transportation to serve as the District's representative to your offices on this proposed project. I thank you in advance for your consideration.

Sincerely,

A handwritten signature in cursive script that reads "Anthony A. Williams".

Anthony A. Williams
Mayor

APPENDIX E: FEDERAL AND STATE-LISTED SPECIAL-CONCERN SPECIES

TABLE E.1: FEDERALLY LISTED SPECIES IN ROCK CREEK PARK

Common Name	Scientific Name	Federal Status ^{a/}
CRUSTACEANS		
Hays amphipod	<i>Stygobromus hayi</i>	LE
BIRDS		
bald eagle	<i>Haliaeetus leucocephalus</i>	LT ^{b/}

a/ Federal status:

LE = Taxa listed as endangered; in danger of extinction throughout all or a significant portion of their range.

LT = Taxa listed as threatened; likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

b/ Bald eagle was proposed for delisting July 1999; delisting is still pending.

TABLE E.2: RARE PLANTS IN ROCK CREEK PARK ^{a/}

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Solitary pussytoes	<i>Antennaria solitaria</i>	--	--	S1
Hairy rockcress	<i>Arabis hirsuta</i>	--	--	SU
Green dragon	<i>Arisaema dracontium</i>	--	--	S3
Cornel-leaved aster	<i>Aster infirmus</i>	--	--	S3
Hairy-leaved sedge	<i>Carex hirtifolia</i>	--	--	S1
Chestnut	<i>Castanea dentata</i>	--	--	S2 S3
Whorled coreopsis	<i>Coreopsis verticillata</i>	--	--	S3
Dandy low kyllinga	<i>Cyperus tenuifolius</i>	--	E	S1
Pointed-leaved tick-trefoil	<i>Desmodium glutinosum</i>	--	--	S3
Butternut	<i>Juglans cinerea</i>	C	--	S2 S3
Two-flowered melic	<i>Melica mutica</i>	--	--	S1
Basil balm	<i>Monarda clinopodia</i>	--	--	S3
Carolina leaf-flower	<i>Phyllanthus caroliniensis</i>	--	--	S3
Shingle oak	<i>Quercus imbricaria</i>	--	--	S3
Overcup oak	<i>Quercus lyrata</i>	--	--	S3
Orange coneflower	<i>Rudbeckia fulgida</i>	--	--	S3

TABLE E.2: RARE PLANTS IN ROCK CREEK PARK (CONTINUED) ^{a/}

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Pearlwort	<i>Sagina decumbens</i>	--	--	S3
Long-beaked arrowhead	<i>Sagittaria longirostra</i>	--	--	SU
Showy skullcap	<i>Scutellaria serrata</i>	--	--	S3
Whorled rosinweed	<i>Silphium trifoliatum</i>	--	--	S3
Hispid goldenrod	<i>Solidago hispida</i>	--	E	SH SX
Little ladies' tresses	<i>Spiranthes tuberosa</i>	--	--	S3
Golden alexanders	<i>Zizia aurea</i>	--	--	S3

a/ Source: Unpublished table dated May 9, 2000 that was prepared by park staff and volunteers.

b/ Status and rank definitions:

Maryland status - This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions for the following categories have been taken from Code of Maryland Regulations (COMAR) 08.03.08.

E = Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.

C = Candidate species in decline.

-- indicates no special status

Maryland rank:

S1 = Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation.

S2 = State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Heritage & Biodiversity Conservation Programs.

S3 = Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Heritage & Biodiversity Conservation Programs.

SH = Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SX = Believed to be extirpated in Maryland with virtually no chance of rediscovery.

SU = Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above.

TABLE E.3: STATE-LISTED SPECIES IN ARLINGTON COUNTY, VIRGINIA ^{a/}

Common Name	Scientific Name	Federal Status ^{b/}	Virginia Status ^{b/}	Virginia Rank ^{b/}
REPTILES				
Wood turtle	<i>Clemmys insculpta</i>	--	LT	S2
PLANTS				
Great Indian-plantain	<i>Arnoglossum muehlenbergii</i>	--	--	S2
Fringed brome	<i>Bromus ciliatus</i>	--	--	S1
White trout-lily	<i>Erythronium albidum</i>	--	--	S2
Sweet-scented Indian-plantain	<i>Hasteola suaveolens</i>	--	--	S2
Low frostweed	<i>Helianthemum propinquum</i>	--	--	S1
Ostrich fern	<i>Matteuccia struthiopteris</i> var <i>Pennsylvanica</i>	--	--	S1
Marsh muhly	<i>Muhlenbergia glomerata</i>	--	--	S2
Yellow nailwort	<i>Paronychia virginica</i> var. <i>virginica</i>	--	--	S1S2
Hairy beardtongue	<i>Penstemon hirsutus</i>	--	--	S2
Blue scorpion-weed	<i>Phacelia covillei</i>	--	--	S1
Fowl bluegrass	<i>Poa palustris</i>	--	--	S1S2
Large-leaf pondweed	<i>Potamogeton amplifolius</i>	--	--	S1S2
Torrey's mountain-mint	<i>Pycnanthemum torrei</i>	--	--	S2?
Dwarf chinquapin oak	<i>Quercus prinoides</i>	--	--	S2
Slender marsh pink	<i>Sabatia campanulata</i>	--	--	S2
Sandbar willow	<i>Salix exigua</i>	--	--	S1
Virginia mallow	<i>Sida hermaphrodita</i>	--	--	S1
Sticky goldenrod	<i>Solidago racemosa</i>	--	--	S1
Rock goldenrod	<i>Solidago rupestris</i>	--	--	S1

a/ Information from Virginia Natural Heritage Program web site, <http://www.state.va.us/~dcr/dnh/arli.htm>. Species listed are specific to Arlington County, Virginia, proximate to Rock Creek Park.

b/ Status and rank definitions:

S1 = Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.

S2 = Very rare; usually between 5 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.

ST = State threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.

-- = no special status.

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
PLANARIANS				
A planarian	<i>Phagocata virilis</i>	--	--	S1
A planarian	<i>Planaria dactyligera</i>	--	--	S2
A planarian	<i>Procotyla typhlops</i>	--	E	S1
Hoffmaster's cave planarian	<i>Sphalloplana hoffmasteri</i>	--	E	S1
CRUSTACEANS				
A harpacticoid copepod	<i>Attheyella spinipes</i>	--	--	SU
Franz's cave isopod	<i>Caecidotea franzi</i>	--	E	S1
Holsinger's cave isopod	<i>Caecidotea holsingeri</i>	--	--	SR
Price's cave isopod	<i>Caecidotea pricei</i>	--	--	S3
Dearolf's cave isopod	<i>Crangonyx dearolfi</i>		E	S1
An entocytherid ostracod	<i>Dactylocythere scotos</i>	--	--	S1
A cyclopoid copepod	<i>Diacyclops palustris</i>	--	--	SU
A conchostracan phyllopod	<i>Eulimnadia francesae</i>	--	--	SU
A conchostracan phyllopod	<i>Eulimnadia ventricosa</i>	--	--	SU
Allegheny cave amphipod	<i>Stygobromus allegheniensis</i>	--	I	S2S3
Biggers' cave amphipod	<i>Stygobromus biggersi</i>	--	E	S1
Greenbrier cave amphipod	<i>Stygobromus emarginatus</i>	--	E	S1
Franz's cave amphipod	<i>Stygobromus franzi</i>	--	I	S2S3
Shenandoah cave amphipod	<i>Stygobromus gracilipes</i>	--	E	S1
Tidewater amphipod	<i>Stygobromus indentatus</i>	--	--	S1
Pizzini's cave amphipod	<i>Stygobromus pizzinii</i>	--	--	S1
Barrelville amphipod	<i>Stygobromus sp 5</i>	--	--	S1
An amphipod	<i>Stygobromus sp 6</i>	--	--	S1
Roundtop amphipod	<i>Stygobromus sp 14</i>	--	--	S1
Tenuis amphipod	<i>Stygobromus tenuis tenuis</i>	--	--	SU
Potomac amphipod	<i>Stygobromus tenuis potomacus</i>	--	--	S3
SPIDERS				
American purse-web spider	<i>Atypus bicolor</i>	--	--	S1S2

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Snivelys cave spider	<i>Oreonetides sp 1</i>	--	--	SU
Appalachian cave spider	<i>Porrhomma cavernicolum</i>	--	--	S2
INSECTS				
<i>Collembola</i>				
Crabtree cave springtail	<i>Arrhopalites sp 1</i>	--	--	SU
	<i>Ephemeroptera</i>	--	--	
Walker's tusked sprawler	<i>Potamanthus walkeri</i>	--	--	SU
	<i>Odonata</i>	--	--	
Spring blue darner	<i>Aeshna mutata</i>	--	E	S1
Sable clubtail	<i>Gomphus rogersi</i>	--	E	S1
Treetop emerald	<i>Somatochlora provocans</i>	--	--	S1
Elusive clubtail	<i>Stylurus notatus</i>	--	--	S1
	(= <i>Gomphus notatus</i>)	--	--	
Gray petaltail	<i>Tachopteryx thoreyi</i>	--	--	SU
<i>Homoptera</i>				
A cicadellid leafhopper	<i>Chlorotettix sp 1</i>	--	--	SU
Eastern sedge barrens planthopper	<i>Limotettix sp 1</i>	--	--	S1
<i>Coleoptera</i>				
A tiger beetle	<i>Cicindela ancocisconensis</i>	--	E	S1
Northeastern beach tiger beetle	<i>Cicindela dorsalis dorsalis</i>	LT	E	S1
White tiger beetle	<i>Cicindela dorsalis media</i>	--	E	S1
Little white tiger beetle	<i>Cicindela lepida</i>	--	E	S1
A tiger beetle	<i>Cicindela patruela</i>	--	--	S1S2
Puritan tiger beetle	<i>Cicindela puritana</i>	LT	E	S1
A tiger beetle	<i>Cicindela purpurea</i>	--	--	S3
A tiger beetle	<i>Cicindela scutellaris</i>	--	--	S3
A tiger beetle	<i>Cicindela splendida</i>	--	--	S3
A tiger beetle	<i>Cicindela unipunctata</i>	--	--	S3
Six-banded longhorn beetle	<i>Dryobius sexnotatus</i>	--	E	S1
A dytiscid beetle	<i>Hopierius planatus</i>	--	--	S1
A hydrophilid beetle	<i>Hydrochara occulta</i>	--	--	SU

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Seth forest water scavenger beetle	<i>Hydrochus sp 1</i>	--	--	SH
Giant stag beetle	<i>Lucanus elephas</i>	--	--	S1
A cave beetle	<i>Pseudanophthalmus sp 15</i>	--	--	S1
A coccinellid beetle	<i>Scymnus gordonii</i>	--	--	SU
A hydrophilid beetle	<i>Sperchopsis tessellatus</i>	--	--	S2
	<i>Trichoptera</i>	--	--	
A scalaris trichopteran	<i>Hydropsyche brunneipennis</i>	--	--	S3
	<i>Lepidoptera - Butterflies</i>			
Pepper-and-salt skipper	<i>Amblyscirtes hegon</i>	--	I	S2
Great purple hairstreak	<i>Atlides halesus</i>	--	--	S1S2
Golden-banded skipper	<i>Autochton cellus</i>	--	E	S1
Silver-bordered fritillary	<i>Boloria selene myrina</i>	--	--	S3
Northern metalmark	<i>Calephelis borealis</i>	--	T	S2
Sooty azure	<i>Celastrina ebenina</i>	--	E	S1
Appalachian blue	<i>Celastrina neglectamajor</i>	--		S3S4
Harris' checkerspot	<i>Chlosyne harrisii</i>	--	T	S2
Pink-edged sulphur	<i>Colias interior</i>	--	--	S1
Gemmed satyr	<i>Cyllopsis gemma</i>	--	--	SHSR
Early hairstreak	<i>Erora laeta</i>	--	E	S1
Mottled duskywing	<i>Erynnis martialis</i>	--	E	S1
Persius duskywing	<i>Erynnis persius</i>	--	--	SHSR
Olympia marble	<i>Euchloe olympia</i>	--	I	S2
Two-spotted skipper	<i>Euphyes bimacula</i>	--	E	S1
Sedge skipper	<i>Euphyes dion</i>	--	--	S3
Saw-grass skipper	<i>Euphyes pilatka</i>	--	--	SU
Northern hairstreak	<i>Fixsenia ontario</i>	--	E	S1S2
Silvery blue	<i>Glaucopsyche lygdamus</i>	--	I	S2
Carolina satyr	<i>Hermeuptychia sosybius</i>	--	--	S1S3
Dotted skipper	<i>Hesperia attalus slossonae</i>	--	--	SH
Indian skipper	<i>Hesperia sassacus</i>	--	--	S3
Frosted elfin	<i>Incisalia irus</i>	--	E	S1

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Bog copper	<i>Lycaena epixanthe</i>	--	E	S1
Compton's tortoiseshell	<i>Nymphalis vaualbum</i>	--	E	S1
Giant swallowtail	<i>Papilio cresphontes</i>	--	I	S2
Palamedes swallowtail	<i>Papilio palamedes</i>	--	--	SU
Chermock's mulberrywing	<i>Poanes massasoit chermocki</i>	--	E	S1
Long dash	<i>Polites mystic</i>	--	--	S3S4
Rare skipper	<i>Problema bulenta</i>	--	T	S1
Southern grizzled skipper	<i>Pyrgus wyandot</i>	--	E	S1
Acadian hairstreak	<i>Satyrrium acadicum</i>	--	--	SA
Hickory hairstreak	<i>Satyrrium caryaevorum</i>	--	E	S1
Edwards' hairstreak	<i>Satyrrium edwardsii</i>	--	E	S1
King's hairstreak	<i>Satyrrium kingi</i>	--	T	S1
Atlantis fritillary	<i>Speyeria atlantis</i>	--	T	S1
Diana	<i>Speyeria diana</i>	--	--	SA
Regal fritillary	<i>Speyeria idalia</i>	--	E	S1
<i>Lepidoptera – Moths</i>				
A noctuid moth	<i>Apamea apamiformis</i>	--	--	S2S3
A noctuid moth	<i>Apamea mixta</i>	--	--	S1
A noctuid moth	<i>Apamea plutonia</i>	--	--	SU
A noctuid moth	<i>Capis curvata</i>	--	--	S1S2
Marbled underwing	<i>Catocala marmorata</i>	--	--	SH
Precious underwing	<i>Catocala pretiosa pretiosa</i>	--	--	SH
A geometrid moth	<i>Cyclophora nanaria</i>	--	--	S1?
A lymantriid moth	<i>Dasychira atrivenosa</i>	--	--	SU
A noctuid moth	<i>Elaphria georgei</i>	--	--	SU
A noctuid moth	<i>Hadena ectypa</i>	--	--	SU
Woodland buckmoth	<i>Hemileuca maia ssp 4</i>	--	--	SU
Cypress sphinx moth	<i>Isoparce cupressi</i>	--	--	SU
Sinuous lytrosis	<i>Lytrosis sinuosa</i>	--	--	S1S3
A noctuid moth	<i>Meropleon titan</i>	--	--	SU
Seaside goldenrod stem borer	<i>Papaipema duovata</i>	--	--	SU
Polymnia stalk borer	<i>Papaipema polymniae</i>	--	--	SH

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
A noctuid moth	<i>Schinia parmeliana</i>	--	--	SH
Franck's sphinx	<i>Sphinx franckii</i>	--	--	SH
A noctuid moth	<i>Xestia bollii</i>	--	--	SU
FISHES				
Mud sunfish	<i>Acantharchus pomotis</i>	--	--	S2
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	LE	E	S1
Atlantic sturgeon	<i>Acipenser oxyrhynchus</i>	--	--	S1
Longnose sucker	<i>Catostomus catostomus</i>	--	E	S1
Flier	<i>Centrarchus macropterus</i>	--	--	SU
Redside dace	<i>Clinostomus elongatus</i>	--	--	S1
Slimy sculpin	<i>Cottus cognatus</i>	--	T	S1
Blackbanded sunfish	<i>Enneacanthus chaetodon</i>	--	I	S1
Maryland darter	<i>Etheostoma sellare</i>	LE	E	S1
Glassy darter	<i>Etheostoma vitreum</i>	--	E	S1
Spotfin killifish	<i>Fundulus luciae</i>	--	--	S2
Stonecat	<i>Noturus flavus</i>	--	I	S1
Logperch	<i>Percina caprodes</i>	--	--	S1
AMPHIBIANS				
Jefferson salamander	<i>Ambystoma jeffersonianum</i>	--	--	S3
Eastern tiger salamander	<i>Ambystoma tigrinum</i>	--	E	S2
Green salamander	<i>Aneides aeneus</i>	--	E	S2
Hellbender	<i>Cryptobranchus alleganiensis</i>	--	E	S1
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>	--	E	S1S2
Barking treefrog	<i>Hyla gratiosa</i>	--	E	S1
Wehrle's salamander	<i>Plethodon wehrlei</i>	--	I	S2
Mountain chorus frog	<i>Pseudacris brachyphona</i>	--	T	S2
Carpenter frog	<i>Rana virgatipes</i>	--	I	S2
REPTILES				
Eastern spiny softshell	<i>Apalone spinifera</i>	--	I	S1
Eastern scarlet snake	<i>Cemophora coccinea</i>	--	--	S3
Bog turtle	<i>Clemmys muhlenbergii</i>	--	T	S2
Timber rattlesnake	<i>Crotalus horridus</i>	--	--	S3

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
Northern coal skink	<i>Eumeces anthracinus</i>	--	E	SU
Rainbow snake	<i>Farancia erythrogramma</i>	--	E	S1
Map turtle	<i>Graptemys geographica</i>	--	E*	S1
Redbelly water snake	<i>Nerodia erythrogaster</i>	--	--	S2S3
Northern pine snake	<i>Pituophis melanoleucus</i>	--	--	SR
Mountain earth snake	<i>Virginia valeriae pulchra</i>	--	E	S2
BIRDS				
Northern goshawk	<i>Accipiter gentilis</i>	--	E	S1B
Sharp-shinned hawk	<i>Accipiter striatus</i>	--		S1S2B
Northern saw-whet owl	<i>Aegolius acadicus</i>	--	--	S1B
Sharp-tailed sparrow	<i>Ammodramus caudacutus</i>	--	--	S3B
Henslow's sparrow	<i>Ammodramus henslowii</i>	--	T	S1B
Short-eared owl	<i>Asio flammeus</i>	--	I	SHB
Long-eared owl	<i>Asio otus</i>	--	--	SHB
Upland sandpiper	<i>Bartramia longicauda</i>	--	E	S1B
American bittern	<i>Botaurus lentiginosus</i>	--	I	S1S2B
Whip-poor-will	<i>Caprimulgus vociferus</i>	--	--	S3S4B
Purple finch	<i>Carpodacus purpureus</i>	--	--	S3B
Hermit thrush	<i>Catharus guttatus</i>	--	--	S3S4B
Piping plover	<i>Charadrius melodus</i>	LT	E	S1B
Wilson's plover	<i>Charadrius wilsonia</i>	--	E	S1B
Common nighthawk	<i>Chordeiles minor</i>	--	--	S3S4B
Northern harrier	<i>Circus cyaneus</i>	--	--	S2B
Sedge wren	<i>Cistothorus platensis</i>	--	T	S1B
Olive-sided flycatcher	<i>Contopus borealis</i>	--	E	SHB
Common raven	<i>Corvus corax</i>	--	--	S3B
Cerulean warbler	<i>Dendroica cerulea</i>	--	--	S3S4B
Blackburnian warbler	<i>Dendroica fusca</i>	--	T	S1S2B
Little blue heron	<i>Egretta caerulea</i>	--	--	S3B
Tricolored heron	<i>Egretta tricolor</i>	--	--	S3B
Alder flycatcher	<i>Empidonax alnorum</i>	--	I	S2B
Least flycatcher	<i>Empidonax minimus</i>	--	--	S3S4B
Common moorhen	<i>Gallinula chloropus</i>	--	I	S2B

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
American oystercatcher	<i>Haematopus palliatus</i>	--	--	S2S3B
Bald eagle	<i>Haliaeetus leucocephalus</i>	LT	E	S2S3B
Least bittern	<i>Ixobrychus exilis</i>	--	I	S2S3B
Dark-eyed junco	<i>Junco hyemalis</i>	--	--	S2B
Loggerhead shrike	<i>Lanius ludovicianus</i>	--	E	S1B
Laughing gull	<i>Larus atricilla</i>	--	--	S1B
Black rail	<i>Laterallus jamaicensis</i>	--	I	S2S3B
Swainson's warbler	<i>Limnothlypis swainsonii</i>	--	E	S1B
Hooded merganser	<i>Lophodytes cucullatus</i>	--	--	S1B
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>	--	--	S2S3B
Mourning warbler	<i>Oporornis philadelphia</i>	--	E	S1B
Savannah sparrow	<i>Passerculus sandwichensis</i>	--	--	S3S4B
Pied-billed grebe	<i>Podilymbus podiceps</i>	--	--	S2B
Vesper sparrow	<i>Pooecetes gramineus</i>	--	--	S3S4B
Sora	<i>Porzana carolina</i>	--	--	S1B
Golden-crowned kinglet	<i>Regulus satrapa</i>	--	--	S2B
Black skimmer	<i>Rynchops niger</i>	--	T	S1S2B
Northern waterthrush	<i>Seiurus noveboracensis</i>	--	--	S2S3B
Red-breasted nuthatch	<i>Sitta canadensis</i>	--	--	S1B
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	--	--	SHB
Dickcissel	<i>Spiza americana</i>	--	--	S2B
Least tern	<i>Sterna antillarum</i>	--	T	S2B
Royal tern	<i>Sterna maxima</i>	--	E	S1B
Gull-billed tern	<i>Sterna nilotica</i>	--	T	S1B
Sandwich tern	<i>Sterna sandvicensis</i>	--	--	S1B
Bewick's wren	<i>Thryomanes bewickii altus</i>	--	E	S1B
Winter wren	<i>Troglodytes troglodytes</i>	--	--	S2B
Common barn-owl	<i>Tyto alba</i>	--	--	S3
Golden-winged warbler	<i>Vermivora chrysoptera</i>	--	--	S3B
Nashville warbler	<i>Vermivora ruficapilla</i>	--	I	S1S2B
Canada warbler	<i>Wilsonia canadensis</i>	--	--	S3B

TABLE E.4: STATE-LISTED ANIMAL SPECIES IN MARYLAND (CONTINUED) ^a

Common Name	Scientific Name	Federal Status ^b	Maryland Status ^b	Maryland Rank ^b
MAMMALS				
Southeastern star-nosed mole	<i>Condylura cristata parva</i>	--	--	SU
Porcupine	<i>Erethizon dorsatum</i>	--	I	S1S2
Bobcat	<i>Lynx rufus</i>	--	I	S3
Fisher	<i>Martes pennanti</i>	--	--	S3S4
Southern rock vole	<i>Microtus chrotorrhinus</i>	--	E	S1
	<i>carolinensis</i>	--	--	
Ermine	<i>Mustela erminea</i>	--	--	SR
Least weasel	<i>Mustela nivalis</i>	--	I	S2S3
Eastern small-footed bat	<i>Myotis leibii</i>	--	I	S2
Indiana bat	<i>Myotis sodalis</i>	LE	E	S1B?
Allegheny woodrat	<i>Neotoma magister</i>	--	E	S1
Delmarva fox squirrel	<i>Sciurus niger cinereus</i>	LE	E	S1
Long-tailed shrew	<i>Sorex dispar</i>	--	I	S2
Smoky shrew	<i>Sorex fumeus</i>	--	T	S1S2
Southern pygmy shrew	<i>Sorex hoyi winnemana</i>	--	--	S2
Southeastern shrew	<i>Sorex longirostris</i>	--	--	S3S4
Southern water shrew	<i>Sorex palustris punctulatus</i>	--	E	S1
Eastern spotted skunk	<i>Spilogale putorius</i>	--	--	S1
Appalachian cottontail	<i>Sylvilagus obscurus</i>	--	I	S1
Southern bog lemming	<i>Synaptomys cooperi</i>	--	--	S3
Black bear	<i>Ursus americanus</i>	--	--	S3

a/ Information from Maryland Department of Natural Resources, Maryland Heritage & Biodiversity Conservation Programs web site, <ftp://ftp.heritage.tnc.org/pub/nhp/us/md/rarean.html>. Table shows species throughout Maryland; species listed are not necessarily specific to the Rock Creek Park region.

b/ Status and rank definitions:

S1 = Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation.

S2 = State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Heritage & Biodiversity Conservation Programs.

S3 = Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Heritage & Biodiversity Conservation Programs.

S3.1A = "Watch List" species that is actively tracked by the Heritage & Biodiversity Conservation Programs because of its global rarity and, therefore, the global significance of Maryland occurrences.

S4 = Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.

S5 = Demonstrably secure in Maryland under present conditions.

SA = Accidental or a vagrant in Maryland.

SH = Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SR = Reported from Maryland, but without persuasive documentation that would provide a basis for either accepting or rejecting the report (e.g., no voucher specimen exists).

SU = Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above.

S? = The species has not yet been ranked.

_B = This species is a migrant and the rank refers only to the breeding status of the species. Such a migrant may have a different rarity rank for non-breeding populations.

Federal status - This is the status of a species as determined by the U.S. Fish and Wildlife Service's Office of Endangered Species, in accordance with the Endangered Species Act. Definitions for the following categories have been modified from 50 CFR 17.

LE = Taxa listed as endangered; in danger of extinction throughout all or a significant portion of their range.

LT = Taxa listed as threatened; likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

PE = Taxa proposed to be listed as endangered.

PT = Taxa proposed to be listed as threatened.

* = A qualifier denoting taxa which may be possibly extinct (although persuasive documentation of extinction has not been made).

Maryland status - This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions for the following categories have been taken from Code of Maryland Regulations (COMAR) 08.03.08.

E = Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.

I = In Need of Conservation; an animal species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.

T = Threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.

* = A qualifier denoting the species is listed in a limited geographic area only.

-- indicates no special status

APPENDIX F – NATIONAL REGISTER OF HISTORIC PLACES PROPERTIES

Historic properties within Rock Creek Park and the Rock Creek and Potomac Parkway that are listed on the National Register of Historic Places include the

Peirce-Klinge Mansion (Linnaean Hill)

Peirce Mill

Peirce Springhouse and Peirce Mill Barn

Godey Lime Kilns

Boulder Bridge and Ross Drive Bridge

Fort DeRussy, which is listed as a contributing feature to “Civil War Fort Sites” National Register nomination

In addition to the listing of individual properties, the area of Rock Creek Park covered by this general management plan was listed in the National Register of Historic Places as Rock Creek Park Historic District (No. 91001524) on October 23, 1991. The historic district boundaries encompass Public Reservation 339 established as Rock Creek Park on September 27, 1890. The historic district included 31 resources classified as contributing to its significance. These resources are listed in table F.1.

TABLE F.1: RESOURCES THAT CONTRIBUTE TO THE SIGNIFICANCE OF THE ROCK CREEK HISTORIC DISTRICT

1) Peirce-Klinge Mansion	12) Visitor Center/Park Police Substation (Lodge House)	22) Morrow Drive Bridge
2) Peirce-Klinge House	13) Jules J. Jusserand Memorial	23) Rapids Footbridge
3 and 4) Peirce-Klinge Utility House and Potting Shed	14) Fort DeRussy Earthworks	24) Rolling Meadow Bridge
5) Peirce-Klinge Stable/Garage	15) Ross Drive Bridge	25) Riley Spring Bridge
6) Peirce Mill	16) Grant Road Bridge	26) Boundary Bridge
7) Peirce Mill Bridge	17) Boulder Bridge	27) Bluffs Bridge
8) Peirce Mill Dam	18) Pinehurst Bridge	28) Circulation Network-Historic Roads and Trails ^{a/}
9) Peirce Mill Barn	19) Sixteenth Street Bridge	29) Rock Creek Golf Course
10) Peirce Springhouse	20) Old Military Road Bridge-Joyce Road Bridge	30) Outdoor Fireplaces (6)
11) Joaquin Miller cabin	21) Milkhouse Ford and Cross Valley Road Structures	31) Culverts and Retaining Walls

^{a/} Includes Beach Drive, Peirce Mill Road, Piney Branch Parkway, Grant Road, Sherrill Drive, Wise Road, Bingham Drive, Joyce Road, Ridge (Glover) Road, Ross Drive, Morrow Drive, and portions of several other roads.

APPENDIX G – COMPARISON OF IMPACTS OF ALTERNATIVES ON TRAFFIC, BASED ON MODELING

This appendix consists of three tables that were developed using the traffic modeling method described in Appendix H.

Table G.1 – Year 2020 Average Weekday Traffic Volumes.

Table G.2 – Year 2020 A.M./P.M. Peak-Hour Traffic Volumes

Table G.3 – Level of Service Analysis

TABLE G.1
MATRIX 1: YEAR 2020 AVERAGE WEEKDAY TRAFFIC VOLUMES

ROADWAY LINK RESULTS							
Roadway	From	To	1990 ADT	2020 ADT			
				Alt A		Alt B	
				Volume	% Chg*	Volume	% Chg*
Beach Drive	Wyndale	W Beach	5,400	12,400	-10.1%	13,800	0
Beach Drive	Wise	Sherrill	8,000	12,100	-28.4%	16,900	0
Beach Drive	Bingham	Joyce	8,700	8,800	-30.2%	12,600	300
Beach Drive	Joyce	Broad Branch	9,000	7,000	-40.2%	11,700	0
Beach Drive	Blagden	Tilden / Park	18,000	21,800	-18.4%	26,700	20,000
Beach Drive	Porter	Zoo	24,000	25,500	-24.6%	33,800	27,900
Beach Drive	Zoo	24th / Cathedral	24,700	26,400	-26.7%	36,000	30,800
RCPW SB	24th / Cathedral	Waterside NB on	21,700	28,300	-9.3%	31,200	27,500
RCPW NB	24th / Cathedral	Waterside NB on	21,700	31,100	-6.9%	33,400	28,900
RCPW SB	Waterside ramps	P ramps	27,500	34,900	-6.7%	37,400	34,900
RCPW NB	Waterside ramps	P ramps	27,500	38,800	-4.2%	40,500	36,700
RCPW SB	K / Whitehurst	Virginia	26,200	34,500	-3.4%	35,700	35,100
RCPW NB	K / Whitehurst	Virginia	26,200	38,300	-3.0%	39,500	36,000
RCPW SB	Virginia	Teddy Roosevelt Br	20,000	26,000	-0.8%	26,200	27,800
RCPW NB	Virginia	Teddy Roosevelt Br	20,000	28,100	-2.8%	28,900	28,300
16th Street	DC line	S Portal	30,000	46,100	-1.1%	46,600	47,400
16th Street	Alaska	Sherrill	36,000	58,000	2.5%	56,600	62,100
16th Street	Missouri	Kennedy	30,000	49,300	2.3%	48,200	49,700
16th Street	Kennedy	Colorado	28,000	45,800	1.8%	45,000	46,700
16th Street	Park	Irving	30,400	46,500	3.6%	44,900	45,700
16th Street	Euclid	Florida	32,200	41,800	1.7%	41,100	42,400
Alaska Avenue	Georgia	Morningside	6,800	11,300	3.7%	10,900	11,600
Georgia Avenue	Alaska	Fern	29,000	38,500	0.3%	38,400	39,800
Georgia Avenue	Dahlia	Aspen	28,000	37,300	0.3%	37,200	38,400
Georgia Avenue	Missouri	Kennedy	22,000	34,900	8.0%	32,300	34,800
Georgia Avenue	Arkansas	Upshur	20,000	33,000	-0.9%	33,300	31,800
Oregon Avenue	Western	Wise / Chesnut	1,700	1,900	0.0%	1,900	1,900
Oregon Avenue	Chesnut	Nebraska	8,500	11,100	3.7%	10,700	11,600
Oregon Avenue	Moreland	Military	3,500	4,300	-8.5%	4,700	4,800
Glover Road	Military	Grant	2,500	3,200	-15.8%	3,800	3,600
Grant Road	Glover	Broad Branch	2,100	2,700	-10.0%	3,000	2,800
Glover Road	Ross	Broad Branch	500	800	-38.5%	1,300	1,100
Ross Drive	Glover	Joyce	200	400	-33.3%	600	300
Broad Branch Road	Western	McKinley	1,200	2,700	0.0%	2,700	3,800
Broad Branch Road	32nd St	27th St	2,000	3,200	3.2%	3,100	3,500
Broad Branch Road	Grant	Brandywine	6,800	8,800	-2.2%	9,000	9,200
Connecticut Avenue	DC line	McKinley	36,200	45,500	0.4%	45,300	46,100
Connecticut Avenue	Nebraska	36th	38,000	47,900	0.8%	47,500	47,400
Connecticut Avenue	Macomb	Cathedral	37,000	50,200	2.9%	48,800	47,300
Connecticut Avenue	Columbia	Florida	41,200	53,700	1.9%	52,700	55,800
Connecticut Avenue	18th St	Dupont Circle	27,600	33,300	2.1%	32,600	34,000
Wisconsin Avenue	Albemarle	Nebraska	30,800	40,000	1.3%	39,500	41,300
Wisconsin Avenue	Porter	Newark	30,200	38,500	2.4%	37,600	39,400
Wisconsin Avenue	Calvert	Reservoir	29,000	34,000	-0.6%	34,200	34,800
Wisconsin Avenue	O St	P St	24,000	31,400	1.3%	31,000	31,400
Massachusetts Avenue	DC line	49th St	25,000	30,900	1.6%	30,400	31,400
Massachusetts Avenue	Macomb	Idaho	33,400	37,600	0.0%	37,600	38,200
Massachusetts Avenue	Garfield	34th St	46,000	52,200	0.8%	51,800	53,000
Massachusetts Avenue	24th St	Sheridan Circle	25,000	30,700	0.3%	30,600	31,300
Massachusetts Avenue	Sheridan Circle	Florida	29,500	35,500	0.3%	35,400	36,100
Massachusetts Avenue	17th St	18th St	22,000	26,000	-1.9%	26,500	27,000
Nebraska Avenue	Oregon	Utah	5,800	8,600	11.7%	7,700	9,200
Nebraska Avenue	Nevada	Military	22,300	27,100	1.9%	26,600	27,400
Nebraska Avenue	Reno	Albemarle	19,000	23,300	1.7%	22,900	23,800
Nebraska Avenue	Van Ness	Massachusetts	21,000	25,000	-0.4%	25,100	25,500
Military Road	Nebraska	32nd St	20,600	24,800	-2.0%	25,300	25,800
Military Road	Oregon	Beach	34,000	39,900	-2.0%	40,700	40,800
Military Road	16th St	14th St	28,400	36,300	0.0%	36,300	37,900
West Beach	Beach	Portal	11,500	14,900	-12.9%	17,100	11,300
Wise Road	Oregon	Beach	10,200	14,600	3.5%	14,100	15,200
Sherrill Drive	Beach	16th St	2,400	6,200	-19.5%	7,700	1,600
Bingham Drive	Oregon	Beach	1,000	1,900	5.6%	1,800	1,900
Joyce Road	Morrow	16th St	900	1,100	-26.7%	1,500	0
Morrow	Joyce	Carter-Barron	1,600	4,000	17.6%	3,400	1,000
Kennedy	14th St	13th St	6,400	9,700	-1.0%	9,800	7,700
Blagden Avenue	Beach	Upshur	7,100	12,600	-2.3%	12,900	13,800
Blagden Avenue	Upshur	Decatur	5,000	9,600	2.1%	9,400	11,200
Piney Branch Pkwy	Beach	16th St	10,100	11,900	-10.5%	13,300	14,000
Tilden Street	Linnean	Beach	9,000	12,200	3.4%	11,800	12,900
Park Road	Beach	Piney Branch	8,900	12,200	0.8%	12,100	12,900
Porter Street	Connecticut	Klingbe	16,000	19,500	4.3%	18,700	19,100
Adams Mill Road	Park	Irving	9,900	11,500	0.0%	11,500	11,800
Harvard Street	Adams Mill	16th St	5,000	6,900	3.0%	6,700	7,200
Zoo Main Rd	Connecticut	Zoo	2,000	3,100	29.2%	2,400	2,400
Cathedral Avenue	Calvert	Beach / 24th	9,000	6,300	-43.2%	11,100	6,300
24th / Calvert access	24th / Calvert	Beach	19,800	34,100	14.4%	29,800	26,400
M Street	30th St	Pennsylvania	44,000	54,600	-0.5%	54,900	54,800
M Street	New Hampshire	22nd St	21,600	24,300	0.0%	24,300	24,800
New Hampshire Avenue	19th St	20th St	10,000	14,200	-4.7%	14,900	16,000
New Hampshire Avenue	21st St	M St	10,200	13,100	5.6%	12,400	14,000
New Hampshire Avenue	Washington Circle	Virginia	6,000	8,000	1.3%	7,900	8,800
Pennsylvania Avenue	M St	L St	30,000	38,000	-0.5%	38,200	37,800
Pennsylvania Avenue	K St	I St	23,000	29,900	0.0%	29,900	29,800
Virginia Avenue	New Hampshire	23rd St	14,000	15,500	-3.1%	16,000	14,000
Constitution Avenue	23rd St	Henry Bacon	34,000	44,600	4.0%	42,900	45,000

* Note: % Change shown represents the difference between the selected alternative and Alternative B (Continued Current Management) in the year 2020.

TABLE G.2
YEAR 2020 AM/PM PEAK HOUR TRAFFIC VOLUMES

ROADWAY LINK RESULTS														
			1990		2020									
			Peak Hour Volume		Alternative A				Alternative B		Alternative C			
			AM	PM	AM Peak Hour Volume	% Chg*	PM Peak Hour Volume	% Chg*	AM Pk Hr Volume	PM Pk Hr Volume	AM Peak Hour Volume	% Chg*	PM Peak Hour Volume	% Chg*
Roadway	From	To	AM	PM	AM Peak Hour Volume	% Chg*	PM Peak Hour Volume	% Chg*	AM Pk Hr Volume	PM Pk Hr Volume	AM Peak Hour Volume	% Chg*	PM Peak Hour Volume	% Chg*
Beach Drive	Wyndale	W Beach	600	700	1,400	7.7%	1,400	0.0%	1,300	1,400	0	-100.0%	0	-100.0%
Beach Drive	Wise	Sherrill	700	900	1,200	-7.7%	1,500	-11.8%	1,300	1,700	0	-100.0%	0	-100.0%
Beach Drive	Bingham	Joyce	700	1,000	700	-22.2%	1,100	-15.4%	900	1,300	100	-88.9%	100	-92.3%
Beach Drive	Joyce	Broad Branch	700	1,000	500	-37.5%	700	-41.7%	800	1,200	0	-100.0%	0	-100.0%
Beach Drive	Blagden	Tilden / Park	1,400	1,900	1,300	-23.5%	1,900	-20.8%	1,700	2,400	1,300	-23.5%	1,900	-20.8%
Beach Drive	Porter	Zoo	1,700	2,100	900	-55.0%	1,400	-44.0%	2,000	2,500	1,400	-30.0%	2,000	-20.0%
Beach Drive	Zoo	24th / Cathedral	1,700	2,100	900	-57.1%	1,200	-53.8%	2,100	2,600	1,900	-9.5%	2,000	-23.1%
RCPW SB	24th / Cathedral	Waterside NB on	3,700	0	4,000	-11.1%	0	0.0%	4,500	0	1,800	-60.0%	1,900	N/A
RCPW NB	24th / Cathedral	Waterside NB on	0	3,600	0	0.0%	4,100	-12.8%	0	4,700	1,900	N/A	1,900	-59.6%
RCPW SB	Waterside ramps	P ramps	4,400	0	4,700	-7.8%	0	0.0%	5,100	0	2,200	-56.9%	2,300	N/A
RCPW NB	Waterside ramps	P ramps	0	4,500	0	0.0%	5,300	-7.0%	0	5,700	2,300	N/A	2,600	-54.4%
RCPW SB	K / Whitehurst	Virginia	3,800	0	4,100	-6.8%	0	0.0%	4,400	0	1,400	-68.2%	2,700	N/A
RCPW NB	K / Whitehurst	Virginia	0	4,200	0	0.0%	5,200	-5.5%	0	5,500	2,200	N/A	2,500	-54.5%
RCPW SB	Virginia	Teddy Roosevelt Br	3,100	0	3,400	-2.9%	0	0.0%	3,500	0	1,600	-54.3%	2,300	N/A
RCPW NB	Virginia	Teddy Roosevelt Br	0	3,400	0	0.0%	4,000	-4.8%	0	4,200	1,800	N/A	2,400	-42.9%
16th Street	DC line	S Portal	2,700	2,700	3,600	0.0%	3,500	-2.8%	3,600	3,600	3,700	2.8%	3,600	0.0%
16th Street	Alaska	Sherrill	3,200	3,200	4,400	0.0%	4,400	0.0%	4,400	4,400	4,500	2.3%	4,800	9.1%
16th Street	Missouri	Kennedy	2,700	2,700	3,800	2.7%	3,800	2.7%	3,700	3,700	3,800	2.7%	3,800	2.7%
16th Street	Kennedy	Colorado	2,500	2,500	3,600	2.9%	3,500	0.0%	3,500	3,500	3,600	2.9%	3,600	2.9%
16th Street	Park	Irving	2,700	2,700	3,600	2.9%	3,700	5.7%	3,500	3,500	3,500	0.0%	3,500	0.0%
16th Street	Euclid	Florida	2,900	2,900	3,300	3.1%	3,200	0.0%	3,200	3,200	3,500	9.4%	3,500	9.4%
Alaska Avenue	Georgia	Morningside	600	600	800	0.0%	800	0.0%	800	800	800	0.0%	900	12.5%
Georgia Avenue	Alaska	Fern	2,600	2,600	3,000	0.0%	3,000	0.0%	3,000	3,000	3,100	3.3%	3,100	3.3%
Georgia Avenue	Dahlia	Aspen	2,500	2,500	2,900	0.0%	2,900	0.0%	2,900	2,900	2,900	0.0%	3,000	3.4%
Georgia Avenue	Missouri	Kennedy	2,000	2,000	2,600	4.0%	2,600	4.0%	2,500	2,500	2,600	4.0%	2,700	8.0%
Georgia Avenue	Arkansas	Upshur	1,800	1,800	2,500	-3.8%	2,500	-3.8%	2,600	2,600	2,500	-3.8%	2,400	-7.7%
Oregon Avenue	Western	Wise / Chesnut	200	200	200	0.0%	200	0.0%	200	200	200	0.0%	200	0.0%
Oregon Avenue	Chesnut	Nebraska	1,000	900	1,000	-9.1%	1,000	0.0%	1,100	1,000	1,100	0.0%	1,000	0.0%
Oregon Avenue	Moreland	Military	400	400	400	0.0%	400	0.0%	400	400	400	0.0%	400	0.0%
Glover Road	Military	Grant	300	200	300	0.0%	200	-33.3%	300	300	300	0.0%	300	0.0%
Grant Road	Glover	Broad Branch	200	200	200	-33.3%	200	0.0%	300	200	200	-33.3%	200	0.0%
Glover Road	Ross	Broad Branch	100	0	100	0.0%	100	0.0%	100	100	100	0.0%	100	0.0%
Ross Drive	Glover	Joyce	0	0	0	-100.0%	0	0.0%	100	0	0	-100.0%	0	N/A
Broad Branch Road	Western	McKinley	100	100	200	0.0%	200	0.0%	200	200	400	100.0%	300	50.0%
Broad Branch Road	32nd St	27th St	200	200	300	0.0%	300	0.0%	300	300	300	0.0%	300	0.0%
Broad Branch Road	Grant	Brandywine	500	600	500	-16.7%	700	16.7%	600	600	600	0.0%	700	16.7%
Connecticut Avenue	DC line	McKinley	3,100	3,300	3,400	0.0%	3,700	2.8%	3,400	3,600	3,300	-2.9%	3,700	2.8%
Connecticut Avenue	Nebraska	36th	3,200	3,400	3,600	0.0%	3,900	2.6%	3,600	3,800	3,300	-8.3%	3,800	0.0%
Connecticut Avenue	Macomb	Cathedral	3,100	3,300	3,800	5.6%	4,100	7.9%	3,600	3,800	3,200	-11.1%	3,700	-2.6%
Connecticut Avenue	Columbia	Florida	3,100	3,300	3,700	5.7%	3,800	2.7%	3,500	3,700	4,100	17.1%	4,000	8.1%
Connecticut Avenue	18th St	Dupont Circle	2,100	2,200	2,400	9.1%	2,500	4.2%	2,200	2,400	2,600	18.2%	2,500	4.2%
Wisconsin Avenue	Albemarle	Nebraska	2,500	2,600	2,700	-3.6%	3,000	3.4%	2,800	2,900	2,900	3.6%	3,100	6.9%
Wisconsin Avenue	Porter	Newark	2,400	2,600	2,800	3.7%	2,900	3.6%	2,700	2,800	2,900	7.4%	3,000	7.1%
Wisconsin Avenue	Calvert	Reservoir	2,300	2,500	2,400	-4.0%	2,700	0.0%	2,500	2,700	2,600	4.0%	2,900	7.4%
Wisconsin Avenue	O St	P St	1,700	1,700	1,900	0.0%	1,900	0.0%	1,900	1,900	1,900	0.0%	1,900	0.0%
Massachusetts Avenue	DC line	49th St	2,100	2,100	2,400	4.3%	2,300	0.0%	2,300	2,300	2,500	8.7%	2,400	4.3%
Massachusetts Avenue	Macomb	Idaho	2,800	2,800	3,000	0.0%	3,000	0.0%	3,000	3,000	3,000	0.0%	3,100	3.3%
Massachusetts Avenue	Garfield	34th St	3,900	3,900	4,300	4.9%	4,100	0.0%	4,100	4,100	4,300	4.9%	4,200	2.4%
Massachusetts Avenue	24th St	Sheridan Circle	2,100	2,100	2,400	4.3%	2,300	0.0%	2,300	2,300	2,400	4.3%	2,500	8.7%
Massachusetts Avenue	Sheridan Circle	Florida	2,500	2,500	2,800	3.7%	2,700	0.0%	2,700	2,700	2,700	0.0%	2,900	7.4%
Massachusetts Avenue	17th St	18th St	1,800	1,800	1,900	0.0%	1,800	-5.3%	1,900	1,900	1,900	0.0%	2,000	5.3%
Nebraska Avenue	Oregon	Utah	500	500	700	16.7%	700	16.7%	600	600	700	16.7%	700	16.7%
Nebraska Avenue	Nevada	Military	2,000	2,000	2,200	0.0%	2,200	0.0%	2,200	2,200	2,200	0.0%	2,200	0.0%
Nebraska Avenue	Reno	Albemarle	1,700	1,700	2,000	5.3%	1,900	0.0%	1,900	1,900	2,000	5.3%	2,000	5.3%
Nebraska Avenue	Van Ness	Massachusetts	1,900	1,900	2,000	-4.8%	2,100	0.0%	2,100	2,100	2,100	0.0%	2,100	0.0%
Military Road	Nebraska	32nd St	1,700	1,700	1,800	-5.3%	1,900	0.0%	1,900	1,900	1,800	-5.3%	1,900	0.0%
Military Road	Oregon	Beach	2,600	2,400	2,700	-6.9%	2,600	-3.7%	2,900	2,700	2,700	-6.9%	2,700	0.0%
Military Road	16th St	14th St	2,200	2,000	2,300	-8.0%	2,300	0.0%	2,500	2,300	2,500	0.0%	2,500	8.7%
West Beach	Beach	Portal	1,000	1,300	1,000	-23.1%	1,500	-6.3%	1,300	1,600	900	-30.8%	1,200	-25.0%
Wise Road	Oregon	Beach	1,000	1,100	1,100	0.0%	1,300	0.0%	1,100	1,300	1,100	0.0%	1,400	7.7%
Sherrill Drive	Beach	16th St	200	300	700	16.7%	700	-12.5%	600	800	200	-66.7%	200	-75.0%
Bingham Drive	Oregon	Beach	100	100	200	0.0%	200	0.0%	200	200	200	0.0%	200	0.0%
Joyce Road	Morrow	16th St	100	100	100	0.0%	100	-50.0%	100	200	0	-100.0%	0	-100.0%
Morrow	Joyce	Carter-Barron	200	200	600	50.0%	400	0.0%	400	400	300	-25.0%	100	-75.0%
Kennedy	14th St	13th St	600	600	700	-12.5%	800	0.0%	800	800	700	-12.5%	700	-12.5%
Blagden Avenue	Beach	Upshur	500	600	800	0.0%	800	-11.1%	800	900	800	0.0%	900	0.0%
Blagden Avenue	Upshur	Decatur	400	400	600	0.0%	600	-14.3%	600	700	700	16.7%	800	14.3%
Piney Branch Pkwy	Beach	16th St	1,200	800	1,000	-23.1%	800	-11.1%	1,300	900	1,400	7.7%	900	0.0%
Tilden Street	Linnean	Beach	700	700	900	12.5%	800	0.0%	800	800	800	0.0%	900	12.5%
Park Road	Beach	Piney Branch	800	900	900	0.0%	1,000	0.0%	900	1,000	900	0.0%	1,100	10.0%
Porter Street	Connecticut	Klingbe	1,300	1,300	1,400	0.0%	1,500	7.1%	1,400	1,400	1,400	0.0%	1,500	7.1%
Adams Mill Road	Park	Irving	800	800	800	-11.1%	800	-11.1%	900	900	700	-22.2%	900	0.0%
Harvard Street	Adams Mill	16th St	400	400	500	0.0%	500	0.0%	500	500	500	0.0%	500	0.0%
Zoo Main Rd	Connecticut	Zoo	200	300	400	33.3%	400	33.3%	300	300	200	-33.3%	400	33.3%
Cathedral Avenue	Calvert	Beach / 24th	1,200	1,300	700	-50.0%	1,600	14.3%	1,400	1,400	1,200	-14.3%	1,100	-21.4%
24th / Calvert access	24th / Calvert	Beach	2,200	2,000	3,500	25.0%	3,400	30.8%	2,800	2,600	2,200	-21.4%	2,100	-19.2%
M Street	30th St	Pennsylvania	3,300	3,700	3,700	0.0%	4,100	-2.4%	3,700	4,200	3,700	0.0%	4,100	-2.4%
M Street	New Hampshire	22nd St												

*Note: % Change shown represents the difference between the selected alternative and Alternative B (Continued Current Management) in the year 2020.

TABLE G.3
MATRIX 3: LEVEL OF SERVICE ANALYSIS*

ROADWAY LINK RESULTS										
Roadway	From	To	1990 LOS		2020 LOS					
			AM	PM	Alt A		Alt B		Alt C	
					AM	PM	AM	PM	AM	PM
Beach Drive	Wyndale	W Beach	A	B	C	C	C	C	--	--
Beach Drive	Wise	Sherrill	B	B	C	C	C	D	--	--
Beach Drive	Bingham	Joyce	B	B	B	C	B	C	A	A
Beach Drive	Joyce	Broad Branch	B	B	A	B	B	C	--	--
Beach Drive	Blagden	Tilden / Park	C	E	C	E	D	F	C	E
Beach Drive	Porter	Zoo	D	E	B	C	E	F	C	E
Beach Drive	Zoo	24th / Cathedral	D	E	B	C	E	F	E	E
RCPW SB	24th / Cathedral	Waterside NB on	C	--	C	--	D	--	C	C
RCPW NB	24th / Cathedral	Waterside NB on	--	C	--	C	--	D	C	C
RCPW SB	Waterside ramps	P ramps	D	--	D	--	E	--	D	D
RCPW NB	Waterside ramps	P ramps	--	D	--	E	--	E	D	E
RCPW SB	K / Whitehurst	Virginia	C	--	C	--	D	--	B	E
RCPW NB	K / Whitehurst	Virginia	--	C	--	E	--	E	D	D
RCPW SB	Virginia	Teddy Roosevelt Br	C	--	C	--	C	--	C	D
RCPW NB	Virginia	Teddy Roosevelt Br	--	C	--	C	--	C	C	D
16th Street	DC line	S Portal	D	D	D	D	D	D	D	D
16th Street	Alaska	Sherrill	E	E	D	D	D	D	D	D
16th Street	Missouri	Kennedy	D	D	D	D	D	D	D	D
16th Street	Kennedy	Colorado	C	C	D	D	D	D	D	D
16th Street	Park	Irving	D	D	D	D	D	D	D	D
16th Street	Euclid	Florida	D	D	D	D	D	D	D	D
Alaska Avenue	Georgia	Morningside	B	B	C	C	C	C	C	C
Georgia Avenue	Alaska	Fern	E	E	E	E	E	E	E	E
Georgia Avenue	Dahlia	Aspen	D	D	E	E	E	E	E	E
Georgia Avenue	Missouri	Kennedy	C	C	E	E	D	D	E	E
Georgia Avenue	Arkansas	Upshur	C	C	D	D	E	E	D	D
Oregon Avenue	Western	Wise / Chesnut	A	A	A	A	A	A	A	A
Oregon Avenue	Chesnut	Nebraska	C	C	C	C	D	C	C	C
Oregon Avenue	Moreland	Military	A	A	A	A	A	A	A	B
Glover Road	Military	Grant	A	A	A	A	A	A	A	A
Grant Road	Glover	Broad Branch	A	A	A	A	A	A	A	A
Glover Road	Ross	Broad Branch	A	A	A	A	A	A	A	A
Ross Drive	Glover	Joyce	C	C	C	C	C	C	C	C
Broad Branch Road	Western	McKinley	A	A	A	A	A	A	A	A
Broad Branch Road	32nd St	27th St	A	A	A	A	A	A	A	A
Broad Branch Road	Grant	Brandywine	B	B	B	B	B	B	B	B
Connecticut Avenue	DC line	McKinley	D	D	D	D	D	D	D	D
Connecticut Avenue	Nebraska	36th	D	D	D	D	D	D	D	D
Connecticut Avenue	Macomb	Cathedral	E	E	E	E	E	E	E	E
Connecticut Avenue	Columbia	Florida	D	D	D	D	D	D	D	D
Connecticut Avenue	18th St	Dupont Circle	C	C	C	C	C	C	C	C
Wisconsin Avenue	Albemarle	Nebraska	D	E	E	E	E	E	E	E
Wisconsin Avenue	Porter	Newark	D	E	E	E	E	E	E	E
Wisconsin Avenue	Calvert	Reservoir	D	D	D	E	D	E	E	E
Wisconsin Avenue	O St	P St	C	C	C	C	C	C	C	C
Massachusetts Avenue	DC line	49th St	D	D	D	D	D	D	D	D
Massachusetts Avenue	Macomb	Idaho	E	E	E	E	E	E	E	E
Massachusetts Avenue	Garfield	34th St	F	F	F	F	F	F	F	F
Massachusetts Avenue	24th St	Sheridan Circle	D	D	D	D	D	D	D	D
Massachusetts Avenue	Sheridan Circle	Florida	D	D	E	E	E	E	E	E
Massachusetts Avenue	17th St	18th St	C	C	C	C	C	C	C	C
Nebraska Avenue	Oregon	Utah	B	B	B	B	B	B	B	B
Nebraska Avenue	Nevada	Military	D	D	D	D	D	D	D	D
Nebraska Avenue	Reno	Albemarle	D	D	D	D	D	D	D	D
Nebraska Avenue	Van Ness	Massachusetts	D	D	D	D	D	D	D	D

TABLE G.3 (Continued)
MATRIX 3: LEVEL OF SERVICE ANALYSIS*

ROADWAY LINK RESULTS										
Roadway	FromTo		1990 LOS		2020 LOS					
					Alt A		Alt B		Alt C	
			AM	PM	AM	PM	AM	PM	AM	PM
Military Road	Nebraska	32nd St	C	C	C	C	C	C	C	C
Military Road	Oregon	Beach	E	D	E	E	E	E	E	E
Military Road	16th St	14th St	D	C	D	D	D	D	E	E
West Beach	Beach	Portal	C	E	C	E	E	F	C	E
Wise Road	Oregon	Beach	C	D	D	E	D	E	D	E
Sherrill Drive	Beach	16th St	A	A	B	B	B	C	--	--
Bingham Drive	Oregon	Beach	A	A	A	A	A	A	--	--
Joyce Road	Morrow	16th St	A	A	A	A	A	A	A	A
Morrow	Joyce	Carter-Barron	A	A	B	A	A	A	A	A
Kennedy	14th St	13th St	B	B	B	C	C	C	B	B
Blagden Avenue	Beach	Upshur	B	B	C	C	C	C	C	C
Blagden Avenue	Upshur	Decatur	A	A	B	B	B	B	B	C
Piney Branch Pkwy	Beach	16th St	D	C	C	C	E	C	E	C
Tilden Street	Linnean	Beach	C	C	D	D	D	D	D	D
Park Road	Beach	Piney Branch	D	D	D	D	D	D	D	E
Porter Street	Connecticut	Klingie	D	D	D	D	D	D	D	D
Adams Mill Road	Park	Irving	C	C	C	C	C	C	B	C
Harvard Street	Adams Mill	16th St	A	A	B	B	B	B	B	B
Zoo Main Rd	Connecticut	Zoo	A	A	A	A	A	A	A	A
Cathedral Avenue	Calvert	Beach / 24th	D	E	B	F	E	E	D	D
24th / Calvert access	24th / Calvert	Beach	F	F	F	F	F	F	F	F
M Street	30th St	Pennsylvania	F	F	F	F	F	F	F	F
M Street	New Hampshire	22nd St	C	C	C	C	C	C	C	D
New Hampshire Avenue	19th St	20th St	C	C	C	D	C	D	E	E
New Hampshire Avenue	21st St	M St	C	C	C	C	C	C	B	E
New Hampshire Avenue	Washington Circle	Virginia	B	B	B	B	B	B	C	B
Pennsylvania Avenue	M St	L St	D	E	E	E	E	E	D	E
Pennsylvania Avenue	K St	I St	C	C	D	D	D	D	C	D
Virginia Avenue	New Hampshire	23rd St	B	B	B	B	B	B	B	B
Constitution Avenue	23rd St	Henry Bacon	F	F	F	F	F	F	F	F

* This analysis provides a general indication of the level of service provided on the corridors within the study area based on volume versus capacity relationships for each roadway. Certain assumptions were made about the volume distributions and lane use during peak hour periods. For the purposes of this analysis, the following volume/capacity relationships were used: LOS A= 0-28%, LOS B= 29-47%, LOS C= 48-66%, LOS D= 67-79%, LOS E= 80-100%, LOS F= 100+%.

Adjustment factors for lane capacity includes adjustments for signalized areas, trucks, buses, access points, grades, lane width, turning vehicles, and on-street parking.

APPENDIX H – SUMMARY OF TRAFFIC MODELING METHODOLOGY

INTRODUCTION

The National Park Service is in the process of producing a General Management Plan (GMP) and an environmental impact statement for Rock Creek Park. During the course of the GMP process a variety of alternatives were developed and analyzed. In order to conduct a through analysis it was necessary to develop a traffic model for Rock Creek Park that would forecast traffic conditions within the study area. The model was used to analyze the traffic impacts of the various alternatives considered in the GMP.

The Metropolitan Washington Council of Governments (MWCOC) is the agency in the Washington, D.C. area that is responsible for regional planning and traffic modeling. The MWCOC regional transportation model was used as the basis for the Rock Creek Park transportation model used to evaluate roadway system alternatives considered in the GMP for the Park. It was necessary to modify the MWCOC regional model to improve the detail and accuracy of the model in the study area and to allow evaluation of the alternatives being considered in this project.

MWCOC REGIONAL TRANSPORTATION MODEL

The MWCOC transportation model files, network plots and supporting documentation were obtained from MWCOC in September, 1996. This model utilizes the MINUTP microcomputer software package (version 93B) developed by Comsis Corporation (currently maintained by the Seiders Group). The model has been developed for several target years, including 1990, 2000, 2010 and 2020. Data on years other than even decades were not available. The MWCOC model has been developed and validated for regional studies and regional air quality analysis, not subregional or corridor studies such as the Rock Creek Park project.

The area covered by the MWCOC includes approximately 4,000 square miles and 12 principal jurisdictions within the Washington, D.C. metropolitan area. These jurisdictions include Washington, D.C. and these surrounding counties: Montgomery, Prince Georges, Charles, Anne Arundel, Howard, and Frederick in Maryland, and Arlington, Alexandria, Fairfax, Loudoun, and Prince William in Virginia.

The roadway network used in the MWCOC model contains over 9,000 links and 6,000 nodes. Existing and proposed HOV lanes for the metropolitan area are included in these networks. The MWCOC model includes 293 districts and 1,478 zones within those districts. Trip generation and trip distribution calculations are performed at the district level, while mode choice and all traffic assignment calculations are performed at the zone level. Zone sizes are typically smaller in the center of the model area (i.e. - Washington, D.C.) and become larger as the zones are located farther out in the Maryland and Virginia suburban counties.

Growth Factors

The current version of land use forecasts, Round 5.3 Cooperative Forecast, reflects the latest estimates of regional job and household growth as agreed upon by local planning agencies around

the region. The regional growth forecasts used by MWCOC for the years 2000, 2010, and 2020 were applied to the Rock Creek Park model to predict traffic in those future years.

Trip Generation

Trip generation calculations are applied at the district level. Productions and attractions are calculated for each district by the following six trip purposes: home based work (HBW), home based shop (HBS), home based other (HBO), non-home based (NHB), medium truck and heavy truck. Miscellaneous trips such as taxi, school, tourist and through trips are estimated separately based on growth factored survey-based trip tables and added later in the model run. All purposes are in vehicle trips except HBW, which is in units of person trips.

Trip Distribution

The trip distribution step utilizes the standard gravity model to develop district level trip tables from productions and attractions calculated in trip generation. While most districts use a base set of friction factors to distribute trips, there are some districts with unique travel characteristics (such as airports and external districts) which utilize different sets of friction factors for trip distribution.

Mode Choice

In the MWCOC model, mode choice currently allocates HBW person trips among motorized travel choices. HBW person trips from trip distribution are split from district to zone level prior to mode choice. Mode choice calculates the number of persons traveling in single occupancy vehicles (SOV) and in high-occupancy vehicles (HOV), walk-access transit, auto-access transit, HOV auto-driver and HOV auto-person trip tables. In these tables, HOV represents all persons actually using HOV lanes, while low-occupancy vehicles (LOV) represents all persons using LOV lanes. This mode choice is only performed once during the base run, and only includes HBW trips. Trips for all other purposes are not included in this mode choice procedure.

Traffic Assignment

Traffic assignment involves a four iteration incremental capacity restraint procedure for loading trips to the network. The loading of each iteration is equal (25% of the trip table), and the path building algorithm weights time and distance equally. The model assigns all trips on a daily basis, assuming a peak-hour factor of 10 percent on all links for capacity calculations except the Beltway (8 percent) and a few other unique roadways such as HOV facilities. Thus, there are no peak period assignments in the MWCOC model.

MODIFICATIONS MADE TO MWCOC MODEL TO CREATE THE ROCK CREEK PARK MODEL

Because the MWCOC regional model only includes the major arterial road network, it was necessary to make additions to roadway network within the study area to include all of the roads within the Park and numerous local city streets near the Park. It was also necessary to develop AM peak period, PM peak period, and OFF peak period trip tables to enable full impact analysis

of the alternatives. It was also necessary to develop High-occupancy Vehicle (HOV) trip tables by trip purpose and by peak period to allow analysis of alternatives that include HOV operation during peak periods.

The model was validated using actual ground count volumes from the year 1990 that were collected by the National Park Service and D.C. Department of Public Works.

As stated above, the MWCOG model has been primarily developed and validated for regional traffic studies and air quality analysis, not subregional or corridor studies such as the Rock Creek Park project. In order to effectively evaluate impacts of project alternatives within the Rock Creek study area, significant modifications to the original MWCOG model were included in the development of the Rock Creek Park (RCP) model. Due to these changes, RCP model results cannot be directly compared to results from the MWCOG model. However, the RCP model has a significantly improved correlation between model results and existing ground counts within the project study area relative to the MWCOG original model. These RCP model volumes are then adjusted in the RCP adjustment spreadsheet.

The following types of modifications to the MWCOG model were included in the development of the RCP model:

- additions and modifications to roadway network within the study area, including better spatial representation of Beach Drive, Rock Creek and Potomac Parkway and other roadways, new local roadways added to the network, relocation of some centroids within their zonal boundaries, addition and relocation of some centroid connectors, and speed and capacity changes along some roadway links

- development of AM peak period, PM peak period, and OFF peak period roadway networks and traffic assignment procedures, with the sum of these peak period assignment results representing an ADT assignment

- development of LOV, HOV-2, HOV-3 trip tables by trip purpose and by peak period to allow analysis of HOV-2 conditions during peak periods along Beach Drive

- use of adjustment spreadsheets for the following purposes: adjust future year model link volumes based on existing (1990) model volume to ground count error, include peak-hour spreading for future year model runs, and present output data in tabular format by roadway and by screenline for improved comparison and analysis

ROCK CREEK PARK TRAFFIC MODEL

The following sections describe the RCP model, with emphasis on the modifications made to the MWCOG model.

Modeling Area

The whole modeling area was retained, even though the project study area was mostly contained within the western half of Washington, D.C. Model run times were not excessively long to justify the effort to reduce the size of the model area.

Land Use / Trip Generation

There was no modification to the MWCOC zone system, land use data or trip generation procedures or results. Thus, it is assumed that project alternatives do not change the number of trips made in any zone.

Highway Networks

Outside of the project study area, all network data remains identical to original MWCOC model area data. Numerous modifications were made to the MWCOC roadway network within the RCP study area. Generally, the project study area boundaries are the Wisconsin Avenue / Foxhall Road alignment to the west, East - West Highway (Rte 410) to the north, the George Mason / 14th Street Bridge to the south, and North Capitol Street to the east.

Trip Distribution

The RCP model keeps trip tables constant for each project alternative being analyzed within any future target year. Trip distribution results from the MWCOC model were utilized for this project. It is assumed that project alternatives do not change the origin and destination of any trips; only the travel paths calculated in traffic assignment can change due to a project alternative. Therefore, the trip tables calculated in the MWCOC action model runs for each target year were used for all RCP model runs.

Mode Choice

The RCP model uses the results of the MWCOC mode choice steps, which estimate LOV auto drivers, LOV auto persons, walk-access transit, auto-access transit, HOV auto-driver and HOV auto-person trip tables for the HBW trip purpose. In these mode choice steps, HOV is defined as HBW persons or drivers actually using an HOV facility included in the MWCOC model, while LOV represents all other HBW persons or vehicles. Note that the MWCOC model only calculates HBW trips which access transit facilities or utilize HOV facilities.

To estimate usage of HOV lanes along Beach Drive, the RCP model utilizes the MWCOC post-mode choice procedure. This procedure estimates LOV auto driver and LOV auto person trip tables by auto occupancy. For the RCP model, SOV, HOV-2 and HOV-3 trip tables were calculated for each trip purpose. MWCOC currently has no available data for auto occupancy by trip purpose in the Washington, D.C. region. Therefore, consultant estimates of average auto occupancy for each trip purpose were utilized based on data collected within the project study area during this study as well as data from other similar urban areas.

Time of Day Trip Table Calculations

As described above, the RCP model performs a post-mode choice procedure to calculate trip tables by auto occupancy. These trip tables are then stratified by period of the day to allow analysis of project alternatives involving peak period roadway network changes. The MWCOC has no available data regarding time of day (TOD) factors for trips by trip purpose (for example, the percentage of daily HBW trips which occur during the AM peak period). Therefore, the consultant compiled available data for other similar urban areas and estimated these TOD factors for each

trip purpose in the MWCOG model. These TOD factors were used to estimate trip tables by trip purpose for the AM peak period (3 hours), the PM peak period (3 hours), and the OFF peak period (18 hours).

Traffic Assignment

Following are the primary changes in the RCP model traffic assignment procedure relative to the MWCOG model:

The RCP model performs separate traffic assignments for the AM, PM and OFF peak periods, and adds the volumes of these three runs to produce ADT model volumes. These three period assignment procedures are identical except for the peak-hour percent of peak period factors as described below. In contrast, the MWCOG model performs one ADT traffic assignment.

Each RCP assignment includes a ten iteration incremental capacity restraint procedure, with each iteration loading 10% of the trip table. The MWCOG assignment procedure includes four iteration incremental capacity restraint procedure, with each iteration loading 25 percent of the trip table. It was observed that the four iteration assignment procedure used by MWCOG occasionally overloaded some minor streets within the project study area; the ten iteration procedure improved results along these minor roadways.

Adjustment Spreadsheet

The 1990 (existing conditions) RCP model link volumes are significantly closer to existing ground counts within the study area than MWCOG model link volumes. However, there is still much error along many links within the study area. Therefore, a spreadsheet was developed which adjusts all future year model results by adding / subtracting this inherent error to each link being analyzed. The same link adjustments are applied to all model run results. This adjustment procedure provides much more reasonable estimates of future link volumes, as known existing year model error is removed.

Air Quality Analysis

Model volumes calculated by the RCP model and adjusted with the adjustment spreadsheet are being utilized for most analytical purposes, including local or hot-spot air quality analysis. However, only selected links are included and adjusted in the adjustment spreadsheet. Regional air quality analysis, which must include all links within a specified geographic area, will use link volumes directly from the RCP model output before adjustment by adjustment spreadsheet. This unadjusted model output includes the same level of traffic diversion along all roadways due to project alternatives, so the relative impact of project alternatives on air quality can be calculated.

Agency Support

In addition to model computer files, MWCOG provided network plots and supporting documentation which were utilized throughout the development of the RCP model. Additionally, the District of Columbia Department of Public Works provided current and historic traffic count maps and count data. These maps and counts were utilized throughout this project.

Model Limitations

The following limitations have been identified about the RCP model:

Due to the nature of the model, it was not practical to attempt to model local roadways which carry very low traffic volumes. In order to model these low volume roadways, zones sizes would have to be greatly reduced and many more roadways would have to be included.

Neither the MWCOG model nor the RCP model provide any data relating to bicycle or pedestrian trips.

The data relating to the use of Metrorail and Metrobus is very limited and considered to be of little use in the analysis of alternatives.

The model does not provide any data on possible mode shifts that would result from a particular alternative.

TRAFFIC MODEL VALIDATION

The traffic model used in the EIS traffic impact analysis was developed in 1996 using the Metropolitan Washington Council of Governments (MWCOG) regional traffic model. The model was developed by MWCOG in the early 1990's and calibrated using 1990 ground traffic count data. The MWCOG model was modified by Robert Peccia & Associates (RPA) to provide more model sensitivity in the vicinity of the Park and within the study area of the EIS. This revised model was also calibrated using 1990 traffic count data provided by the Washington D.C. Department of Public Works.

It is essential that the model used to assess the traffic impacts of the various alternatives being considered be accurate enough for this purpose. In an effort to assess the current validity of the model it was necessary to compare current traffic counts with the model results for the same year. The most current traffic counts available from the Washington D.C. Department of Public Works were for the year 1999. These actual traffic counts were compared to traffic volumes generated by the model for the year 1999.

The traffic growth projections included in the model were used to estimate 1999 traffic volumes. RPA then compared actual traffic counts at 40 locations within the vicinity of the study area with the model results. The results of this analysis are presented in table H.1.

The data in table H.1 indicates that the actual overall trends in traffic volumes in the area of Rock Creek Park have not increased as much as the model predicted. It is not unreasonable to expect a traffic model to vary somewhat from actual growth trends. The MWCOG growth trends used to project traffic were based on a variety of factors including the anticipated growth of residential and commercial developments within the region. On average the model is projecting traffic volumes that are about 5% greater than the actual ground counts. The modeled traffic volumes for individual streets ranged from 22% less than the actual volume to 23% more than the actual traffic counts. In 24 of the 40 locations examined the actual volumes were within 10% of the modeled results. In 34 of the 40 locations the actual and modeled volumes were within 15% of each other. Considering the wide variety of social and economic variables that determined the growth

within the area between 1990 and 1999, the differences in traffic volumes are not considered unusual.

TABLE H.1: TRAFFIC VALIDATION SUMMARY

Roadway	From	To	1999 Actual Volumes (Thousands)	1999 Model Volumes (Thousands)	% Difference Be- tween Modeled and Actual Vol- umes
Beach Drive	Joyce	Broad Branch	12.5	9.8	-21%
Beach Drive	Porter	Zoo	25.0	26.9	8%
Rock Creek and Potomac Parkway southbound	Virginia	Teddy Roosevelt Br	24.1	21.8	-9%
Rock Creek and Potomac Parkway northbound	Virginia	Teddy Roosevelt Br	24.1	22.8	-5%
16th Street	Missouri	Kennedy	32.2	35.3	10%
16th Street	Park	Irving	33.8	34.5	2%
Georgia Avenue	Alaska	Fern	31.5	31.5	0%
Georgia Avenue	Missouri	Kennedy	22.7	24.9	10%
Georgia Avenue	Park	Kenyon	21.0	22.6	7%
Oregon Avenue	Chestnut	Nebraska	9.0	9.0	0%
Connecticut Avenue	D.C. line	McKinley	35.9	38.6	8%
Connecticut Avenue	Macomb	Cathedral	33.0	39.9	21%
Reno Road / 34th Street	Macomb	Woodley	16.7	17.7	6%
Massachusetts Avenue	Macomb	Idaho	30.5	34.6	13%
Adams Mill Road	Park	Irving	10.6	10.2	-4%
New Hampshire Avenue	21st St	M St	9.7	10.7	10%
Virginia Avenue	New Hampshire	23rd St	12.8	14.3	11%
23rd Street	N St	P St	20.0	15.6	-22%
19th Street	E St	Pennsylvania	16.1	16.6	3%
18th Street	E St	Pennsylvania	16.9	17.5	4%
Connecticut Avenue	18th St	Dupont Circle	30.2	28.8	-5%
Massachusetts Avenue	17th St	18th St	26.2	23.2	-12%
17th Street	Massachusetts	P St	7.8	9.2	17%
16th Street	Scott Circle	P St	17.2	21.1	23%
14th Street	Irving	New Hampshire	21.4	23.1	8%
Wisconsin Avenue	Newark	Woodley	29.2	31.7	9%
Connecticut Avenue	Jennifer	Military	35.9	40.1	12%
Nevada Avenue	Nebraska	Military	5.8	6.9	18%
Nebraska Avenue	Nevada	Military	19.0	23.3	23%
13th Street	Kennedy	Missouri	18.1	20.5	13%
16th Street	Kalmia	Iris	39.0	40.1	3%

TABLE H.1: TRAFFIC VALIDATION SUMMARY (CONTINUED)

Roadway	From	To	1999 Actual Volumes (Thousands)	1999 Model Volumes (Thousands)	% Difference Be- tween Modeled and Actual Vol- umes
Utah Avenue	32nd St	Western	2.0	2.0	1%
5th Street	Missouri	Kennedy	8.4	7.6	-9%
41st Street	Western	Military	7.4	8.5	14%
Western Avenue	41st St	Military	19.7	22.4	14%
Blair Road	Piney Branch	Fern	14.2	16.4	15%
Blair Road	Piney Branch	Fern	14.2	16.4	15%
14th Street	Pennsylvania	New York	33.0	35.5	8%
13th Street	E St	G St	14.5	14.5	0%
North Capital Street	Irving	Scale Gate	36.8	37.4	2%
OVERALL TOTAL=			838.1	883.6	5%

It is important to note that traffic modeling provides the analyst with information that indicates the anticipated trends in traffic changes resulting from a particular alternative. The actual volume estimated on a particular street is not nearly as important as the relative change in traffic volumes produced as a result of the alternative. When examining the model results the most important information provided relates to the relative changes in traffic patterns and the magnitude of the volume changes. The model is used as a tool to identify where volumes are likely to increase or decrease as a result of the alternative and to estimate the general magnitude of those changes. There is no evidence that indicates that the model does not provide a reasonable assessment of the relative change in traffic volumes resulting from a particular alternative.

This validity analysis indicates that in general the model reflects a slightly greater traffic volume for the year 1999 than what actually occurred in that year. However, the impact analysis included in the GMP/EIS, which relies heavily on relative changes in traffic patterns, does provide a reasonably accurate assessment of the traffic impacts within the area resulting from the various alternatives. The slight difference between the modeled and actual volumes is considered acceptable considering that the analysis was intended to examine the alternatives using a “worst case scenario.” The model results provide a reasonable approximation of the traffic impacts that would occur with each alternative.

Based on a comparison of the most current traffic volume data with the traffic model, it is the opinion of Robert Peccia & Associates that the traffic model is still valid for the purposes of the analyzing the GMP alternatives. Although the traffic volumes projected by the model are slightly greater than the actual traffic volumes, it still is valid for use as a basis for determining possible traffic impacts. We believe that the modified MWCOG model and the analysis results contained in the GMP/EIS are valid and can be used for traffic planning efforts within the study area.



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