# Environmental Assessment

## Design and Build Two Stacked Loop Hiking and Biking Trail Systems

## Develop Three Trails on Existing Roads

## Analyze Bike Use on Park Trails

West Virginia
2011

Cover photo by Tina Dempsey.

## Project Summary

The National Park Service (NPS) proposes to develop two stacked loop hiking and biking trail systems in the Craig Branch and Garden Ground Areas of the New River Gorge National River, develop three new single track trails on existing informal routes and to analyze the impacts of bicycle use on all proposed new trails, as well as on some of the park's existing trails. Analysis of the impacts of bicycle use on park trails must be done in order to promulgate a special rule in the Code of Federation Regulations that allows bike use on those trails.

The purpose of the project is to enhance recreational opportunities for visitors in the park while rehabilitating some resource damage that occurred prior to NPS ownership. Public input for park planning processes has underscored the need for more trails in the park, for opportunities to create loops within the trail system through trail connections and to normalize the use of bicycles on some park trails.

This Environmental Assessment examines in detail three alternatives:

- Alternative A, the No Action Alternative – provides for:
  - The continuation of current management
- Proposals common to both action alternatives – provides for:
  - Allowing bicycle use on some existing park trails and administrative roads
  - The development of the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and allowing bicycle use on those trails
- Alternative B, New Route Single Track Trail Construction (NPS Preferred Alternative) – provides for:
  - The development of the Craig Branch Stacked Loop Trail System, consisting of about 11 miles of new single track trail and allowing bicycle use on those trails
  - The development of the Garden Ground Stacked Loop Trail System, consisting of about 33 miles of new single track trail and allowing bicycle use on those trails
- Alternative C, Existing Disturbance Single Track Trail Construction – provides for:
  - The development of the Craig Branch Stacked Loop Trail System, consisting of about 4.5 miles of new single track trail and allowing bicycle use on those trails
  - The development of the Garden Ground Stacked Loop Trail System, consisting of about 45 miles of new single track trail and allowing bicycle use on those trails

Environmental impacts that would result from implementation of the three alternatives are addressed in this document. Impact topics include Water Quality; Streamflow Characteristics; Vegetation; Wildlife and Habitat; Cultural Resources; Park Facilities and Operations; Visitor Use, Experience, and Access; and Socioeconomics.

**Public Review and Comment.** This Environmental Assessment will be distributed for public review and comments for a minimum of 30 days. The NPS will consider and respond to the comments received, and if no major substantive issues are identified, the NPS will select an alternative and prepare a Finding of No Significant Impacts.

**Notes to Reviewers and Respondents.** This environmental assessment is available online at the New River Gorge National River park planning website (http://parkplanning.nps.gov/NERI) by following the appropriate links. It is also being distributed for agency review and comment for a period of 30 days. Comments can be made online, through the park planning website (preferred), or in the form of email and letters, which must be post marked by the due date posted on the website. Before including any personal identifying information in your comment, you should be aware that your entire comment – including personal identifying information – may be made publicly available at any time. If you would like to request that personal identifying information in your comment be withheld from public review, you must state this prominently at the beginning of your comment. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

**Please comment online at the park website, http://parkplanning.nps.gov/NERI.**

If you are sending a letter, please address it to:
NPS – New River Gorge National River
Attn: Superintendent; Comment on Hike and Bike EA
P.O. Box 246
Glen Jean, WV 25846-0246

If you are sending an email, please address it to NERI_Superintendent@nps.gov with the following subject line: "Comment on Hike and Bike EA".

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# 1 PURPOSE AND NEED FOR ACTION

Chapter One of this Environmental Assessment describes the purpose of the proposed project and why it is needed. This chapter also summarizes the context for the project in the park and in a legal and policy framework.

## 1.1 New River Gorge National River Overview

The New River Gorge National River, a unit of the NPS, encompasses approximately 72,000 acres within a 53-mile corridor along the New River, extending from Hinton to Hawks Nest State Park in West Virginia. Congress established the park in 1978 "for the purpose of conserving and interpreting outstanding natural, scenic and historic values and objects in and around the New River Gorge and preserving as a free-flowing stream an important segment of the New River in West Virginia for the benefit and enjoyment of present and future generations" (Public Law 95-625, 11/10/78).

As described in the park's Foundation Plan (NPS 2009), the purposes of the New River Gorge National River are to:

- Preserve an important free-flowing segment of the New River
- Preserve, protect and conserve outstanding resources and values in and around the New River Gorge, including geologic and hydrologic features, terrestrial and aquatic ecosystems, historic and archeological resources, cultural heritage and scenic character
- Provide opportunities for public understanding, appreciation and enjoyment of the park's natural, cultural, scenic and recreational resources and values.

## 1.2 Definitions

**Administrative Road**. Park administrative roads, generally having one-lane or two-track dirt and gravel surfaces, are those that are open only to NPS-authorized vehicle use. Public access is limited to hiking, in some cases biking, and in limited cases equestrian use.

**Backcountry.** Backcountry zones are described in the 2010 GMP as areas managed to protect large contiguous tracts of intact forest with negligible site-specific impacts. Visitor use would be low, and low-impact recreation would occur that would have negligible to minor impacts on overall forest values. Backcountry trails would be designed for low use by highly experienced hikers and, in designated cases, bicyclists. Trails would not exceed 18 to 24 inches in width and could have a rugged surface with exposed obstacles, such as rocks and roots.

**Bicycle.** The Code of Federal Regulations defines "bicycle" as "every device propelled solely by human power upon which a person or persons may ride on land, having one, two, or more wheels, except a manual wheelchair" (36 CFR 1.4). The terms "bicycle" and "bike" are used interchangeably throughout this document, and the action of using a bicycle is referred to interchangeably as "bicycling" and "biking".

**Frontcountry.** Frontcountry zones are described in the 2010 Draft GMP as areas managed to protect large block of contiguous forest with some minor, site-specific forest fragmentation. Visitor use in a frontcountry zone would be moderate, with moderate-impact recreation occurring that would have negligible to minor impacts on overall forest values. Frontcountry trails would accommodate a moderate intensity of use by a broad range of users, have a maximum width of 30 to 36 inches and may have uneven surfaces.

**Off-road Bicycling.** The Code of Federal Regulations prohibits the use of a bicycle "except on park roads, in parking areas and on routes designated for bicycle use" (36 CFR 4.30). Off-road bicycling, a term used interchangeably in this document with "mountain biking", refers to the use of bicycles

beyond park roads and parking areas, generally on routes that include trails. The park's 1982 GMP calls this activity "dirt bicycling."

**Single Track Trail.** Single track trails occur throughout the park, including in both frontcountry and backcountry management zones. They can vary in width through the differently zoned trail standards, but are generally of a width where users must travel in single file or would feel most comfortable traveling in single file.

## 1.3 Purpose and Need for Action

The purpose of the project is to enhance recreational opportunities for visitors in the park while rehabilitating some resource damage that occurred prior to NPS ownership.

Action is needed at this time for the following reasons:

- Line-item construction funding was awarded to the park in 2009 to design and construct new stacked loop single track trail systems; this funding should be spent within a reasonable amount of time.
- The Boy Scouts of America (BSA) requested the opportunity to bring about 2,000 volunteers to the park during June and July 2011 to construct new trails and participate in resource rehabilitation.
- During the park's recent planning process for a new General Management Plan (GMP), park managers learned that more prohibited off-road bicycle use was occurring on park trails than previously understood.
- Public input for the GMP process revealed that the public wants the park to provide more trails, more opportunities to create loops from trails and trail connections and to sanction bicycle use on some park trails, including both existing and new trails.
- Internal scoping for this Environmental Assessment revealed more extensive resource damage in some of the project areas from prior land uses and prohibited off-highway vehicle (OHV) use; rehabilitation of these areas is necessary to better protect park resources.

## 1.4 Project Background

The New River Gorge National River's guiding management document is its 1982 GMP, which the park began a planning process to update in 2005 through the production of a new GMP. A Draft GMP was released for public review and comment during January through April of 2010. At the time of publication of this EA, a Record of Decision authorizing the park to take action under the new GMP has not been signed. The Draft GMP proposes that the park would develop new trails, including several stacked loop trail systems, and the specifics of these decisions would be determined through the subsequent development of a park-wide Trail Management Plan. Under normal circumstances, the actions proposed in this EA would be components of the Trail Management Plan. However, because of the need to spend available funds, and particularly because of the time-limited availability of the large volunteer labor crew the BSA would like to provide, park managers determined that the park should move forward with the planning process for the actions proposed in this EA prior to the approval of the new GMP. The actions proposed are consistent with both the 1982 GMP and the 2010 Draft GMP; if the Record of Decision is signed for the new GMP, there would be no conflicts between actions proposed in this EA and desired condition decisions proposed by the Draft GMP or the anticipated subsequent Trail Management Plan.

In addition to new trail development, the Draft GMP proposes an expansion of biking opportunities in the park. Bicycle use is currently allowed on nine designated park administrative roads, though unauthorized use also occurs on park trails; park management was not aware of the extent of this prohibited activity until the new GMP was being developed. Through the public scoping and comment opportunities for the new GMP, many members of the public and park user groups requested that the NPS consider designation of additional routes for biking in the park. Because bike use occurs on park trails, the New River Gorge National River is currently not in compliance with the Code of Federal

Regulations, 36 CFR 4.30, which prohibits bicycle use except on park roads, in developed areas and on designated routes. Because the decision would be consistent with both the 1982 and 2010 Draft GMPs, the park is proposing in this EA to designate routes for bike use in order to meet public demand. In order to come into full compliance with the Code of Federal Regulations, the park must both determine that bicycle use is appropriate on routes proposed for designation based upon a formal impact analysis and promulgate a special regulation for those designated routes. The promulgation process is occurring in conjunction with the process of developing this EA, and includes a separate opportunity for public review and comment. Approval of a special regulation allowing off-road bicycle use in the park is pursuant to a Finding of No Significant Impact for the decisions proposed in this EA.

## 1.5 Project Areas

Because there are four distinct actions proposed in this EA, there are four distinct project areas considered. Figure 1-1 indicates where each of these project areas is located within the New River Gorge National River.

**Existing Trails and Administrative Roads.** Trails and administrative roads exist throughout the entire park, as represented in Figure 1-2, and are available to be considered as trails on which the park may propose to allow bicycle use.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** These areas, represented in Figures 1-3 and 1-4, contain old roads and sections of railroad grade that have not been used in many years, and are available to redevelop as new park trails.

**Craig Branch Area.** Most of the Craig Branch area, represented in Figure 1-5, came into NPS ownership in 2005. The park currently does not provide recreational facilities in the newly-purchased property, though the Draft GMP proposes that trails be developed in this area.

**Garden Ground Area.** The Garden Ground area, represented in Figure 1-6, is also an area of the park where the Draft GMP proposes that trails be developed.

1 **Figure 1-1. Project Areas Within the New River Gorge National River**

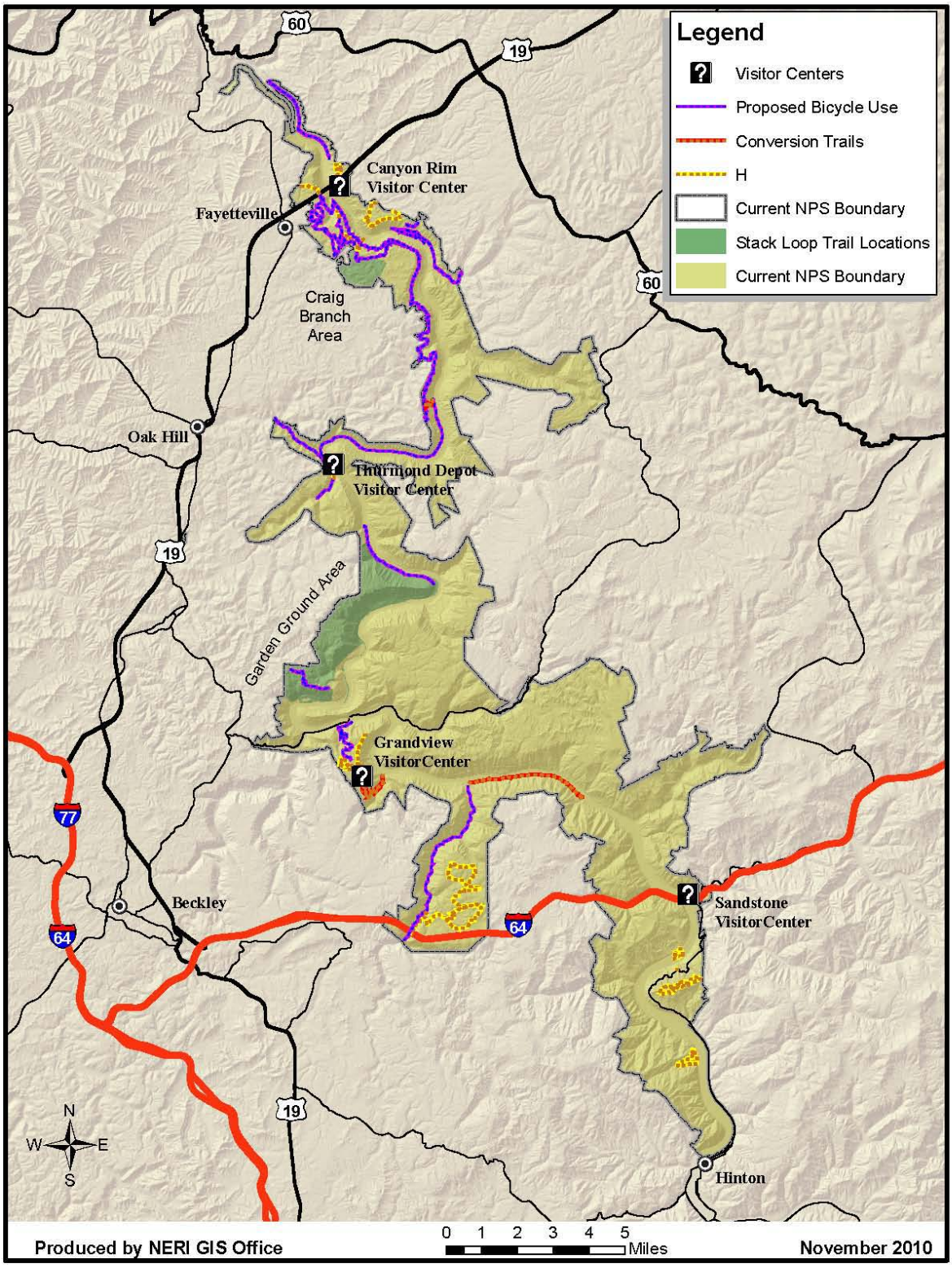


**Figure 1-2. Project Area for Existing Trails and Administrative Roads**

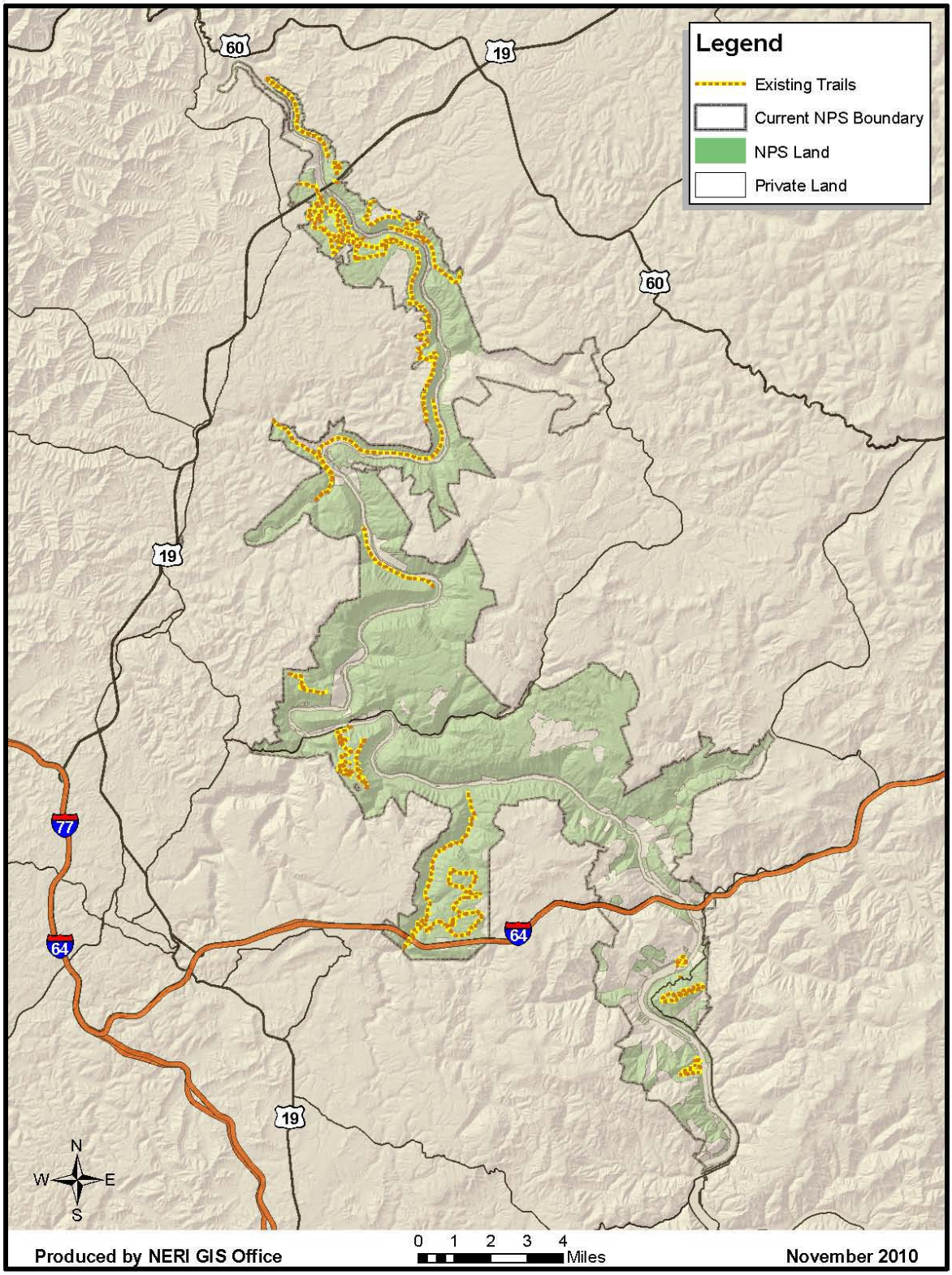


**Figure 1-3. Mud Turn and Panther Branch Project Areas**

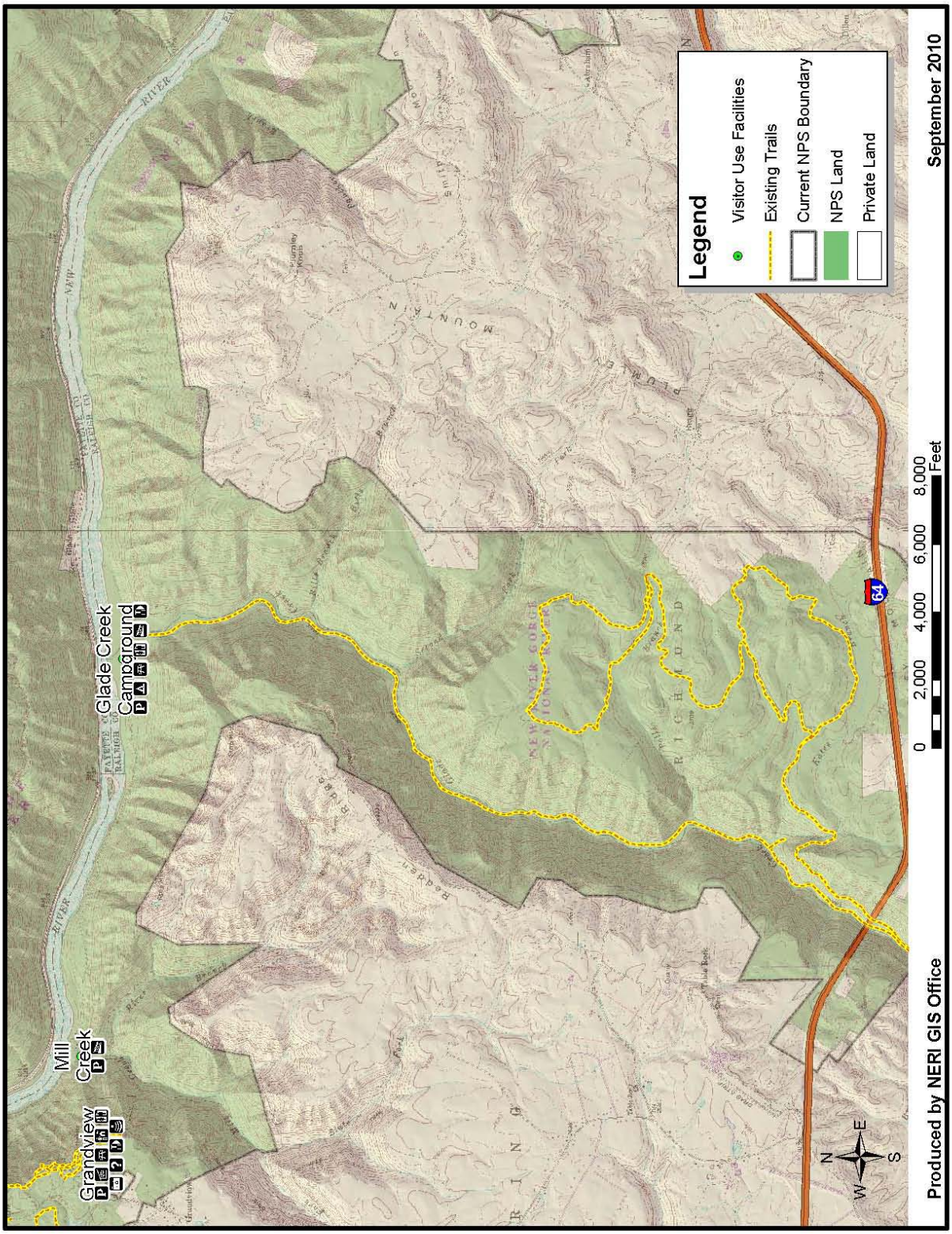


**Figure 1-4. Brooklyn Mine Project Area**

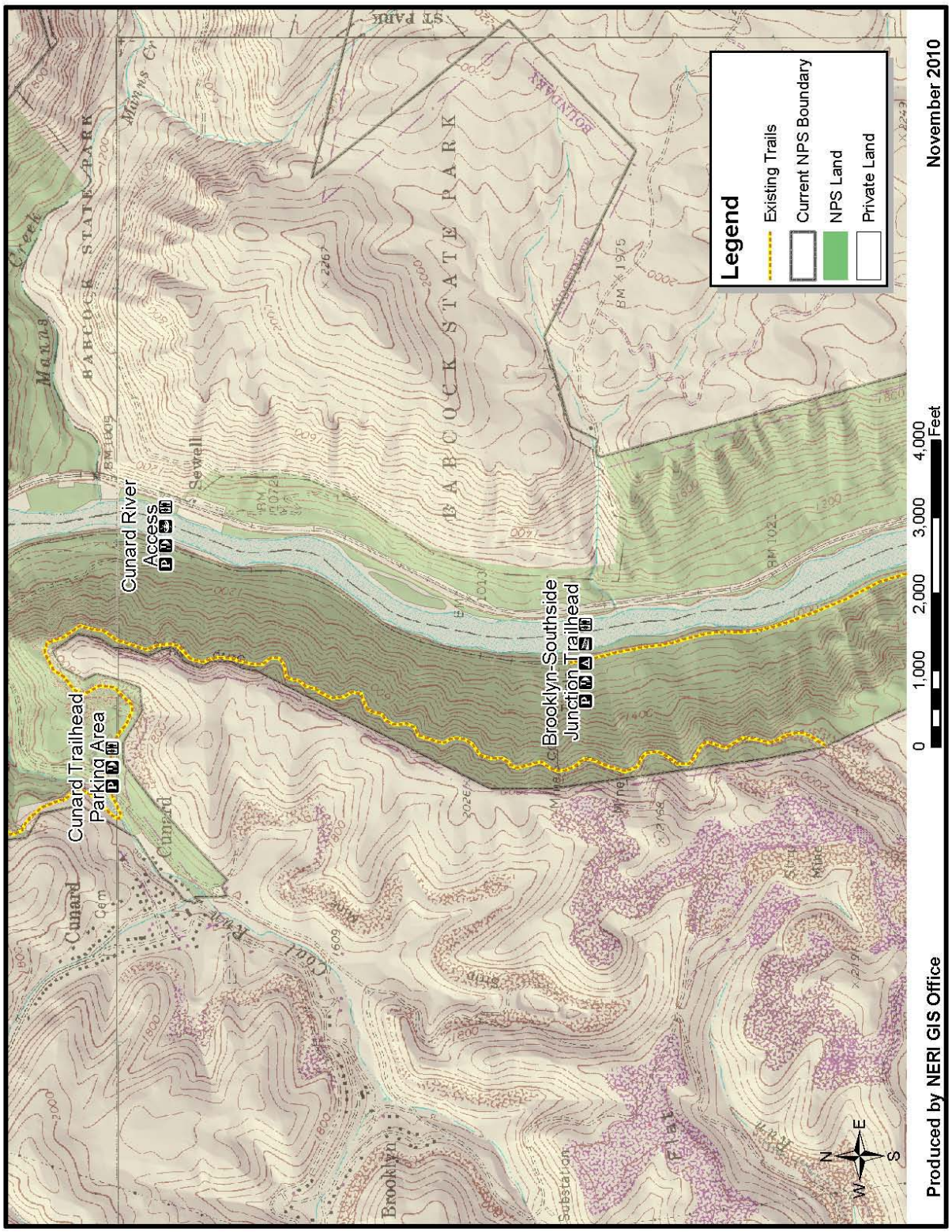


**Figure 1-5. Craig Branch Project Area**

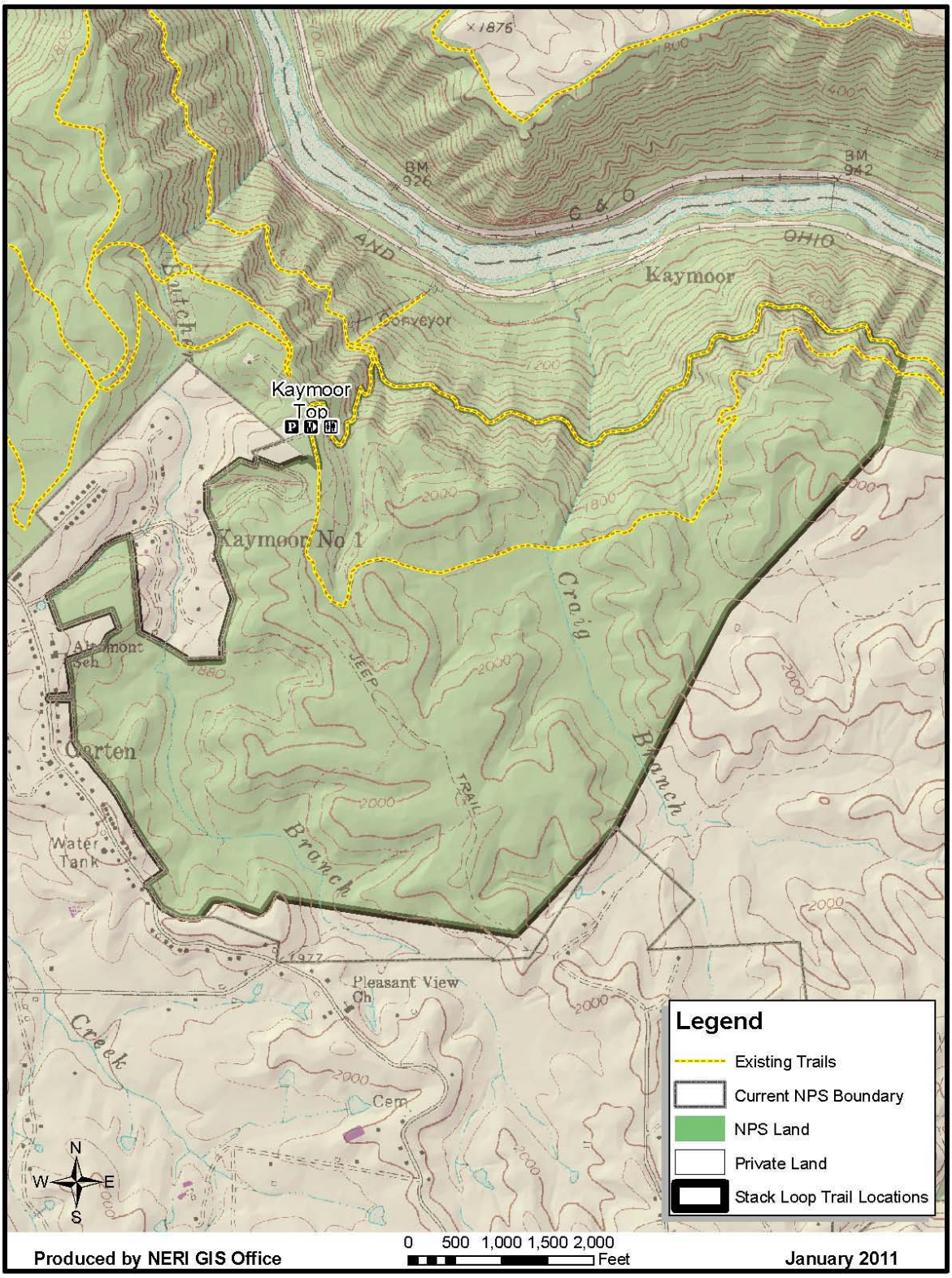
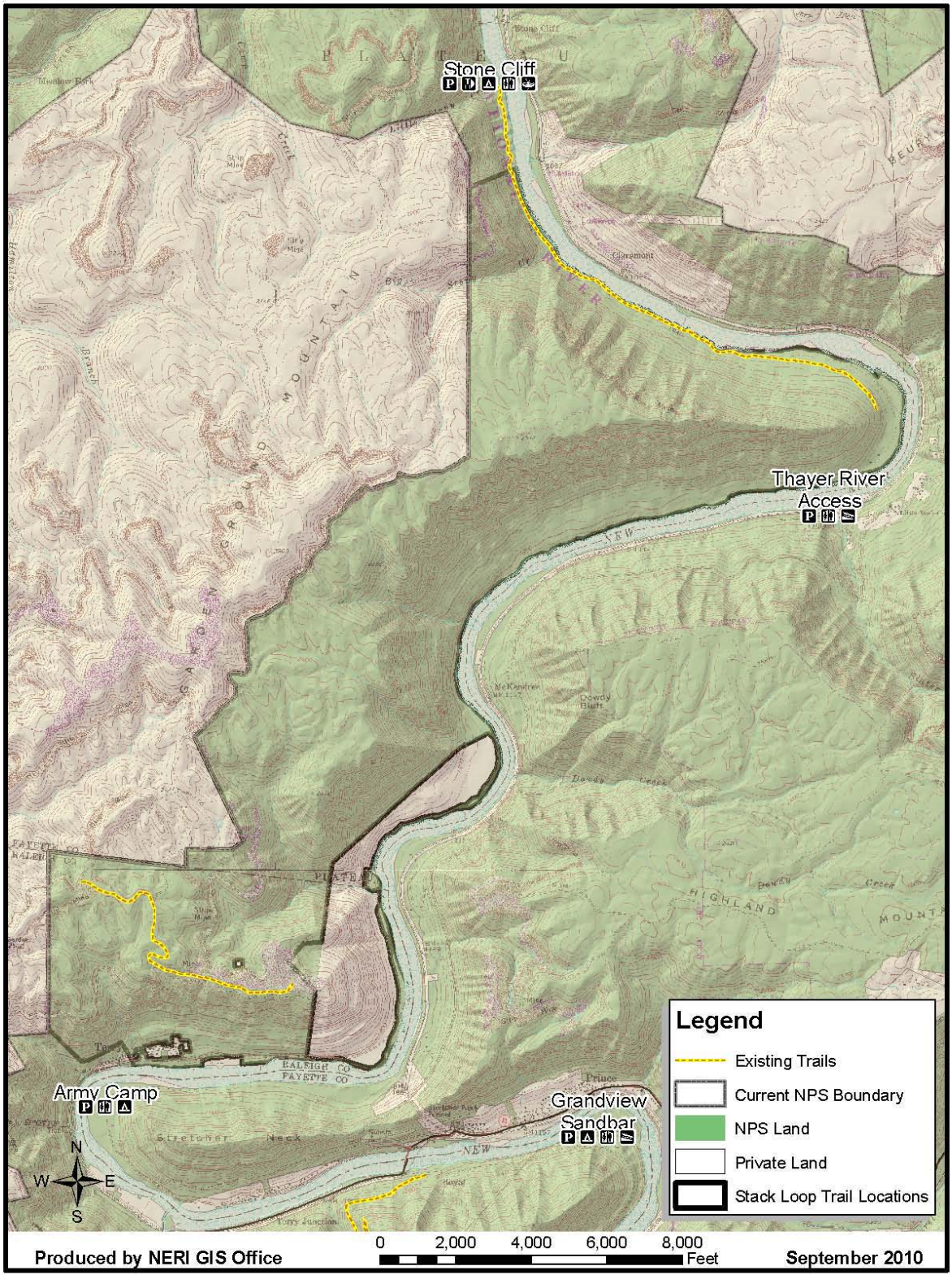


**Figure 1-6. Garden Ground Project Area**



## 1.6 Relationship of the Project to Laws, Policies and Plans

### 1.6.1 Laws

**New River Gorge National River Enabling Legislation and Amendments.** Congress created the park when it enacted Public Law 95-625 in November of 1978. The park's legislation has been amended several times through subsequent acts of Congress. The project and this Environmental Assessment are consistent with all acts of Congress that govern the management of the park.

**National Environmental Policy Act of 1969, as Amended.** The National Environmental Policy Act (NEPA) was passed by Congress in 1969 as Public Law 91-190 and took effect on January 1, 1970. This legislation established this country's environmental policies, including the goal of achieving productive harmony between human beings and the physical environment for present and future generations. It provided the tools to implement these goals by requiring that every federal agency prepare an in-depth study of the impacts of "major federal actions having a significant effect on the environment" and alternatives to those actions. It also required that each agency make that information an integral part of its decisions. NEPA also requires that agencies make a diligent effort to involve the interested members of the public before they make decisions affecting the environment.

NEPA is implemented through regulations of the Council on Environmental Quality (CEQ) [40 CFR 1500-1508]. The NPS has in turn adopted procedures to comply with the act and the CEQ regulations, as found in Director's Order 12 (DO-12): Conservation Planning, Environmental Impact Analysis and Decision Making (NPS 2001a) and its accompanying handbook.

**National Park Service Organic Act of 1916.** By enacting the NPS Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of the Interior and the NPS to manage units "to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1a-1). The Organic Act and its amendments afford the NPS latitude when making resource decisions that balance resource preservation and visitor recreation.

**National Parks Omnibus Management Act of 1998.** The National Parks Omnibus Management Act (NPOMA) [16 USC 5901 et seq.] Public Law 105-391, underscores NEPA and is fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both also provide options for resource impact analysis, should such data not be readily available.

**Redwood National Park Act of 1978, as Amended.** Under Public Law 95-250, all national park system units are to be managed and protected as parks, whether established as a recreation area, historic site or any other designation. This act states that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

**National Historic Preservation Act of 1966, as Amended Through 2000 (16 USC 470).** The National Historic Preservation Act (NHPA) of 1966, passed as Public Law 89-665 and as amended through 2000, protects buildings, sites, districts, structures and objects that have significant scientific, historic or cultural value. The act established affirmative responsibilities of federal agencies to preserve historic and prehistoric resources. Effects on properties that are listed in or which are eligible for the National Register of Historic Places must be taken into account in planning and operations. Any property that may qualify for listing in the National Register must not be inadvertently transferred, sold, demolished, substantially altered or allowed to deteriorate.

Section 106 of this act requires federal agencies to consider the effects of their undertakings on historic properties and allow the Advisory Council on Historic Preservation (ACHP) and the State

Historic Preservation Officer (SHPO) a reasonable opportunity to comment. Revised regulations, "Protection of Historic Properties" (36 CFR 800), became effective on January 11, 2001.

In 2002, the park established a programmatic agreement (PA) with these agencies to manage its cultural resources including consultation. In 2008, a nationwide PA was adopted, which expands upon the park's 2002 PA. The initial consultation with the SHPO for this project is documented in Appendix C.

**Endangered Species Act of 1973.** Section 7 of this act, Public Law 93-205, as amended (16 USC 1531 et seq) requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. NPS management policies also require cooperation with appropriate state conservation agencies to protect state-listed and candidate species of special concern within the park boundaries. Consultation with USFWS is in process for this project and is described in Chapter 5 of this document.

**Migratory Bird Treaty Act of 1918.** This act (16 USC 703-712) and Executive Order 13168 protect the bird species listed in 50 CFR 10.13, their nests and eggs. The law requires that a federal action not take any of these bird species, or if individuals of those species must be taken, the agency implementing the action must apply to the U.S. Fish and Wildlife Service (USFWS) for a permit to do so. Take is defined by the law as "to pursue, hunt, shoot, wound, kill, trap, capture or collect, or any attempt to carry out these activities". Take is further delineated by the executive order into "intentional take," which means that "take is the purpose of the activity in question," and "unintentional take," which means that "take results from, but is not the purpose of, the activity in question. Federal agencies are required by the executive order to develop a Memorandum of Understanding (MOU) on migratory bird policies with the U.S. Fish and Wildlife Service. An MOU between USFWS and the NPS was signed in the April 2010. This MOU provides strategies for the NPS to avoid, minimize or mitigate both the unintentional take of migratory birds and impacts to their habitats.

**Code of Federal Regulations, National Park Service, Bicycles.** The Code of Federal Regulations establishes rules for the use of bicycles on NPS lands. It states that the "use of a bicycle is prohibited except on park roads, in parking areas and on routes designated for bicycle use," and additionally that "routes may only be designated for bicycle use based on a written determination that such use is consistent with the protection of a park area's natural, scenic and aesthetic values, safety considerations and management objectives and will not disturb wildlife or park resources" (36 CFR 4.30). "Except for routes designated in developed areas and special use zones, routes designated for bicycle use shall be promulgated as special regulations" (36 CFR 4.30).

NPS Management Policies further clarifies the making of a determination of appropriateness of bicycle use, stating, "the Service will allow only uses that are (1) appropriate to the purpose for which the park was established, and (2) can be sustained without causing unacceptable impacts" (2006, 8.1.1). Appropriate park uses are determined by:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the Service; and
- whether the public interest will be served. (NPS 2006a, sec. 8.1.2)

### 1.6.2 Policies

**NPS Management Policies 2006.** This handbook is the policy guidance for the management of the national park system and ensures that actions across the agency are consistent with NPS values and mission, as well as guiding laws and regulations.

**NPS Management Policies 2006, Section 1.4: The Prohibition on Impairment of Park Resources and Values.** By enacting the NPS Organic Act of 1916 (Organic Act), Congress directed the U.S. Department of Interior and the NPS to manage units "to conserve the scenery and the natural

and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1a-1).

NPS Management Policies 2006, Section 1.4.4, explains the prohibition on impairment of park resources and values:

> While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the Nation Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The NPS has discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park (NPS 2006a, sec. 1.4.3). However, the NPS cannot allow an adverse impact that would constitute impairment of the affected resources and values (NPS 2006a, sec 1.4.3). An action constitutes an impairment when its impacts "harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (NPS 2006a, sec 1.4.5). To determine impairment, the NPS must evaluate "the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (NPS 2006a, sec 1.4.5). A determination on impairment for the preferred alternative evaluated in this Environmental Assessment is provided in Appendix D.

### 1.6.3 Plans

**1982 New River Gorge National River General Management Plan.** This 1982 document is the most current approved management plan for the park. It will be superseded by the New River Gorge National River General Management Plan (2010) upon completion and pending approval, which currently is in draft form and described below.

The actions proposed in this environmental assessment are consistent with the 1982 GMP, which calls for the development of trails and trailhead facilities to provide for hiking and horseback riding opportunities in the park, including interpretive themes for natural and cultural resources along the trails and consideration of vehicular access to trailheads.

The 1982 GMP also provides for the management of off road bicycle use within the park. "Levels of use or new or unusual forms of recreation (such as hang gliding, rock climbing, dirt bicycling) will be managed to avoid problems of visitor safety, conflicts between uses, or resource impacts" (NPS 1982, p. 18). In 1982, mountain biking (called dirt bicycling) was a relatively new sport; the 1982 GMP allows for adaptive management of this activity, provided that visitor safety, user conflicts and resource impacts are sufficiently addressed. Newer and higher level laws and policies supersede the allowance of off road bicycling in an NPS unit, which is described in Section 1.6.1 of this document and will be addressed through the promulgation of a special rule allowing this use in the park.

**1993 Trail Development Plan for the New River Gorge National River.** This Trail Development Plan emphasizes the creation of a trail system for multiple uses – including "hiking, mountain bicycling, interpretation, equestrian and wheel chair access" (NPS 1993, p. 15) – phased trail development, trail identification and rating systems, a trail system sign plan, a construction and maintenance program, trailhead development that passively manages for type and level of use on trails, a trail condition monitoring program and partnerships with trail communities. While nearly all of the trails recommended in this plan have been developed, the aforementioned trail concepts are still applied in the park and in the actions proposed in this EA.

**2010 New River Gorge National River Draft General Management Plan.** Since the 1982 GMP was written, the park boundary has changed several times, the park has acquired a great deal more land than the 1982 plan anticipated, and park and public needs and priorities have changed. In response, the development of an updated GMP began in 2005. Because current management objectives and research on park resources and impacts is best reflected in the 2010 Draft GMP, much of the information in this EA references the newer document, and, as described in Section 1.4, decisions made would be consistent with the new GMP, as well as the subsequent Trail Management Plan it proposes. However, decisions made in this EA are tiered to the 1982 GMP.

## 1.7 Impact Topics

### 1.7.1 Impact Topics Selected for Detailed Analysis

Specific impact topics were identified for detailed analysis of the environmental consequences of each alternative for this project. Topics were selected based on the following requirements and conditions:

- federal laws, regulations and executive orders, including NEPA guidance documents;
- NPS Management Policies (NPS 2006a)
- NPS staff knowledge of special or vulnerable natural and cultural resources in the project areas;
- external and internal scoping; and
- relevance to the project's planning issues.

The following impact topics are addressed in this document:

- Water Quality
- Streamflow Characteristics
- Vegetation
- Wildlife and Habitat
- Cultural Resources
- Park Facilities and Operations
- Visitor Use, Experience and Access
- Socioeconomics

### 1.7.2 Impact Topics Dismissed from Detailed Analysis

The following impact topics were initially considered but then were dismissed from detailed analysis because the resources would not be impacted by the project. A brief rationale for the dismissal of each impact topic is provided below.

**Air Quality.** The 1963 Clean Air Act as amended (42 USC 7401 et seq) requires that federal land managers protect air quality. The *NPS* Management Policies (NPS 2006a) address the need to analyze air quality during park planning. New River Gorge National River is designated as a Class II Clean Air Area. Fayette and Raleigh Counties are designated under the Clean Air Act as air quality attainment areas and Class II Clean Air Areas. The designation establishes a limit on the allowable increase in sulfur dioxide and particulate matter concentrations, effectively preventing additional pollutant-emitting industrial development in the vicinity of the park. Because New River Gorge National River is within a Class II Clean Air Area, NPS is not required to conduct air quality or visibility monitoring within the park.

None of the alternatives for the actions proposed in this document would permanently affect air quality. However, local air quality could be temporarily affected by dust and vehicle emissions during construction of the proposed new stacked loop trail systems. These effects would last only as long as construction occurs. The area's Class II air quality status would not be affected. Therefore the air quality impact topic was dismissed from detailed analysis.

**Climate Change.** This topic is a far-reaching and long-term issue that will affect the park, its resources, visitors and management beyond the scope of this trail development plan, with some

effects known or likely to occur but with many potential impacts unknown. Because the drivers of climate change are largely outside park control, the NPS alone does not have the ability to prevent climate change from happening and it is unlikely that any of the proposed developments would have a measureable effect on, or contribute in a noticeable way to cumulative impacts of climate change. For these reasons, the climate change impact topic was dismissed from detailed analysis.

**Cultural Landscapes.** The NPS Cultural Resource Management Guidelines (1998, ch. 7) define a cultural landscape as "a reflection of human adaptation and use of natural resources [that] is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls and vegetation, and by use reflecting cultural values and traditions." A cultural landscape inventory of historic properties owned by the NPS was conducted in 2005, and identified 13 cultural landscapes, ten of which retain the integrity needed to convey their significance as cultural landscapes. Only a portion of the Kaymoor Top section of the Kaymoor Mine and Kaymoor cultural landscape may coincide with the project, in the Craig Branch area. It was determined that the actions proposed would not adversely impact the cultural landscape because historic resources in the area would be avoided and preserved as part of the project and the presence of a trail through or near the cultural landscape would not affect its character. Therefore, the cultural landscapes impact topic was dismissed from detailed analysis.

**Energy Resources.** NPS Management Policies (NPS 2006a) require the NPS to conduct its activities in ways that use energy wisely and economically. Management actions in all alternatives would comply with NPS sustainable energy design and energy management requirements. Any facility development must include improvements in energy efficiency and reduction in greenhouse gas emissions for both the building and mechanical systems that support the facility. In all alternatives the facilities, vehicles and equipment would be operated and managed to minimize consumption of energy, water and nonrenewable fuels. Because of these commitments to energy conservation and sustainability, the energy resources impact topic was dismissed from detailed analysis.

**Environmental Justice.** Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental impacts of their programs and policies on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Revised Draft Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1997).

Minority and low-income populations as defined in E.O. 12891, reside in Fayette and Raleigh Counties in the vicinity of New River Gorge National River. In Fayette County, 18.2 percent of families and 21.7 percent of individuals live below the poverty level, and minorities constitute less than ten percent of the population (U.S. Census Bureau 2000). In Raleigh County, 14.6 percent of families and 18.5 percent of individuals live below the poverty level, and minorities constitute barely more than ten percent of the population. None of the alternatives under consideration for the project would have disproportionately high or adverse human health, economic, social or environmental impacts on minority or low-income populations residing in Fayette or Raleigh Counties. Negligible beneficial short-term economic impacts on the local and regional economy would result from construction and operation of new visitor use facilities in the project areas. Potential long-term economic benefits could be realized as a result of the actions proposed and will be analyzed in the Socioeconomics impact analysis in this document (Section 4.8), though any potential impacts would not affect minority or low-income populations any differently than it would any other local groups or populations. Subsistence hunting and fishing – an activity occurring in the project areas by minority and low-income populations – would continue and would be enhanced through better access. Therefore the environmental justice impact topic was dismissed from detailed analysis.

**Ethnographic Resources.** Comprehensive studies have not been completed in the New River Gorge National River to identify its specific traditional ethnographic cultural and natural resources. However, the recently completed *Ethnographic Overview and Assessment of the New River Gorge National River and the Gauley River National Recreation Area* (Hufford et al. 2006) claims that there are places within the park boundaries that have great significance to the park's traditionally associated peoples. The

ethnographic resources identified as vital are the mixed mesophytic forest and associated forests associated with the collective memory – the stories – that animate and are animated by the landscape (Hufford et al. 2006). It is possible that this landscape today forms one of the most intact examples of a community forest and watershed to be found in North America (Hufford et al. 2006). Further research and study will identify the connections between the park's traditionally associated people and groups and the park's specific cultural and natural resources found within the park's mixed mesophytic watershed. Developing new trails and allowing bicycle use on some park trails would not impact the collective memory associated with the overall landscape. Because cultural resources would be protected as part of the actions proposed, the individual artifacts that may contribute to the ethnographic character of the park landscape and demonstrate connections between the park's traditionally associated people and the land would not be impacted. Therefore, this topic was dismissed from detailed analysis.

**Floodplains.** Executive Order 11988, "Floodplain Management," requires federal agencies to "take action to reduce the risk of flood loss, to minimized the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by flood plains" by, among other things, avoiding new developments within floodplains where practicable. The only element of the project that may be located within a floodplain is the construction of the proposed Panther Branch Connector Trail by converting an existing old road and railroad grade into a single track trail. Because this action applies only to an existing feature, no new developments would occur within a floodplain, including buildings or other facilities. Short- and long-term impacts to the floodplain from road-to-trail conversion would be negligible, therefore this impact topic was dismissed from detailed analysis.

**Geohazards.** NPS Management Policies (2006a) states that the NPS is charged with preserving naturally occurring geologic processes, such as landslides, floods, shoreline processes, etc., and trying to avoid placing new visitor and other facilities in geologically hazardous areas. In areas where dynamic natural processes cannot be avoided, and when it has been determined that facilities must be located in such areas, their design and location would be based on a thorough understanding of the nature of the physical processes, as well as avoiding or mitigating the risks to human life and property and the effect of the facility on natural physical processes and the ecosystem.

While the New River Gorge is subject to seasonal flooding and occasional rock fall and slope failures, the actions proposed within each alternative are not expected to exasperate or prevent any of these natural processes from occurring. Trails are necessary for visitors to access the river floodplain to fish, boat and swim in the river and likewise to access the cliffs and mine benches to hike or bike to scenic vistas, rock climb and visit culturally historic sites within the gorge. All trailheads, parking and restroom facilities proposed in any alternatives would generally be located outside of areas with known geohazards. Trails located along mine benches and near historic coal mines would be kept to minimal development standards, monitored for potential slope failure and mitigated to reduce and avoid the risks to human life and property. Mines would be closed to visitor access using signing and physical barriers. For these reasons, the geohazard impact topic was dismissed from further detailed analysis.

**Indian Sacred Sites.** Executive Order 13007, "Indian Sacred Sites", requires managers of federal lands to avoid adversely affecting the physical integrity of Indian sacred sites. There are no Indian sacred sites as defined by E.O. 13007 within the project areas. During the development of the 2010 Draft GMP, the NPS contacted 14 Native American tribes who may have some interest in the New River Gorge National River. Two tribes responded that they would be interested in receiving information about management actions in the park. There are no federally-recognized tribal affiliations with the park. Therefore the Indian sacred sites impact topic was dismissed from detailed analysis.

**Indian Trust Resources.** Secretarial Order 3175 requires that any anticipated impacts to Indian Trust Resources from a proposed project or action by agencies of the Department of the Interior be explicitly addressed in environmental documents. There are no known Indian Trust Resources at New River Gorge National River. No land within the park is held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore the topic of Indian Trust Resources was dismissed from detailed analysis.

**Lightscapes and Night Sky.** NPS Management Policies (2006a) require the NPS to preserve natural ambient lightscapes as natural resources and values that exist in the absence of human-caused light. None of the alternatives for the project would permanently affect the park's lightscape. None of the alternatives propose nighttime lighting in conjunction with development of visitor facilities. Therefore the topic of lightscapes and night sky was dismissed from detailed analysis.

**Noise and Soundscape.** NPS Management Policies (2006a) state that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks. Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks must be monitored, and action must be taken to prevent or minimize unnatural sounds that adversely affect park resources or values, or visitor enjoyment of them. The frequencies, magnitudes and duration of human-caused sound considered acceptable varies among NPS units, as well as throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Construction required for the proposed new stacked loop trail systems would result in local short-term negligible impacts on daytime ambient noise levels. Equipment and vehicles would be the primary noise generators. Noise reduction technology would be used on equipment to the extent practicable. Slightly increased traffic on Gatewood, Kaymoor Number 1, Terry, Mill Creek, Garden Ground and Thurmond-McKendree Roads associated with increased visitor use levels would result in a local long-term negligible impact on daytime ambient noise levels. Therefore the noise and soundscape impact topic was dismissed from detailed analysis.

**Park Museum Collections.** NPS Management Policies (2006a) require park's to collect, protect, and preserve cultural objects and natural history specimens relating to their archeology, ethnography, history, biology, geology and paleontology. The purpose of these collections is to enhance the understanding and experience of park visitors and advance knowledge in the humanities and sciences. The project would require archeological surveys, which may negligibly increase the size of the park's archeological and historic collections. If artifacts are collected from the project areas in the future, they would be curated into the park's collections. Once in the collection, the artifacts would be documented and stored in accordance with the NPS Archeological Sites Management Information System (ASMIS) and museum standards and the park's draft 2010 Scope of Collection Statement. The museum collection impact topic was therefore dismissed from detailed analysis.

**Prime and Unique Farmland Soils.** Council on Environmental Quality (CEQ) NEPA Regulations (40 CFR 1508.27) require federal agencies to assess the impacts of their actions on soils classified by the U.S. Natural Resources Conservation Service as prime or unique farmland soils. No areas of prime farmland soils are within the area of impact associated with the project. There are no soils classified as unique within New River Gorge National River. Therefore the prime and unique farmland soils impact topic was dismissed from detailed analysis.

**Scenic Resources.** Scenic resources on existing trails and proposed new stacked loop trail systems include a variety of views of natural and cultural features and cultural landscapes that can be seen from the trails. Views of natural features include enclosed forest views, views of rock cliffs, rock ledges and rock faces, and views of cascading streams. Views of cultural resources and landscapes are of railroads, historic railroad and coal towns, bridges, home sites and other historic structures, as well as the New River Gorge Bridge. The actions proposed would not alter scenic views along existing trails, and would provide several new opportunities to enjoy the park's scenic resources from the proposed new stacked loop trail systems. Short-term negligible impacts to scenic resources may occur during construction of the proposed new stacked loop trail systems, but once construction is complete, the park's scenic resources would not be affected. New trail corridors would occur almost entirely below the forest canopy and would not be visible at all for most of the year. During winter, trails on the plateau would not be seen from any vantage point, and trails along the steep slopes of the gorge would be difficult to discern from a scenic vista. Therefore the scenic resources impact topic was dismissed from detailed analysis.

**Soil Resources.** NPS Management Policies (2006a) direct the service to actively seek to understand and preserve the soil resources of parks, and to prevent, to the extent possible, human-caused erosion. It further informs managers that when soil excavation is an unavoidable part of an approved facility development project, the NPS would minimize soil excavation and erosion.

Construction of proposed new trails would lead to new soil disturbance in the defined corridors but would have no effect on soil resources in general. The required trail construction mitigations designed to control erosion from the constructed trail tread are expected to greatly reduce or eliminate any unnatural erosion. Additionally, the associated reclamation proposed on existing roads and on unauthorized OHV routes is expected to greatly reduce known erosional issues within the project areas. Based on the expected negligible short-term and long-term impacts to soil resources, this impact topic was dismissed from detailed analysis.

**Wetlands.** Executive Order 11990, "Protection of Wetlands," requires federal agencies to avoid, where possible, impacts to wetlands. The Clean Water Act, the Rivers and Harbors Appropriation Act of 1899 and the Freshwater Wetlands Protection Act also protect wetlands (NJSA 13:9-B-1 et seq). NPS Management Policies (NPS 2006a) provide guidance on NPS activities regarding the management of wetlands, including a "no net loss" policy. The project would avoid any impacts to wetlands by avoiding them during new trail construction. Existing trails do not cross through wetland areas. Wetland features on old roads and OHV routes that would be rehabilitated within the Craig Branch and Garden Ground areas would be retained and enhanced by the rehabilitation. There would be no adverse impacts to wetlands in the project areas, therefore this impact topic has been dismissed from detailed analysis.

**Wild and Scenic River.** The Wild and Scenic Rivers Act establishes a system for the protection of rivers with outstanding scenic, recreational, geological, cultural or historic values. These rivers are to be preserved in free-flowing condition for the benefit and enjoyment of present and future generations. The New River in West Virginia has been found to possess several characteristics, making it eligible for inclusion in the National Wild and Scenic River System, including wildlife, cultural, recreational and geological outstanding remarkable values. No actions in this planning process are proposed that could adversely affect the values that qualify the New River for inclusion in the National Wild and Scenic River System. Therefore the Wild and Scenic River impact topic was dismissed from detailed analysis.

**Wilderness.** The Wilderness Act of 1964 established the National Wilderness Preservation System, composed of federal lands designated as wilderness. The Act mandates a policy for the enduring protection of wilderness resources for public use and enjoyment. New River Gorge National River does not include any land within the National Wilderness Preservation System designated pursuant to the Wilderness Act of 1964. Therefore the wilderness impact topic was dismissed from detailed analysis.

# 2 DESCRIPTION OF ALTERNATIVES

The National Environmental Policy Act (NEPA) requires that federal agencies explore a range of reasonable alternatives for proposed management actions. The alternatives under consideration must include the "no action" alternative, as prescribed by 40 CFR 1502.14. Any alternative analyzed must meet the management objectives of the park, either wholly or partially, while also meeting the purpose of and need for the project. Project alternatives may originate from the proponent agency, local government officials or members of the public. Alternatives may also be developed during the early stages of project development at public meetings, or in response to comments from coordinating or cooperating agencies. The alternatives, and all their components, that are analyzed in this document are the result of internal scoping, public scoping and agency consultation.

The NPS explored and objectively evaluated a range of alternatives that are described in Chapter Two of this document. Two proposed actions are common to both action alternatives; alternatives are otherwise described under the following headings:

- **Alternative A** – No Action Alternative (Continuation of Current Management)
- **Alternative B** – New Route Single Track Trail Construction (NPS Preferred Alternative)
- **Alternative C** – Existing Disturbance Single Track Trail Construction

A comparative summary of alternatives is provided.

For all proposed new trail construction under both action alternatives, Alternatives B and C, certain design and construction techniques, features and mitigation measures would be applied, and are also described in this chapter.

Also provided is a description of alternatives and elements of alternatives that were initially considered during scoping and alternative development, but were then dismissed from analysis, with the rationale for dismissal. Chapter Two further identifies both the environmentally preferred and the NPS preferred alternative, with the rationale for these selections as well as a comparative summary of the environmental impacts of the alternatives.

## 2.1 Alternative A – No Action Alternative (Continuation of Current Management)

Alternative A, the No Action Alternative, would continue current management of all project areas.

### 2.1.1 Bicycle Use on Existing Park Trails and Administrative Roads

Continuation of current management of bicycle use on existing park trails and administrative roads indicates that bicycle use would continue to be allowed on the park's public vehicular roadways and administrative roads, including public and commercial use.

The planning process for the 2010 Draft GMP and this EA revealed that park trails are currently used by bicycles to a greater degree than previously realized. Because the NPS acknowledges in this document that this use occurs, the No Action Alternative actually represents two key differences from current management of bicycle use on existing park trails and administrative roads.

- Special use permits for bicycling events could not be issued for use of the park's single track trails. They would only be issued for use of the park's administrative roads.
- The bicycle use that has occurred on park trails to date could not continue. The park would more stringently enforce the prohibition of off-road bicycle use to the degree feasible under staffing and funding constraints.
- The NPS would not promulgate a special regulation allowing off-road bicycle use.

### 2.1.2 Three Single Track Trails on Existing Informal Routes

Continuation of current management of the Mud Turn, Panther Branch and Brooklyn Mine areas indicates the following:

- The Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails would not be constructed. No new facilities would be provided.
- These areas would continue to be managed for incidental and informal use, including hunting and hiking.
- Bicycle use would not be allowed on the existing informal routes within which the proposed trails would be constructed under the action alternatives. The NPS would not promulgate a special regulation allowing off-road bicycle use.

### 2.1.3 Craig Branch Stacked Loop Trail System

Continuation of current management in the Craig Branch area indicates the following:

- The Craig Branch Stacked Loop Trail System would not be constructed. No new facilities would be provided.
- This area would continue to be managed for incidental and informal use, including hunting and hiking.
- Off-road bicycle use would not be allowed in the Craig Branch Area. The NPS would not promulgate a special regulation allowing off-road bicycle use.
- This area would continue to be a low funding priority for removal of invasive plant species and reclamation of the environmental effects of prior mining and logging operations.
- The NPS would continue to enforce the prohibition of OHV use in this area under its current staffing and funding constraints.

### 2.1.4 Garden Ground Stacked Loop Trail System

Continuation of current management in the Garden Ground area indicates the following:

- The Garden Ground Stacked Loop Trail System would not be constructed. No new facilities would be provided.
- This area would continue to be managed for incidental and informal use, including hunting and hiking.
- Off-road bicycle use would not be allowed in the Garden Ground Area. The NPS would not promulgate a special regulation allowing off-road bicycle use.
- This area would continue to be a low funding priority for removal of invasive plant species, reclamation of environmental effects of prior mining and logging operations.
- The NPS would continue to enforce the prohibition of OHV use in this area under its current staffing and funding constraints.

## 2.2 Proposals Common to Both Action Alternatives

### 2.2.1 Bicycle Use on Existing Park Trails and Administrative Roads

Under both action alternatives, bicycle use would be allowed on the following trails and administrative roads (also see Figure 2-1), pending the promulgation of a special regulation:

**Table 2-1. Trails Proposed for Bicycle Use**

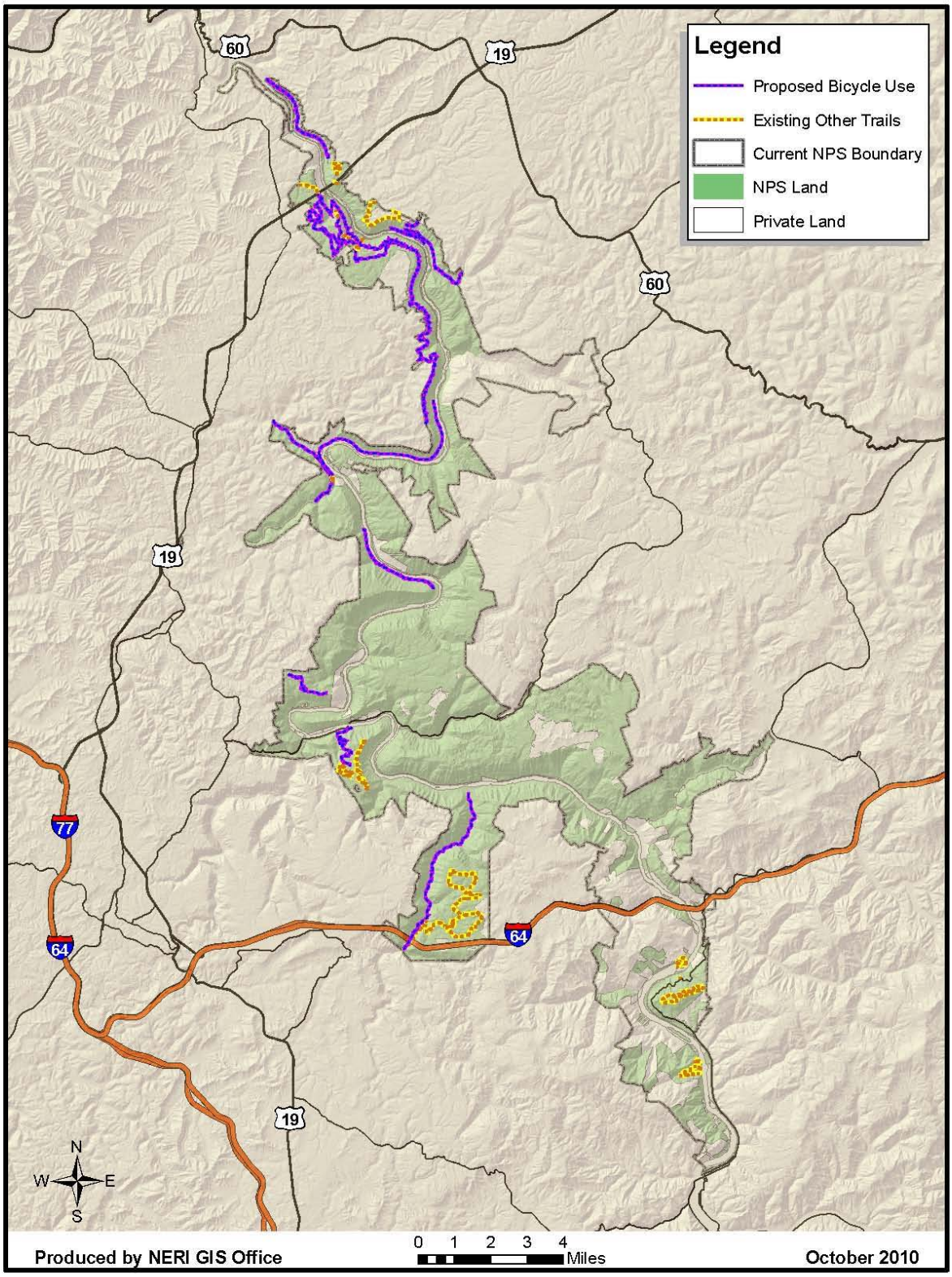
| Trail or Administrative Road | Mi. | Trail Standard |
|---|---|---|
| Park Loop | 1.1 | backcountry |
| Fayetteville | 4.0 | backcountry |
| Timber Ridge | 1.0 | backcountry |
| Long Point Trail (except the last 0.2 mi) | 1.4 | frontcountry |
| Kaymoor | 8.6 | frontcountry/ admin road |
| Craig Branch | 2.4 | admin road |
| Hawks Nest Connector | 3.5 | frontcountry |
| Southside | 7.0 | frontcountry/ admin road |
| Brooklyn Mine | 2.7 | admin road |
| Glade Creek | 5.6 | frontcountry/ admin road |
| Rend | 3.4 | admin road |
| Keeney Creek | 3.0 | admin road |
| Nuttall Mine | 0.5 | admin road |
| Nuttallburg Tipple | 0.8 | admin road |
| Nuttallburg Town Connector | 0.3 | frontcountry |
| Stone Cliff | 2.7 | admin road |
| Terry Top | 1.7 | admin road |
| Little Laurel | 2.6 | admin road |

Amenities, such as bike racks, related to management of mountain bike use would be provided at appropriate points to be determined. For example, a bike rack might be installed on the Long Point Trail at the end point of the section of trail on which bikes would be allowed so that visitors could store their bikes in a designated location while they walk the remainder of the trail to the Long Point vista.

The park would keep equestrian and bicycle use separated in most instances in order to prevent conflicts between these user groups for visitors' safety. This may mean that the park discontinues equestrian use on selected administrative roads where it is currently allowed, such as the Brooklyn Mine Trail/Administrative Road.

Existing trails would be assessed to determine their trail classification, as described in Table 2-2, and they would be signed accordingly.

**Figure 2-1. Existing Park Trails and Administrative Roads to Open to Bicycle Use**



### 2.2.2 Three Single Track Trails on Existing Informal Routes

The NPS would construct three single track trails within the disturbed areas along existing old road and railroad grades that are no longer in use, including the Mud Turn Trail (2.75 miles) and Panther Branch Connector Trail (three miles) represented in Figure 2-2, and the Brooklyn Miner's Connector Trail (0.8 miles) represented in Figure 2-3.

Mitigation measures described in Section 2.6 and design and construction techniques described in Section 2.5 would be applied in the development of these trails.

**Trail Facilities and Access.** Once constructed, these proposed trails would be assessed to determine their trail classification, as described in Table 2-2, and they would be signed accordingly, also indicating direction.

Existing access, parking and amenities would accommodate visitors' facility needs for these three proposed trails. Additional amenities and facilities would be provided in appropriate locations as determined appropriate. For example, if visitor use regularly overflows the existing pull-out, improvements might be made to the parking area at the lower end of the proposed Mud Turn Trail along Glade Creek Road where it crosses Mill Creek, such as additional parking spaces and a vault toilet.

**Bicycle Use.** Bicycle use would be allowed on the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, pending the promulgation of a special regulation.

**Figure 2-2. Proposed Mud Turn and Panther Branch Connector Trails**

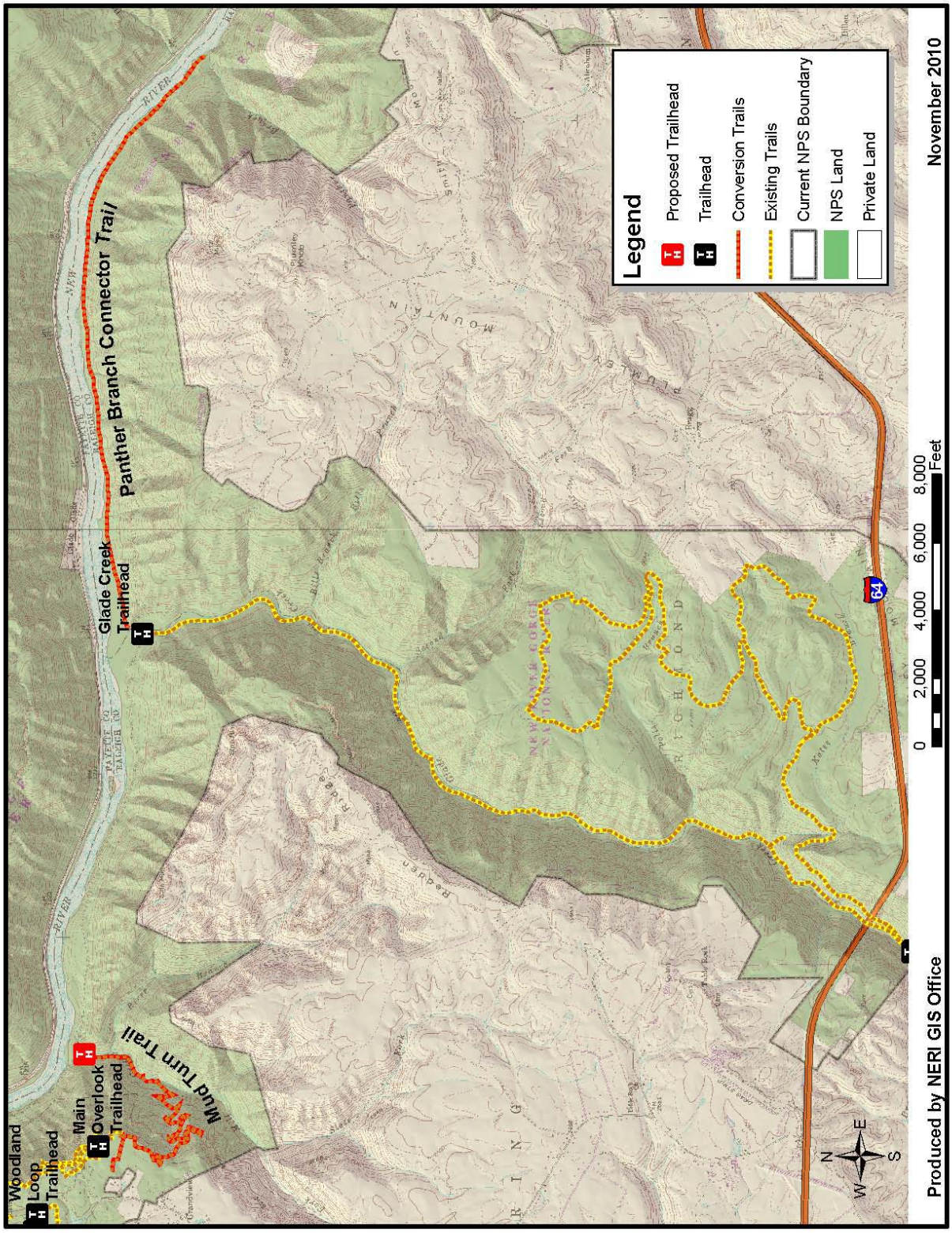
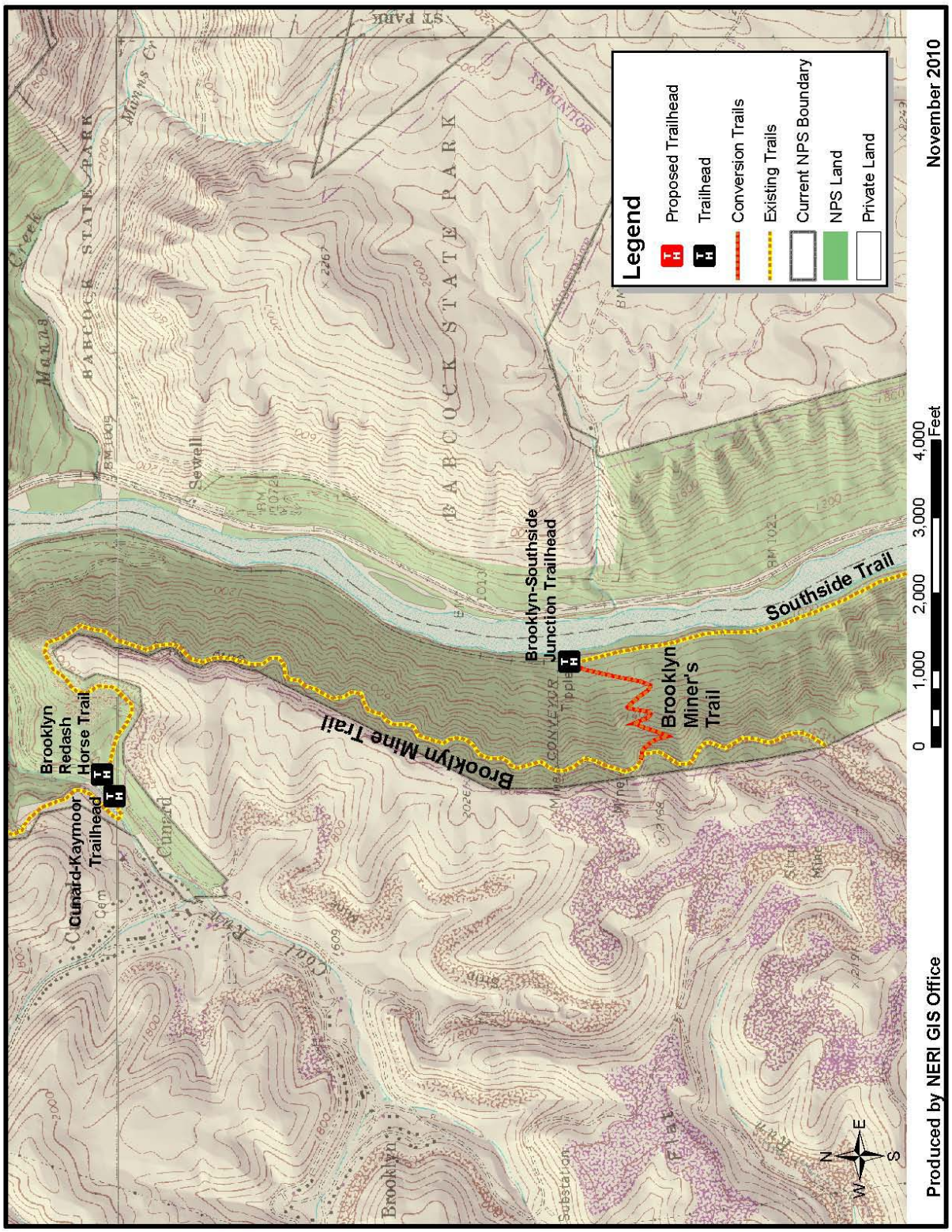


**Figure 2-3. Proposed Brooklyn Miner's Connector Trail**



## 2.3 Alternative B – New Route Single Track Trail Construction

This alternative is both the Environmentally Preferred Alternative and the NPS Preferred Alternative (see Section 2.10).

### 2.3.1 Craig Branch Stacked Loop Trail System

The NPS would construct approximately 11 miles of new frontcountry, single track trail in the Craig Branch area, as represented in Figure 2-4. About three miles of this interconnected system of trail loops would be constructed within the previously-disturbed areas of existing informal routes (many of which were originally developed as logging roads by the prior landowner). The alignments and grades of these informal routes are sustainable and appropriate for conversion to formal park trails. Most of the trail system (about eight miles) would be newly constructed where no informal routes currently exist.

The proposed new trails would connect in several locations to the existing Craig Branch Trail/Administrative Road, and they would take visitors to two new vista points along the canyon rim, otherwise remaining on the rolling terrain of the plateau.

The terrain lends itself to the development of trails that would be classified and signed as Easiest and More Difficult (described in Table 2-2 and represented in green and blue, respectively, in Figure 2-4). The NPS would construct the trails to optimize novice and intermediate skill level use and frontcountry trail experiences, as well as to safely accommodate multiple uses (pedestrian and bicycling) adhering to the design and construction techniques described in Section 2.5.

Mitigation measures described in Section 2.6 would be applied in the development of these trails.

**Trail Facilities and Access.** A new trailhead would be constructed on a heavily disturbed former log landing along the Craig Branch Trail/Administrative Road; it would serve as the primary public access point to the Craig Branch Stacked Loop Trail System. The gate across the administrative road would be moved about 0.5 miles from its current location so that the public could use the road to access the trailhead. Facilities would be developed at the trailhead, including parking spaces and an informational kiosk, and amenities, such as a vault toilet, trash cans, bike racks and a bike washing station, would be provided as determined appropriate.

A signed access point would be located along the Kaymoor No. 1 Road that would not include any parking or other facilities.

Existing access, parking and amenities would also accommodate visitors' facility needs, including the Kaymoor Top Parking Area and the Long Point Trailhead.

Trails would be signed to indicate direction and classification.

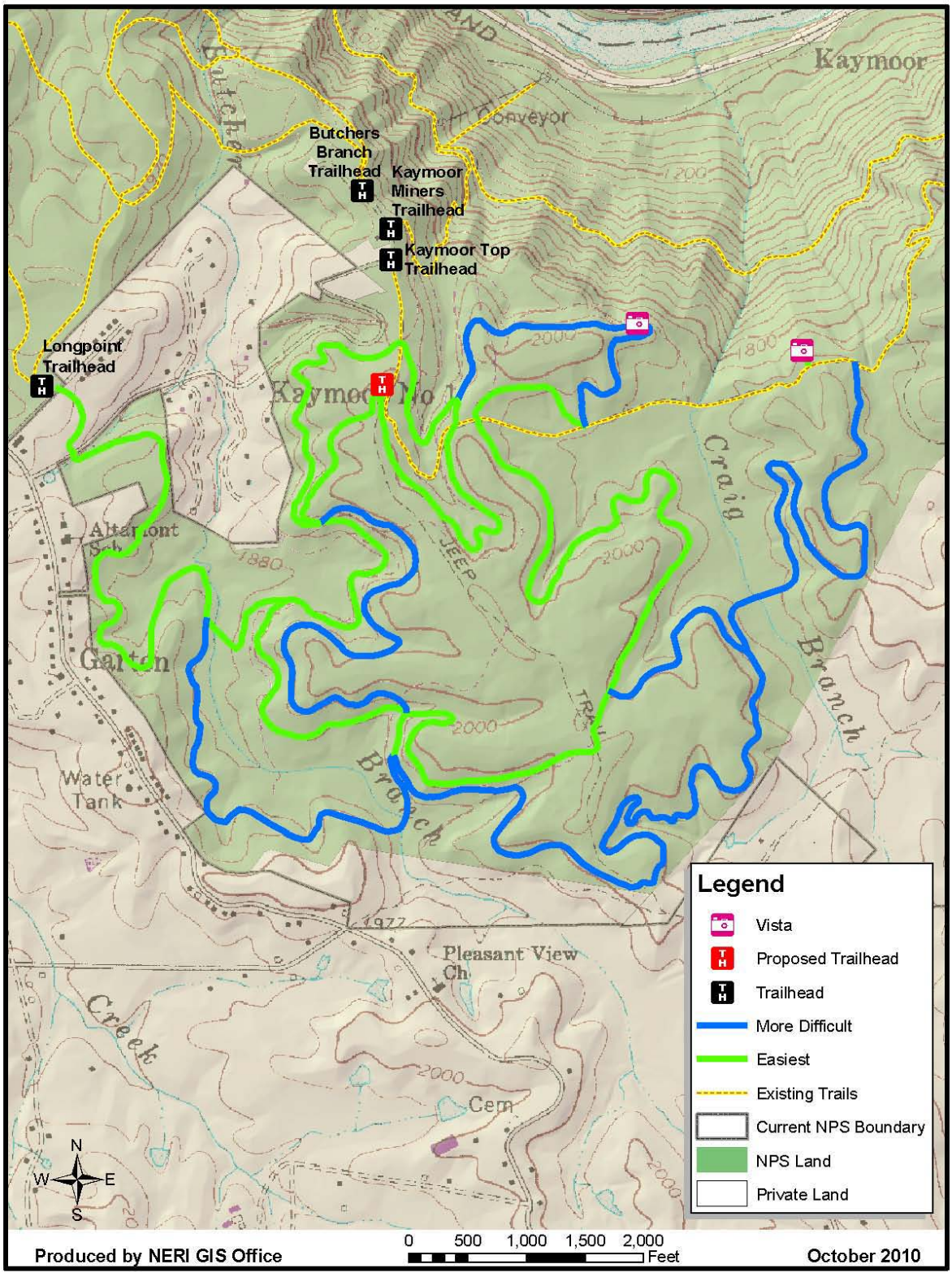
**Land Ownership.** A short section of trail represented in Figure 2-4 crosses private property beyond the NPS boundary line, connecting the Long Point Trailhead and the proposed signed access point along the Kaymoor No. 1 Road. If appropriate, in the future, the NPS would work with the landowner for an easement, purchase or other form of agreement allowing park visitors to cross that property. The NPS would, at that time, construct this trail segment.

**Bicycle Use.** Bicycle use would be allowed on the Craig Branch Stacked Loop Trail System, pending the promulgation of a special regulation.

**Informal Route Closures and Area Rehabilitation.** As a result of past use of the land in the Craig Branch area (prior to NPS ownership), the area has an extensive network of informal routes, including former logging roads and about ten miles of user-created OHV routes, in addition to numerous and thriving populations of non-native and invasive plant species. Where the proposed trail is not constructed within the existing disturbance of these informal routes, the informal routes would be closed and rehabilitated to a condition that would mitigate issues including continued informal use,

erosion and non-native and invasive plant growth. Additionally, non-native and invasive plants would be removed or treated. Much of this rehabilitation would occur in conjunction with trail construction.

**Figure 2-4. Proposed Craig Branch Stacked Loop Trail System (Alternative B, Preferred)**



### 2.3.2 Garden Ground Stacked Loop Trail System

The NPS would construct approximately 33 miles of new backcountry, single track trail in the Garden ground area, as represented in Figure 2-5. A majority of this interconnected system of trail loops would be newly constructed where no informal routes currently exist, with the exception of about four miles where the alignments and grades of existing informal routes (abandoned logging roads and a short section of mine bench) are sustainable and appropriate for conversion to formal park trails.

The proposed new trails would connect to the existing Terry Top and Stone Cliff Trails/Administrative Roads, and they would take visitors to several new vista points along the canyon rim from the loops on the plateau. Additionally, trails would be constructed to provide rim-to-river opportunities, ascending and descending the steep slopes of the gorge on either end of the project area with a section of trail running roughly parallel to the river along the canyon's lower elevations.

The terrain in the Garden Ground area lends itself to the development of trails that would be classified and signed as More Difficult and Most Difficult (described in Table 2-2). Trails would be assessed for their classification after construction. The NPS would construct the trails to optimize intermediate and expert skill level use and backcountry trail experience, as well as to safely accommodate multiple uses (pedestrian and bicycling) adhering to the design and construction techniques described in Section 2.5.

Mitigation measures described in Section 2.6 would be applied in the development of these trails.

**Trail Facilities and Access.** A new trailhead would be constructed in the Terry Top area along the Terry Top Trail/Administrative Road as close to County Road 28 as is feasible; it would serve as the primary public access point to the Garden Ground Stacked Loop Trail System. The gate across the administrative road may be moved away from the intersection with County Road 28 far enough to accommodate the proposed trailhead. Facilities would be developed at the trailhead, including parking spaces and an informational kiosk, and amenities, such as a hardened area large enough to accommodate a bus turn-around, a vault toilet, trash cans, bike racks and a bike washing station, would be provided as determined appropriate.

A signed access point would be located along County Road 28 that would not include any parking or other facilities.

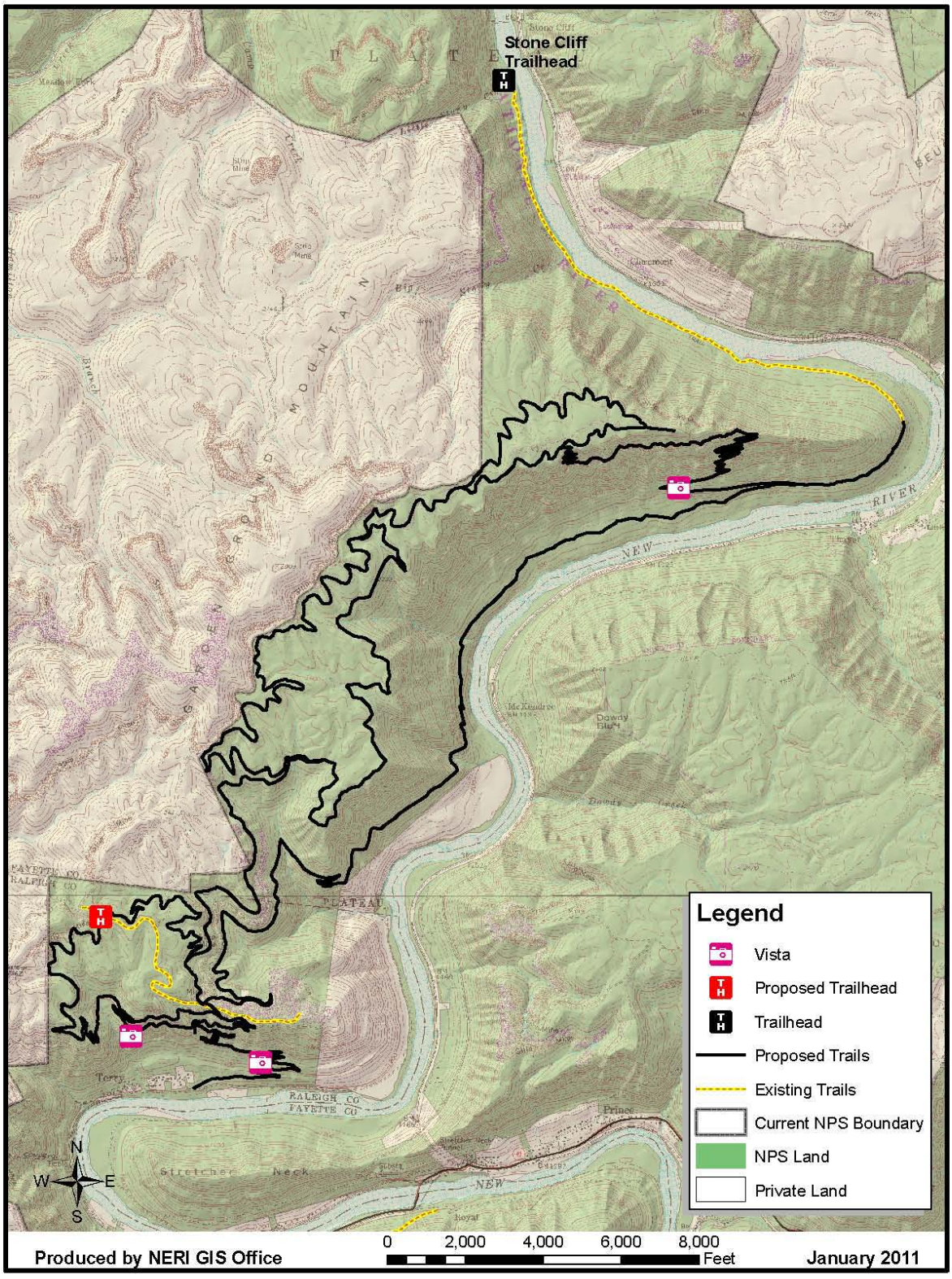
Existing access, parking and amenities at the Stone Cliff Trailhead would also accommodate visitors' facility needs.

Trails would be signed to indicate direction and classification.

**Bicycle Use.** Bicycle use would be allowed on the Garden Ground Stacked Loop Trail System, pending the promulgation of a special regulation.

**Informal Route Closures and Area Rehabilitation.** As a result of past use of the land in the Garden Ground area (prior to NPS ownership), the area has a network of informal routes, including former mining and logging roads and about five miles of user-created OHV routes, in addition to populations of non-native and invasive plant species. Where existing informal routes upon which the proposed trails are not developed may be easy for visitors to access and use them, preventing natural reclamation of the disturbances (such as near the park boundaries or the proposed trail), they would be closed and rehabilitated to a condition that would mitigate issues including continued informal use, erosion and non-native and invasive plant growth. Additionally, non-native and invasive plants would be removed or treated. Much of this rehabilitation would occur in conjunction with trail construction.

**Figure 2-5. Proposed Garden Ground Stacked Loop Trail System (Alternative B, Preferred)**



## 2.4 Alternative C – Existing Disturbance Single Track Trail Construction

### 2.4.1 Craig Branch Stacked Loop Trail System

The NPS would construct approximately 4.5 miles of new frontcountry, single track trail in the Craig Branch area, as represented in Figure 2-6. All of this interconnected system of trail loops would be constructed within the previously-disturbed areas of existing informal routes, mainly old logging roads that were originally developed by the prior landowner, the grades of which approach 20 percent in some locations.

The proposed new trails would connect to the existing Craig Branch Trail/Administrative Road. The terrain in the Craig Branch area lends itself to the development of trails that would be classified and signed as Easiest and More Difficult (described in Table 2-2). Trails would be assessed for their classification after construction. The NPS would construct the trails to optimize novice and intermediate skill level use and frontcountry trail experiences, as well as to safely accommodate multiple uses (pedestrian and bicycling) adhering to the design and construction techniques described in Section 2.5.

Mitigation measures described in Section 2.6 would be applied in the development of these trails.

**Trail Facilities and Access.** A new trailhead would be constructed on a heavily disturbed former log landing along the Craig Branch Trail/Administrative Road; it would serve as the only formal public access point to the Craig Branch Stacked Loop Trail System. The gate across the administrative road would be moved about 0.5 miles from its current location so that the public could use the road to access the trailhead. Facilities would be developed at the trailhead, including parking spaces and an informational kiosk, and amenities, such as a vault toilet, trash cans, bike racks and a bike washing

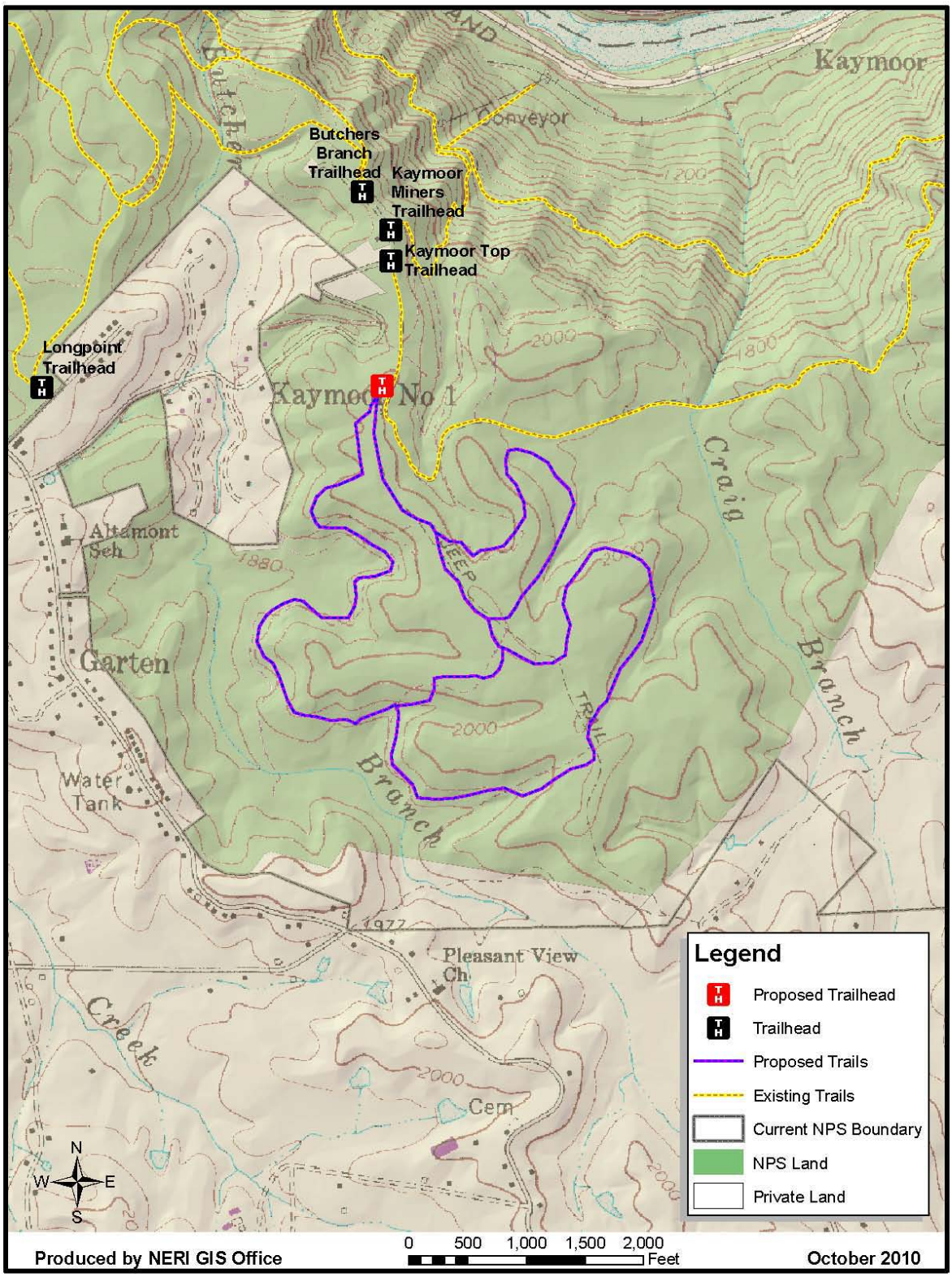
Existing access, parking and amenities at the Kaymoor Top Parking Area would also accommodate visitors' facility needs.

Trails would be signed to indicate direction and classification.

**Bicycle Use.** Bicycle use would be allowed on the Craig Branch Stacked Loop Trail System, pending the promulgation of a special regulation.

**Informal Route Closures and Area Rehabilitation.** As a result of past use of the land in the Craig Branch area (prior to NPS ownership), the area has an extensive network of informal routes, including former logging roads and about ten miles of user-created OHV routes, in addition to numerous and thriving populations of non-native and invasive plant species. Where the proposed trail is not constructed within the existing disturbance of these informal routes, the informal routes would be closed and rehabilitated to a condition that would mitigate issues including continued informal use, erosion and non-native and invasive plant growth. Additionally, non-native and invasive plants would be removed or treated. Much of this rehabilitation would occur in conjunction with trail construction.

**Figure 2-6. Proposed Craig Branch Stacked Loop Trail System (Alternative C)**



### 2.4.2 Garden Ground Stacked Loop Trail System

The NPS would construct approximately 45 miles of new backcountry, single track trail in the Garden Ground area, as represented in Figure 2-7. Much of this construction would occur within the previously-disturbed areas of existing informal routes, including abandoned logging and mining roads and user-created OHV routes. For example, a segment of the proposed trail would be located on the existing mine bench on the upper slope of the gorge.

The proposed new trails would connect to the existing Terry Top and Stone Cliff Trails/Administrative Roads, and they would take visitors to several new vista points along the canyon rim from the loops on the plateau. Additionally, trails would be constructed to provide rim-to-river opportunities, ascending and descending the steep slopes of the gorge on either end of the project area with a section of trail running roughly parallel to the river along the canyon's lower elevations.

The terrain in the Garden Ground area lends itself to the development of trails that would be classified and signed as More Difficult and Most Difficult (described in Table 2-2). Trails would be assessed for their classification after construction. The NPS would construct the trails to optimize intermediate and expert skill level use and backcountry trail experience, as well as to safely accommodate multiple uses (pedestrian and bicycling) adhering to the design and construction techniques described in Section 2.5.

Mitigation measures described in Section 2.6 would be applied in the development of these trails.

**Trail Facilities and Access.** A new trailhead would be constructed in the Terry Top area along the Terry Top Trail/Administrative Road as close to County Road 28 as is feasible; it would serve as the primary public access point to the Garden Ground Stacked Loop Trail System. The gate across the administrative road may be moved away from the intersection with County Road 28 far enough to accommodate the proposed trailhead. Facilities would be developed at the trailhead, including parking spaces and an informational kiosk, and amenities, such as a hardened area large enough to accommodate a bus turn-around, a vault toilet, trash cans, bike racks and a bike washing station, would be provided as determined appropriate.

A signed access point would be located along County Road 28 that would not include any parking or other facilities.

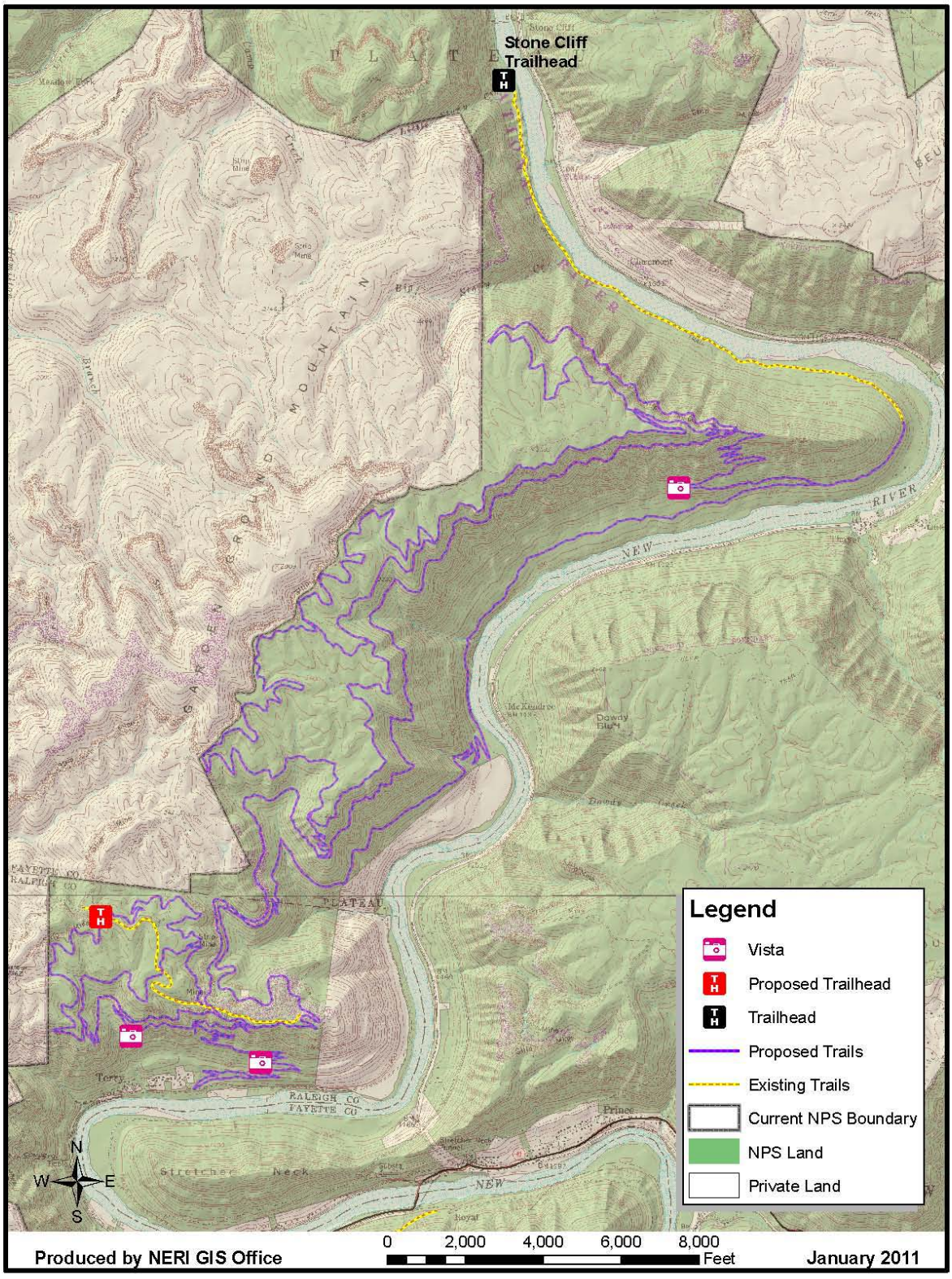
Existing access, parking and amenities at the Stone Cliff Trailhead would also accommodate visitors' facility needs.

Trails would be signed to indicate direction and classification.

**Bicycle Use.** Bicycle use would be allowed on the Garden Ground Stacked Loop Trail System, pending the promulgation of a special regulation.

**Informal Route Closures and Area Rehabilitation.** As a result of past use of the land in the Garden Ground area (prior to NPS ownership), the area has a network of informal routes, including former mining and logging roads and several miles of user-created OHV routes, in addition to populations of non-native and invasive plant species. Where existing informal routes upon which the proposed trails are not developed may be easy for visitors to access and use them, preventing natural reclamation of the disturbances (such as near the park boundaries or the proposed trail), they would be closed and rehabilitated to a condition that would mitigate issues including continued informal use, erosion and non-native and invasive plant growth. Additionally, non-native and invasive plants would be removed or treated. Much of this rehabilitation would occur in conjunction with trail construction.

**Figure 2-7. Proposed Garden Ground Stacked Loop Trail System (Alternative C)**



## 2.5 Design and Construction Techniques, Features and Use

The design and construction techniques, features and management actions described in this section apply to all proposed new trail development in both action alternatives, including the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and the Craig Branch and Garden Ground Stacked Loop Trail Systems.

**Sustainable Trails.** Sustainable trail design minimizes trail use impacts on the environment, especially as a result of erosion, and leads to a trail that requires relatively little maintenance. It also meets the needs of its users, providing fun and challenging opportunities and experiences and, through design, managing the manner of their use and the expectations with which they approach the trail. In this way, sustainable trails also manage visitor conflicts.

Trails designed and constructed to manage the physical and social impacts of multiple user groups are the most sustainable. The ten principles or elements of sustainable trails (see Appendix A) would be incorporated into the design and construction of all proposed new trails. Specific trail features and site-specific construction techniques that would be incorporated into trail development are described and depicted in Appendix B. Additional trail features that mitigate for social impacts may include long sight lines so that trail users are not surprised and attributes that would slow trail users down as they approach turns and other areas where long sight lines are unavailable.

Because there is a history of OHV use in the project areas of the proposed new trails, the NPS would develop trail features that could deter or prevent this inappropriate use. Constricting features and barricades to OHV access would be constructed along the proposed trails and their access points where OHV users may illegally enter the area and use the trails, damaging the other features and designs that make the trails sustainable. These constricting features and barricades would blend in with the landscape as much as possible.

When constructing trails within previously-disturbed areas of existing informal routes, such as abandoned logging and mining roads and user-created OHV routes, it is ideal to do this on alignments and grades that inherently lend themselves to sustainable trail design principles. When these informal routes exist in locations that would not lend themselves to sustainable trail development (such as flat areas that hold water, fall lines, steep side slopes or informal routes that capture and divert water from its natural course), construction of sustainable or near-sustainable trail becomes highly resource-, material-, labor- and cost-intensive. Where proposed new trails are constructed on existing informal routes, the NPS would make every effort to incorporate the design and features necessary to make the trails as sustainable as possible.

**Trail Classifications.** Proposed new and existing trails would be assessed and signed for classifications (see Sections 2.2, 2.3 and 2.4) that alert users to the difficulty of the trail. Table 2-2 describes general guidelines for how these classification determinations would be made. New trails would be designed and signed so that trail users could expect alignments, grades features and challenges that are consistent throughout a particular segment of trail that they enter from an intersection or trailhead. Because the specifications for trail classifications are considered guidance rather than restrictions, it is possible, for example, that a backcountry area may have an Easiest trail segment, provided that the segment is built in accordance with backcountry trail standards and the terrain and route naturally lend themselves to the skill level of a novice trail user.

**Table 2-2. Trail Classification Specifications**

| | Easiest | More Difficult | Most Difficult |
|---|---|---|---|
| **Symbol** | Green Circle | Blue Square | Black Diamond |
| **Active Tread Width** | 30-36 in. | 20-24 in. | 12-18 in. |
| **Unavoidable Natural Obstacles** | 2 in. tall or less | 8 in. tall or less | 15 in. tall or less |
| **Trail Features** | Firm trail surface. May include rock surfaced sections. | May also include steps, stairs and steep/exposed sections. | May also include steps, stairs and significantly steep/exposed sections. |
| **Average Trail Grade** | 5% or less | 10% or less | 15% or less |
| **Maximum Trail Grade** | 10% or less | 15% or less | 15% or more |
| **Suitable Location** | Frontcountry only | Frontcountry or Backcountry | Frontcountry or Backcountry |

**Trail Directional and Interpretive Signage.** Information kiosks would be provided at proposed new trailheads, and proposed new trails would be signed to indicate direction and classification (see Sections 2.2, 2.3 and 2.4). Additionally, information would be provided at appropriate locations to alert visitors to expect multiple user groups on the trails (pedestrians and bicyclists), pending promulgation of a special regulation allowing for off-road bicycle use. The NPS would provide interpretive signage at appropriate locations at trailheads and along proposed new trails to educate visitors about park resources and how to protect them, including educational information about preventing the spread of non-native and invasive plant species along trail corridors.

**Other Recreational Use.** Hunting would be allowed in the project areas of the proposed new trails pursuant to existing state and federal regulations and NPS policies.

Equestrian use would be prohibited on proposed new trails, which would not be designed to sustain the impacts of such use. The 2010 Draft GMP proposes the development of trails for equestrian use in the Craig Branch area; these equestrian trails would be designed to support equestrian use and would be separate from the Craig Branch Stacked Loop Trail System proposed in this EA, though the two trail systems may intersect.

Special events, special uses and large group use of all proposed trails would be subject to existing park policies and regulations.

## 2.6 Mitigation Measures

The mitigation measures and management actions described in this section apply to all proposed new trail development in both action alternatives, including the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and the Craig Branch and Garden Ground Stacked Loop Trail Systems.

For all proposed new trails, routes would be flagged on the ground, and resource surveys, as described in Section 2.6 would be conducted along a corridor of within about 100 feet on either side of the proposed trail, creating about a 200-foot survey corridor.

### 2.6.1 Mitigations to Protect Soils, Streams and Water Resources

Riparian areas and ruts in old road traces that have filled with water and serve as habitats for wetland plants and amphibians would be avoided during design and construction of proposed new trails. Where trails must cross perennial and intermittent streams, a bridge or bottomless culvert would be used to reduce the possibilities of erosion and interference with aquatic invertebrates. Crossings of ephemeral channels would be minimized, and where they are necessary, the trail should cross perpendicular to the channel direction.

During construction, some side casting of soils would be appropriate where there are no streams. On steep slopes, side casting would be limited, as it could create a future hazard for erosion and possibly safety. Construction occurring near streams would include measures that minimize or prevent loose soils from entering the waterways. Additionally, as much as possible, the duff layer removed to construct the trail tread would be preserved intact and replaced on any areas where soils have been cast. Often, plants in the duff layer are able to continue growing in their new location, reducing the opportunity for side-cast soils to erode and mitigating the visual effects of trail construction.

Where trail alignments use existing road and railroad traces or mine benches, hydrology could be improved through trail construction. In many places, streams have been captured by ruts in the roads and benches, and rerouted from their natural course. On benches in particular, streams that have been captured and rerouted threaten the structural integrity of the bench, and flood events can often cause these sections of mine bench to slough off the hill as landslides. Where these situations exist along trail alignments, a component of trail construction would be to restore the streams to their original flow locations, or to develop features that route water downward rather than along a contour line, reducing landslide hazards and improving the structural integrity of the trail.

### 2.6.2 Mitigations to Protect Vegetation

**Rare Plants.** Known rare plants would be avoided during design and construction of proposed new trails. Once proposed trail routes are flagged, rare plant surveys would be conducted within the survey corridors. If surveys reveal that the proposed trail route encounters a rare plant or plants, the trail would be moved to a different location, preferably within the survey corridor, as other resource surveys would occur within a similar corridor. If a reroute beyond the survey corridor is necessary to avoid rare plants, concurrence among resource specialists for vegetation, wildlife and cultural resources would be needed to approve the new altered route.

Where possible, rare plant surveys would occur in both the early and late phases of the growing season, roughly in June and August. To conduct two seasonal surveys would be preferred because the vegetative stages of the many plants growing in West Virginia differ greatly over time, resulting from variables such as species, elevation, aspect and moisture gradient. For example, August survey work might identify sunflowers that are not visible in May or early June, while many species of the lily family are growing during a short period in the spring and would not be detectable in August. All proposed trails would, at a minimum, be surveyed during one of the recommended seasons.

At the time of publication of this document, late season rare plant surveys have been conducted along all of the proposed Craig Branch Stacked Loop Trail System and approximately 12 miles of the proposed Garden Ground Stacked Loop Trail System for Alternative B, "New Route Single Track Trail Construction" (NPS Preferred Alternative). Early season rare plant surveys would be conducted for these trail sections and other proposed trails in 2011.

**Rare Plant Communities.** Known rare plant communities would generally be avoided in the design of proposed new trails. These communities include forest seeps and riparian communities, as well as both the top and the bottom of cliffs, as cliff ecosystems tend to support globally rare vegetation communities. Generally, no trail would be placed closer than about 200 feet from any boundary of a mapped Cliff Top Virginia Pine Forest. Exceptions to avoidance of cliff top vegetation communities would be made for a limited number of vistas comprising short trail segments running out and back from overlooks, but not running parallel to cliff edges through cliff top vegetation communities.

**Non-Native and Invasive Plant Species.** Invasive plants within a 50-foot corridor on either side of the center line of proposed trails would be treated during construction using mechanical methods to control the further spread of exotic plants. Depending upon the season of trail construction, greater care may need to be taken with certain species to avoid seed dispersion during removal.

### 2.6.3 Mitigations to Protect Wildlife

Wildlife surveys targeting key habitat of species of concern would be conducted by the park wildlife biologist within the survey corridors. If surveys reveal that the proposed trail route encounters key habitat, especially for bats and Allegheny woodrats, the trail would be moved to a different location, preferably within the survey corridor, as other resource surveys would occur within a similar corridor. If a reroute beyond the survey corridor is necessary to avoid these habitats, concurrence among resource specialists for vegetation, wildlife and cultural resources would be needed to approve the new altered route.

**Bats.** Protected bat habitat includes abandoned mines, trees and snags (dead standing trees). For both protection of bat habitat and for visitor safety, the NPS would seek to route proposed trails away from mine portals. Where the best option for a trail is a location near a mine opening, the portal would be gated with a bat-friendly design.

Because trees, including snags, of a size greater than or equal to five inches diameter breast height (≥5" DBH) could serve as bat habitat, particularly those with exfoliating bark, hollows or crevices, the NPS would design trails so as to minimize the need to remove them, avoiding these trees where it is feasible. The project areas are forested, and the NPS predicts that an estimated ten of these trees per mile of new trail would need to be removed to accommodate sustainable trail alignments. Prior to the removal of these trees, they would be inspected and approved for removal, on a tree by tree basis, by resource specialists, regardless what time of year they would be removed. Trees ≥5" DBH that need to be felled for trail construction would be removed between November 15 and March 31. The park adopted these dates for tree clearing so as to coincide with Indiana bat hibernation. The dates and tree size specifications originated from guidance for surface mining activities and are the tree clearing dates required for areas with underground mines where Indiana bats have been recorded (USFWS et al. 2009). Cutting during this time reduces the impact to all locally-present bat species and breeding birds.

**Allegheny Woodrats.** Allegheny woodrat habitat includes boulder fields, cliff bases (including bases of mining high walls) and mine portals. Trails going to or through woodrat habitat facilitate mammalian predator movement into woodrat home ranges, exposing them to increased predator pressure and pathogen exposure. Trails in woodrat habitat also create areas denuded of vegetation that further increase their vulnerability to predation when traversing the area. For these reasons, the NPS would design trails to avoid, as much as possible, Allegheny woodrat habitat. Where the best option for a trail is a location in or near woodrat habitat, the NPS would take actions to protect woodrats as much as possible, such as gating mine portals with bat-friendly designs, which are also woodrat-friendly, or building raised features through unavoidable boulder fields, under which woodrats would be protected from view of predators.

**Birds.** The Swainson's warbler (*Limnothlypis swainsonii*) is listed by the West Virginia Natural Heritage Program (2007) with a ranking of S3B, meaning that it occurs in the state during breeding, and may be somewhat vulnerable to extirpation. The Swainson's warbler is a confirmed breeding resident of the park and is also listed by the park as a species of management concern. In the Appalachian Mountains, Swainson's warblers establish breeding territories in dense rhododendron thickets. Any trail through a rhododendron thicket could fragment the habitat and open it to increased predation pressures, therefore the NPS would design trails to avoid, as much as possible, rhododendron thickets.

**Amphibians.** Riparian areas and ruts in old road traces that have filled with water and serve as habitats for wetland plants and amphibians would be avoided during design and construction of proposed new trails.

### 2.6.4 Mitigations to Protect Cultural Resources

Known archeological and historic sites would be avoided when during trail design.

Archeological and historic resource surveys would be conducted by the park's cultural resource staff within the survey corridors. The assessment of proposed new trail routes would be based on archival research, pedestrian survey including visits to known archeological sites, and targeted shovel testing of upland landforms that have a higher potential for archeological sites (Bodor and Torp 2008, Dowdy Creek). The findings from the field work would be documented in a Phase One archeological survey report that includes restricted site location maps and state site registration forms. The pre-report findings would also be used to coordinate the avoidance of all known and potential archeological sites and to interpret historic resources. Digital data would be entered into NPS GIS databases for future planning actions. Any Native American artifacts recovered during the surveys would be accessioned and cataloged into the park's museum collection.

If surveys reveal that the proposed trail route encounters an archeological or historic site, the trail would be moved to a different location, preferably within the survey corridor, as other resource surveys would occur within a similar corridor. If a reroute beyond the survey corridor is necessary to avoid these habitats, concurrence among resource specialists for vegetation, wildlife and cultural resources would be needed to approve the new altered route.

At the time of publication of this document, cultural resource surveys have been conducted along all of the proposed Craig Branch Stacked Loop Trail System and approximately 12 miles of the proposed Garden Ground Stacked Loop Trail System for Alternative B, "New Route Single Track Trail Construction" (NPS Preferred Alternative).

Prior to construction, trail crews would be trained for how to recognize archeological and historic sites inadvertently discovered during construction and what to do to protect the sites. A cultural resource specialist would be roving and available during trail construction in order to mitigate any potential impacts to sites and resources discovered at that time.

## 2.7 Comparative Summary of Alternatives

**Table 2-3. Comparative Summary of Alternatives for Bicycle Use on Existing Trails and Administrative Roads**

| | No Action Alternative (Alternative A) | Both Action Alternatives (Alternatives A and B) |
|---|---|---|
| **Bicycle Use on Administrative Roads** | Bike use would continue to be allowed, pursuant to the Superintendent's Compendium.<br>- Kaymoor, between the junction of Craig Branch Trail and Butcher Branch<br>- Craig Branch<br>- Southside, from Brooklyn Trailhead to Red Ash Island<br>- Rend<br>- Keeney Creek<br>- Little Laurel<br>- Nuttall Mine<br>- Nuttallburg Tipple<br>- Terry Top | Yes. Pursue a special regulation confirming that bike use is allowed on administrative roads:<br>- Kaymoor, between the junction of Craig Branch Trail and Butcher Branch<br>- Craig Branch<br>- Southside, from Brooklyn Trailhead to Red Ash Island<br>- Rend<br>- Keeney Creek<br>- Little Laurel<br>- Nuttall Mine<br>- Nuttallburg Tipple<br>- Terry Top<br>- Brooklyn Mine<br>- Glade Creek |
| **Bicycle Use on Frontcountry Trails** | No. | Yes. Pursue a special regulation allowing bike use on the following trails:<br>- Kaymoor<br>- Long Point (except the last 0.2 miles)<br>- Hawks Nest Connector<br>- Southside<br>- Glade Creek<br>- Nuttallburg Town Connector |
| **Bicycle Use on Backcountry Trails** | No. | Yes. Pursue a special regulation allowing bike use on the following trails:<br>- Park Loop<br>- Fayetteville<br>- Timber Ridge |
| **Facilities** | No new facilities. | New amenities where determined appropriate. |
| **Other User Groups** | Continued pedestrian trail use. Multi-use (including bikes) on administrative roads listed above. | Multi-use (including bikes) on trails and administrative roads listed above. Possible discontinuance of equestrian use on the Brooklyn Mine Trail/Administrative Road. |

**Table 2-4. Comparative Summary of Alternatives for Three Single Track Trails on Existing Informal Routes**

| | No Action Alternative (Alternative A) | Both Action Alternatives (Alternatives A and B) |
|---|---|---|
| **Construction of New Trails** | None. | Develop single track trails as follows:<br>- Mud Turn Trail (2.75 mi.)<br>- Panther Branch Connector Trail (3 mi.)<br>- Brooklyn Miner's Connector Trail (0.8 mi.) |
| **Facilities and Access** | No new facilities. | New facilities and amenities where determined appropriate. Existing access points and trailheads are available for visitors. |
| **Opportunities** | Continued informal hiking and hunting use. | - Trail classifications to be determined.<br>- Continued hunting use. |
| **Bicycle Use** | No. | Yes. Pursue a special regulation allowing bike use on proposed trails. |

**Table 2-5. Comparative Summary of Alternatives for the Craig Branch Stacked Loop Trail System**

| | No Action Alternative (Alternative A) | "New Route Construction" (Alternative B, NPS Preferred) | "Existing Disturbance Construction" (Alternative C) |
|---|---|---|---|
| **Construction of New Trails** | None. | 11 miles of single track trail, including 3 miles within existing informal routes and 8 miles newly constructed. | 4.5 miles of single track trail within existing informal routes. |
| **Facilities and Access** | No new facilities. | - New trailhead on the log landing along the existing Craig Branch Trail/Administrative Road with parking, kiosk and other appropriate facilities.<br>- Signed access point on the Kaymoor No. 1 Road. | New trailhead on the log landing along the existing Craig Branch Trail/Administrative Road with parking, kiosk and other appropriate facilities. |
| **Opportunities** | Continued informal hiking and hunting use. | - Easiest and More Difficult trail classifications.<br>- 2 vistas from the canyon rim.<br>- Continued hunting use. | - Easiest and More Difficult trail classifications.<br>- Continued hunting use. |
| **Bicycle Use** | No. | Yes. Pursue a special regulation allowing bike use on proposed trails. | Same as Alternative B. |

**Table 2-6. Comparative Summary of Alternatives for the Garden Ground Stacked Loop Trail System**

| | No Action Alternative (Alternative A) | "New Route Construction" (Alternative B, NPS Preferred) | "Existing Disturbance Construction" (Alternative C) |
|---|---|---|---|
| **Construction of New Trails** | None. | 33 miles of single track trail, including about 4 miles within existing informal routes and 29 miles newly constructed. | About 45 miles of single track trail; much of this on existing informal routes, including the mine bench. |
| **Facilities and Access** | No new facilities. | - New trailhead near the intersection of County Road 28 and Terry Top Trail/Administrative Road, with parking, kiosk and other appropriate facilities.<br>- Signed access point on County Road 28. | Same as Alternative B. |
| **Opportunities** | Continued informal hiking and hunting use. | - More Difficult and Most Difficult trail classifications.<br>- Several vistas from the canyon rim.<br>- Continued hunting use. | Same as Alternative B. |
| **Bicycle Use** | No. | Yes. Pursue a special regulation to allow bike use on proposed trails. | Same as Alternative B. |

## 2.8 Alternatives Considered but Dismissed from Detailed Analysis

**Bicycle Use on the Bluestone Turnpike Trail.** The Bluestone Turnpike Trail is located within the Bluestone National Scenic River, a unit of the NPS that is managed out of the New River Gorge National River administrative offices. Designating the Bluestone Turnpike Trail for bicycle use was considered but eliminated from further evaluation because it is situated in a separate unit of the NPS, and it was determined that the scope of this EA should remain within the New River Gorge National

River. If, in the future, a regional trail plan for all three NPS units in the New River Gorge region is initiated, then bicycle use within the Bluestone National Scenic River could be evaluated in that future plan.

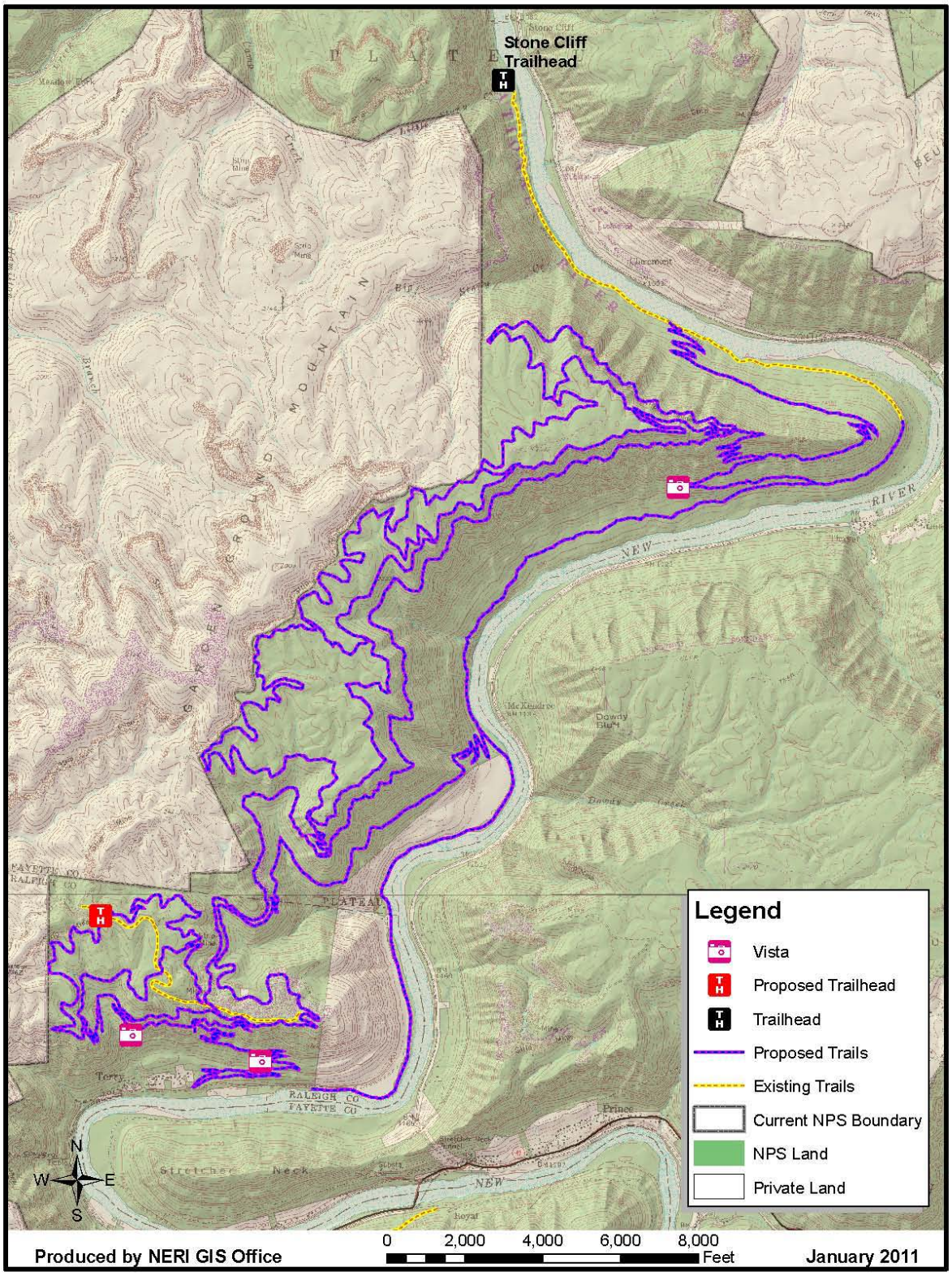
**Trailhead in the Craig Branch Area.** Within the Craig Branch area, there is a second log landing (in addition to the proposed trailhead) located near Gatewood Road, adjacent to several lots of private property. The log landing was considered as a possible trailhead for the proposed Craig Branch Trail System, but it was eliminated from detailed analysis. The access to this log landing is a narrow, gated gravel road that the NPS does not own, but does have a right of way for use. Approximately the first 50 feet of this road are shared with a private driveway that accesses two houses. Additionally, upon examination of the property line, the NPS owns only a portion of the log landing itself. It was determined that putting a trailhead here could cause too many conflicts with landowners and may impact private lands.

**Trailheads in the Garden Ground Area.** Development of a trailhead adjacent to the town of Terry was considered, but eliminated from detailed analysis. The terrain and property ownership is such that this trailhead could accommodate only a few cars, and the location at the bottom of the gorge is not feasible for a trailhead due to the steep slope that would be very difficult for the majority of trail users.

Development of a full trailhead with parking and facilities was considered at the proposed access point to the Garden Ground Trail System along County Road 28 where the corners of NPS and BSA property meet. This action was eliminated from detailed analysis, however, because County Road 28 is narrow, remote and used almost exclusively by the few private landowners that live along it. Inviting public traffic down this road could cause conflicts with park neighbors, space for a trailhead would be constrained by terrain and ownership and substantial road improvements may be necessary to make public access viable.

**Garden Ground Stacked Loop Trail System Alternative.** An additional alternative for the Garden Ground Stacked Loop Trail System was considered (Figure 2-8). It incorporated additional mileage and looping, interconnected trail segments beyond that proposed in Alternative C, "Existing Disturbance Single Track Trail Construction". Resource specialists assessed that, while the 2010 Draft GMP finds that a single track trail is not considered to be a fragmenting feature in the project area's mixed mesophytic forest, the cumulative effect of the multiple loops of trail in this alternative could approach the potential for becoming a fragmenting feature. This alternative also proposed a segment of new trail through a tract of private land to the north and northeast of Terry. The NPS does not necessarily anticipate an opportunity to acquire the land or to work with the landowner to come to an agreement about public access. This alternative was eliminated from further analysis.

**Figure 2-8. Garden Ground Stacked Loop Trail System (Dismissed From Analysis)**



## 2.9 Comparative Summary of Consequences

**Table 2-7. Comparative Summary of Consequences for Bicycle Use on Existing Trails and Administrative Roads**

| | No Action Alternative (Alternative A) | Both Action Alternatives (Alternatives A and B) |
|---|---|---|
| **Water Quality** | Sedimentation would continue where existing trails and administrative roads follow unsustainable alignments, resulting in long-term, negligible, adverse impacts. | Sediment delivery could increase somewhat where existing trails and administrative roads follow unsustainable alignments, resulting in long-term, negligible, adverse impacts. |
| **Streamflow Characteristics** | Where existing trails and administrative roads are not properly designed for drainage, alterations to streamflow characteristics would continue, resulting in long-term, negligible, adverse impacts. | Streamflow alteration could increase somewhat where existing trails and administrative roads are not properly designed for drainage, resulting in long-term, negligible, adverse impacts. |
| **Vegetation** | Current use of existing trails and administrative roads would continue with no increased disturbance to vegetation, resulting in long-term, negligible, adverse impacts. | Research demonstrates that impacts of hiking and biking are slightly different in character but similar in intensity. Impacts to vegetation of bike use on existing trails would result in long-term, negligible, adverse impacts. |
| **Wildlife and Habitat** | Allegheny woodrats, amphibians and neotropical migratory birds, as well as federally designated threatened and endangered species would encounter long-term, indirect, negligible, adverse impacts from the continuation of current management. | Impacts to amphibians could be long-term, minor and adverse where bikers might travel through standing water, and hikers may walk around the pools. Bike use would have long-term, negligible, adverse impacts on Allegheny woodrats, neotropical migratory birds and federally protected bats. |
| **Cultural Resources** | Continuation of current management would result in no impact and no adverse effect (Section 106) to cultural resources in our around existing trails and administrative roads. | Allowing bike use on trails in addition to hiking use would result in no impact and no adverse effect (Section 106) to cultural resources in our around existing trails and administrative roads. |
| **Park Facilities and Operations** | More stringent enforcement of prohibited bicycle use on park trails would result in moderate, long-term, adverse impacts on park operations, due to staffing and funding constraints associated with law enforcement responsibilities and priorities. | Where existing trails pass through wet areas, slightly more frequent maintenance or short re-routes may be needed, creating negligible adverse impacts on park facilities and operations. |
| **Visitor Use, Experience and Access** | Because the NPS would be induced to more stringently enforce prohibited bicycle use, this regional user group would experience major, long-term, adverse impacts, while no other user groups would experience any benefit from this action. | Long-term, negligible, adverse impacts could result for any equestrian users who may still be using the Brooklyn Mine Trail/Administrative Road. Overall impacts to visitor use would be beneficial because the NPS would provide more of the public's desired recreational opportunities. |
| **Socioeconomics** | More stringent enforcement of bicycle use would cause minor, adverse impacts to local tourism and marketing efforts, which would have a moderate adverse impact on the Fayetteville economy and a negligible adverse impact on the overall regional tourism economy. | Allowing bicycle use on selected park trails could produce substantial benefits for the local economy. |

**Table 2-8. Comparative Summary of Consequences for Three Single Track Trails on Existing Informal Routes and Bicycle Use on Those Trails**

| | No Action Alternative (Alternative A) | Both Action Alternatives (Alternatives A and B) |
|---|---|---|
| **Water Quality** | Sedimentation would continue where these existing informal routes have unsustainable hydrologic conditions, resulting in long-term, negligible, adverse impacts. | Development of new trails within the existing informal route disturbance, even with sustainable design and construction, could increase sedimentation and result in long-term, negligible, adverse impacts. |
| **Streamflow Characteristics** | These existing roads have some features that have altered natural runoff patterns, resulting in long-term, negligible, adverse impacts. | Development of new trails within the existing informal route disturbance, even with sustainable design and construction, could carry forward some of the current water delivery issues and result in long-term, negligible, adverse impacts. |
| **Vegetation** | Rare plants and plant communities along these existing routes would continue to be protected from increased visitor use, resulting in long-term, negligible, adverse impacts. | Development of new trails within the existing informal route disturbance would avoid rare plants, though some trampling of these plants beyond the trail tread could occur. New trails could act as vectors to spread invasives. Impacts to vegetation would be localized, long-term, minor and indirect. |
| **Wildlife and Habitat** | Allegheny woodrats, amphibians and neotropical migratory birds, as well as federally designated threatened and endangered species would encounter long-term, indirect, negligible, adverse impacts from the continuation of current management. | Because mitigations are proposed to protect federally-listed and non-listed bat species, Allegheny woodrats and amphibians, impacts to them would be local, long-term, indirect, negligible and adverse. Impacts to neotropical migratory birds would be local, long-term, minor and adverse. |
| **Cultural Resources** | Historic structures in association with the three existing informal routes/old roads may be under some pressure from incidental use of the areas, resulting in possible negligible, long-term, adverse impacts and no adverse effects (Section 106). | Mitigations that include archeological surveys and trail reroutes where proposed trails encounter archeological sites would result in negligible, adverse impacts and no adverse effects (Section 106) to archeological resources. The three historic roads upon which the trails would be built would be protected and interpreted, providing a benefit for historic resources. |
| **Park Facilities and Operations** | No construction of new facilities and no change in management would result in no impacts on park facilities and operations. | Short-term, minor, adverse impacts would result for park budget and staff time from the development of the proposed trails, and long-term, negligible, adverse impacts would result from the need to maintain and patrol additional park facilities, or assets. |
| **Visitor Use, Experience and Access** | Minor, adverse impacts on visitor use would result from the continuation of current management because the NPS would continue not to provide facilities that would fulfill the public's needs and the park's goals. | Short-term, minor, adverse impacts could result for visitors from the noise and activity of trail construction. Long-term impacts would be beneficial, because the NPS would provide more of the public's desired recreational opportunities. |
| **Socioeconomics** | Continuation of current management would have no impact on the local economy. | Development of new trails and allowing bicycle use on them could produce substantial benefits for the local economy. |

**Table 2-9. Comparative Summary of Consequences for the Craig Branch Stacked Loop Trail System and Bicycle Use on Those Trails**

| | No Action Alternative (Alternative A) | "New Route Construction" (Alternative B, NPS Preferred) | "Existing Disturbance Construction" (Alternative C) |
|---|---|---|---|
| **Water Quality** | Sedimentation would continue from unsustainable existing informal routes, resulting in long-term, negligible, adverse impacts. | Rehabilitation of existing informal routes, and sustainable design and construction of new trails would result in beneficial impacts. | More sedimentation is likely from proposed new trails under this alternative than under Alternative B, but with rehabilitation of existing informal routes, this would result in beneficial impacts. |
| **Streamflow Characteristics** | Prior land use actions have altered natural runoff patterns, creating long-term, negligible, adverse impacts. | Rehabilitation of existing informal routes would remove features that have changed natural runoff patterns, resulting in beneficial impacts. | More of the current water delivery issues would be carried forward under this alternative than under Alternative B, but with rehabilitation of existing informal routes, this would result in beneficial impacts. |
| **Vegetation** | Existing disturbances in this area would continue to affect vegetation, resulting in long-term, minor, direct, adverse impacts. | Short trail segments into cliff top habitat that access vistas would result in local, long-term, minor, adverse impacts to globally rare plant communities. Rehabilitation of existing informal routes and treatment of invasives would be beneficial for vegetation in this area in the long term. | Trails would not be constructed in cliff top habitat, so no rare plants or rare plant communities would be disturbed. With rehabilitation of existing informal routes not converted to trails and treatment of invasives, this alternative would benefit vegetation in this area in the long term. |
| **Wildlife and Habitat** | Existing and continued disturbances in this area would continue to affect wildlife and habitat in the area, resulting in local, long-term, indirect, negligible impacts to federally-listed and non-listed bat species; long-term, indirect, minor, adverse impacts to amphibians; and long-term, indirect, moderate adverse impacts to neotropical migratory birds. | Because mitigations are proposed to protect federally-listed and non-listed bat species, impacts to them could be local, long-term, indirect, negligible and adverse. Amphibians would benefit from the rehabilitation of informal routes. Considering both new trail construction and rehabilitation of informal routes, neotropical migratory birds would continue to experience local, long-term, indirect, moderate adverse impacts to their breeding capacity in this area, representing a negligible increase in adverse impact from the existing condition. | Because mitigations are proposed to protect federally-listed and non-listed bat species, impacts to them could be local, long-term, indirect, negligible and adverse. Amphibians would benefit from the rehabilitation of informal routes. Considering both new trail construction and rehabilitation of informal routes, neotropical migratory birds would continue to experience local, long-term, indirect, moderate adverse impacts to their breeding capacity in this area, representing a negligible benefit from the existing condition. |
| **Cultural Resources** | Existing informal routes and their prohibited use by OHVs that pre-dates | Mitigations that include archeological surveys and trail reroutes where | Mitigations that include archeological surveys and trail reroutes where |

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|---|---|---|---|
| | NPS ownership has resulted in minor, adverse impacts to archeological resources in this area, which is considered adverse effect under Section 106. | proposed trails encounter archeological sites in addition to rehabilitation of existing informal routes, which would decrease the likelihood of further damage to cultural resources, as well as the increased ease in ability of park law enforcement rangers to patrol the looted sites in the area would result in beneficial impacts to cultural resources and no adverse effects under Section 106. | proposed trails encounter archeological sites in addition to rehabilitation of existing informal routes, which would decrease the likelihood of further damage to cultural resources, as well as the increased ease in ability of park law enforcement rangers to patrol the looted sites in the area would result in beneficial impacts to cultural resources and no adverse effects under Section 106. |
| **Park Facilities and Operations** | More stringent enforcement of prohibited OHV use in this area result in moderate, long-term, adverse impacts on park operations, due to staffing and funding constraints and challenges of enforcing OHV use in this area. | Short-term, moderate, adverse impacts would be created through the cost in money and staff time to develop the proposed trail system, but because OHV use would be deterred through construction and use and further more easily enforced by NPS law enforcement staff bike patrols of the area, which would also protect archeological sites from looters, park facilities and operations could ultimately benefit from the proposed trail system because of the increased ability to protect the area's fundamental resources and values. | Short-term, moderate, adverse impacts would be created through efforts to develop sustainable trails on unsustainable alignments of existing informal routes. Increased maintenance needs for the sections of these trails that cannot be made sustainable would create long-term, minor, adverse impacts on park operations for maintenance. Also, the short and centralized trail system would make it difficult to enforce any prohibited OHV use that may occur on the periphery of the project area. |
| **Visitor Use, Experience and Access** | Moderate adverse impacts would result on visitor experience from the continuation of current management because visitors would not have desirable facilities to explore this area and may encounter OHV use while exploring the area's resources through off-trail travel. | Short-term, minor, adverse impacts could result for visitors from the noise and activity of trail construction. Long-term impacts would be beneficial, because the NPS would provide more of the public's desired recreational opportunities. | Short-term, minor, adverse impacts could result for visitors from the noise and activity of trail construction. Long-term impacts would be beneficial, because the NPS would provide more of the public's desired recreational opportunities, though Alternative C would provide fewer benefits than Alternative B because these proposed trails would not be as desirable. |
| **Socioeconomics** | Continuation of current management would have no impact on the local economy. | Development of new trails and allowing bicycle use on them could produce substantial benefits for the local economy. | Development of new trails and allowing bicycle use on them could produce substantial benefits for the local economy. |

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**Table 2-10. Comparative Summary of Consequences for the Garden Ground Stacked Loop Trail System and Bicycle Use on Those Trails**

| | No Action Alternative (Alternative A) | "New Route Construction" (Alternative B, NPS Preferred) | "Existing Disturbance Construction" (Alternative C) |
|---|---|---|---|
| **Water Quality** | Sedimentation would continue from unsustainable existing informal routes, resulting in long-term, negligible, adverse impacts. | Development of new trails, even with sustainable design and construction, would increase sedimentation and result in long-term, negligible, adverse impacts. | More sedimentation is likely from proposed new trails under this alternative than under Alternative B, resulting in long-term, negligible, adverse impacts. |
| **Streamflow Characteristics** | Prior land use actions have altered natural runoff patterns, creating long-term, negligible, adverse impacts. | Development of new trails, even with sustainable design and construction, could alter water delivery and result in long-term, negligible, adverse impacts. | More of the current water delivery issues would be carried forward under this alternative than under Alternative B, resulting in long-term, negligible, adverse impacts. |
| **Vegetation** | The area would continue to receive relatively little use, protecting rare plant communities from encounters with people regularly trampling vegetation or bringing invasives deeper into this area. However, existing disturbances in this area would continue to affect vegetation, resulting in long-term, minor, direct, adverse impacts. | Short trail segments into cliff top habitat that access vistas would result in local, long-term, minor, adverse impacts to globally rare plant communities. Rehabilitation of existing informal routes and treatment of invasives would be beneficial for vegetation in this area in the long term. | The proposed trail along existing informal routes could encounter several rare plant communities, increasing the potential for impacting these communities and bringing invasives into them. While rehabilitation of existing disturbances would be beneficial to vegetation, overall impacts from disturbance caused by the construction of new trails would be long-term, moderate and adverse. |
| **Wildlife and Habitat** | Existing and continued disturbances in this area would continue to affect wildlife and habitat in the area, resulting in local, long-term, indirect, negligible impacts to federally-listed and non-listed bat species; long-term, indirect, negligible adverse impacts to Allegheny woodrats; long-term, indirect, minor, adverse impacts to amphibians; and long-term, indirect, minor adverse impacts to neotropical migratory birds. | Because mitigations are proposed to protect federally-listed and non-listed bat species, impacts to them could be local, long-term, indirect, negligible and adverse. With mitigations but an increased availability of trails for predator movement, adverse impacts to Allegheny woodrats would be local, long-term, indirect and minor. Amphibians would benefit from the rehabilitation of informal routes. Considering both new trail construction and rehabilitation of informal routes, neotropical migratory birds would experience local, long-term, indirect, moderate adverse impacts to their breeding capacity in this area, representing a | Because mitigations are proposed to protect federally-listed and non-listed bat species, impacts to them could be local, long-term, indirect, negligible and adverse. The use of the mine bench for new trail, in favor of constructing new trails on existing disturbance, would result in local, long-term, indirect, moderate adverse impacts to Allegheny woodrats. Amphibians would benefit from the rehabilitation of informal routes. Considering both new trail construction and rehabilitation of informal routes, neotropical migratory birds would experience local, long-term, indirect, moderate adverse impacts to their breeding capacity in this |

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|---|---|---|---|
| | | noticeable, incremental increase in adverse impact from the existing condition. | area, representing a noticeable, incremental increase in adverse impact from the existing condition. |
| **Cultural Resources** | Cultural resources would receive negligible, adverse impacts from continued management, resulting in a Section 106 determination of no adverse effect, unless the prohibited OHV use in the area were to increase, which would result in minor, adverse impacts and a determination of adverse effect. | Mitigations that include archeological surveys and trail reroutes where proposed trails encounter archeological sites would result in negligible, adverse impacts and no adverse effects (Section 106) to archeological resources. | Mitigations that include archeological surveys and trail reroutes where proposed trails encounter archeological sites would result in negligible, adverse impacts and no adverse effects (Section 106) to archeological resources. The proposal of more miles of trails under Alternative C than Alternative B would result in an imperceptibly higher potential for adverse impacts, though the overall impacts would still be negligible and adverse, and the Section 106 determination would remain "no adverse effect." |
| **Park Facilities and Operations** | More stringent enforcement of prohibited OHV use in this area result in moderate, long-term, adverse impacts on park operations, due to staffing and funding constraints and challenges of enforcing OHV use in this area. | Short-term, moderate, adverse impacts would be created through the cost in money and staff time to develop the proposed trail system, but because OHV use would be deterred through construction and use and further more easily enforced by NPS law enforcement staff bike patrols of the area, park facilities and operations could ultimately benefit from the proposed trail system because of the increased ability to protect the area's fundamental resources and values. | Short-term, moderate, adverse impacts would be created through efforts to develop sustainable trails on unsustainable alignments of existing informal routes. Increased maintenance needs for the sections of these trails that cannot be made sustainable would create long-term, minor, adverse impacts on park operations for maintenance. |
| **Visitor Use, Experience and Access** | Minor, adverse impacts would result on visitor experience from the continuation of current management because visitors unclear, unsigned access to the area would persist, and visitors could only explore its resources via cross country travel through thick vegetation. | Short-term, minor, adverse impacts could result for visitors from the noise and activity of trail construction. Long-term impacts would be beneficial, because the NPS would provide more of the public's desired recreational opportunities. | Short-term, minor, adverse impacts could result for visitors from the noise and activity of trail construction. Long-term impacts would be beneficial, because the NPS would provide more of the public's desired recreational opportunities. |
| **Socioeconomics** | Continuation of current management would have no impact on the local economy. | Development of new trails and allowing bicycle use on them could produce substantial benefits for the local economy. | Development of new trails and allowing bicycle use on them could produce substantial benefits for the local economy. |

## 2.10 Preferred Alternative

### 2.10.1 Environmentally Preferred Alternative

The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment [NPS 2001a, Sec. 4.5 E(9)]. The environmentally preferred alternative is defined by the Council on Environmental Quality in their NEPA's Forty Most Asked Questions: "The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the lease damage to the biological and physical environment; it also means the alternative which best protects, preserves and enhances historic, cultural and natural resources" (Q6a).

Alternative B, "New Route Single Track Trail Construction," was selected as the environmentally preferred alternative.

The action alternatives, Alternatives B and C, are preferred over Alternative A, the No Action Alternative for the following primary reasons:

- They include extensive rehabilitation of disturbance and invasive species removal in the Craig Branch and Garden Ground areas, which Alternative A, the No Action Alternative, does not.
- They include features and mitigations in all proposed new trail development that would mitigate for existing erosion and streamflow issues resulting from past land use. Alternative A, the No Action Alternative, does not propose mitigation of these issues.

Alternative B, "New Route Single Track Trail Construction," is preferred over Alternative C, "Existing Disturbance Single Track Trail Construction," for the following primary reasons:

- It proposes development of fewer miles of trail in the Garden Ground area, would result in fewer impacts on neotropical migratory birds that depend upon large, unfragmented forest blocks.
- It does not propose new trail development on the mine bench, which is key habitat for the Allegheny woodrat, whereas Alternative C would develop trail on the mine bench.
- The 2010 Draft GMP proposes that new trails, particularly those in backcountry areas, would be constructed on existing disturbance, such as existing informal routes like old logging and mining roads. It was thought that fewer adverse impacts to natural resources would result from developing trail in disturbed areas. Through the development of the proposals in this EA, the NPS learned that there are numerous species of rare plants that prefer to grow in these disturbed areas. Also, many of the existing informal routes in the park were developed for resource extraction or for OHV use, and were not designed for sustainable long-term recreational use. Often, these informal routes and disturbed areas are the source of erosion and streamflow issues that indirectly impact water quality, vegetation and wildlife. Alternative B, "New Route Single Track Trail Construction," proposes trail development on existing disturbances where they would lend themselves to sustainable trails; otherwise these disturbances would be avoided and, in many cases, rehabilitated. Alternative C, "Existing Disturbance Single Track Trail Construction," proposes to use even the unsustainable alignments of these existing disturbances for trail construction; to make those trails sustainable, considerable recontouring would be necessary, in addition to importing materials such as rock and dirt to build features that would adhere to sustainable trail standards. Even with this extra construction, it may not be possible to mitigate some of the issues and impacts that occur simply as a result of the unsustainable alignments.

### 2.10.2 NPS Preferred Alternative

Alternative B, "New Route Single Track Trail Construction," was selected as the NPS preferred alternative because it is the environmentally preferred alternative and because it provides

better opportunities and experiences for park visitors. Additionally, costs and labor for new trail development would be greater under Alternative C, "Existing Disturbance Single Track Trail Construction," than under Alternative B for the reasons discussed in Section 2.10.1 regarding issues, impacts and mitigation measures associated with development of new trails on existing disturbance.

# 3 AFFECTED ENVIRONMENT

Chapter Three of this EA describes the existing conditions of the human environment for the project areas and summarizes relevant data and research collected to inform the impact analysis. Existing conditions are organized by the impact topics the NPS has determined it must analyze. The information provided here is the best and most current information available, though it is by no means fully comprehensive.

## 3.1 Water Quality

Most running waters in the park (the New River and many of its tributaries) are adversely impacted by contamination from fecal pollution indicator bacteria (Purvis 2010). Sedimentation and the presence of trace metals and other chemical elements and compounds are secondary water quality issues, and there are isolated areas where acidic runoff, usually from past mining activity, is a concern (Purvis et al. 2002).

Improper treatment and disposal of domestic sewage is the most pervasive water resource issue in the park (Purvis et al. 2002). This problem is indicated by often high levels of fecal coliform bacteria. The park conducts a regular water quality monitoring program that documents the extent, magnitude and trend in fecal coliform bacteria (e.g. Purvis 2010). Information gathered from this monitoring is shared with the West Virginia Department of Environmental Protection, and other state, regional and local agencies and groups concerned about water quality in an effort to influence management decisions and funding allocations to improve regional sewage treatment.

The park's monitoring program regularly samples several New River mainstem sites. New River water quality is generally good, but contamination by fecal coliform bacteria is common after some rain events. These high bacteria levels occur frequently enough so that the New River mainstem is on the 303d list for fecal coliform bacteria, with a 2008 Total Maximum Daily Load (TMDL) (WV DEP 2008, Appendix B1-1). The West Virginia standard for contact recreation is based on levels of fecal coliform bacteria.

Sedimentation, resulting from soil erosion, is usually low on naturally vegetated land surfaces, and on land that is in near natural conditions (successful long-term recovery or reclamation from disturbance). Most sediment contamination results from inadequate erosion control measures for land conversion activities (usually residential, commercial and municipal development), logging, agricultural activities and motorized travel on unpaved roads and trails. Other sources of sediment occur when increased runoff from existing hardened surfaces (e.g. roads, parking lots, roofs, etc.) or non-natural vegetation (e.g. lawns, golf courses) causes erosion as this water is discharged to stream drainage networks. Some sedimentation also occurs from legacy land uses (particularly mining, logging and ancillary activities like road networks) that had inadequate reclamation.

Trace metals and other contaminants result from legacy coal mining activities (Messinger 2004) and industrial activities conducted without adequate containment or treatment of pollutants (Purvis et al. 2002).

### 3.1.1 Existing Trails and Administrative Roads

Runoff from existing roads and trails does have some effect on water quality, the degree of which is heavily influenced by the condition of roads and trails. All of the existing trails and administrative roads proposed for bicycle use in this project are maintained for use and have negligible impacts upon the local area water quality as a result of erosion from trail surfaces into streams and water courses. Most sediments from runoff from these surfaces is captured in the surrounding soils and duff layer.

### 3.1.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

**Mud Turn Area.** The proposed Mud Turn Trail follows an intermittent (possibly ephemeral) drainage along its lower reaches (Mill Creek). This area has recovered well from prior disturbance, and although it is not monitored, water quality is likely to be good.

**Panther Branch Area.** The proposed Panther Branch Connector Trail runs along the New River from Panther Branch downstream to Glade Creek. Monitoring results for the closest upriver site, the New River below Sandstone Falls, between 1993 and 2009, showed that 12 of 118 samples (ten percent) exceeded the contact recreation standard for fecal coliform bacteria (Purvis 2010).

Glade Creek is on the 303d list (WV DEP 2008) for fecal coliform bacteria throughout its 23.9 miles. The upper reaches of Glade Creek are relatively densely populated in the area of Glade Springs Resort, and this, along with recreational use in this area, may be the source of fecal contamination. Even though Glade Creek is on the 303d list, NPS monitoring shows good water quality in this stream within the park. Between 1995 and 2006, only four of 58 samples (seven percent) exceeded the contact recreation standard (Purvis and Wilson 2007). The park's sampling at the mouth indicates that this contamination has diminished by the time the stream's waters reach that far.

Glade Creek is also on the 303d list for biological conditions not allowable from 8.4 miles above the mouth to the headwaters. This situation exists as a measure of stream ecological integrity; in this case a measure of stream bottom dwelling invertebrates (mostly insects), is not at acceptable levels. Conditions that cause this measure to be unacceptable usually relate to a lack of stream side tree canopy and/or sedimentation from surface disturbing activities. Again, it is likely that this condition is due to activities in the Glade Springs Resort area, and since stream mile 8.4 is upstream of the park boundary, this condition does not exist within the New River Gorge National River. Indeed, the West Virginia Division of Natural Resources stocks trout in the upper three miles of Glade Creek within the park, and there is a reproducing population of brown trout in the lower three miles of Glade Creek within the park (Purvis et al. 2002).

The closest monitoring sites on the New River downstream of Panther Branch are located below Laurel Creek and below Prince. For the New River below Prince between 1990 and 2002, 11 of 107 samples (ten percent) exceeded the contact recreation standard (Wilson et al. 2007). In 2003, this site was replaced with the nearby New River below Laurel Creek (Purvis and Wilson 2007), which between 2003 and 2006, exceeded the contact recreation standard in three of 21 samples (14 percent).

Panther Branch is not monitored. Its watershed is sparsely populated only in the upper reaches, and it is relatively undisturbed. There may be some fecal pollution, especially following high runoff events following rainfall, as upstream populations may not be well-served by a sewer system. There may also be some erosion-caused sedimentation in Panther Branch, though the sparse level of surface disturbance in this watershed is not likely re result in much sedimentation except following intense rain events.

A number of small, ephemeral channels drain into the New River along this route. As for similar channels described earlier, these flow only immediately following rainfall or snowmelt events, are not monitored for water quality, and are unlikely to be cause for water quality concern.

**Brooklyn Mine Area.** The proposed Brooklyn Miner's Connector Trail does not cross any perennial drainages and is located approximately one mile upstream of Coal Run.

### 3.1.3 Craig Branch Area

The small perennial streams Craig and Butcher Branches run through this area. Neither stream is part of the park's regular water quality monitoring program, although they were sampled during the evaluation of the 2001 floods (NPS2001). High-water events like floods tend to result in higher fecal coliform bacteria levels, and this was noted in many New River Gorge National River streams. These levels tend to go down as high waters recede. Both Butcher and Craig Branches were well within the West Virginia standard for contact recreation, although the sampling date for both streams was several days after the initial flood.

Craig Branch is sparsely populated, and it is not likely to have high fecal coliform densities. Population density along Butcher Branch is also sparse, but higher than Craig Branch. Also, the residences in the Butcher Branch watershed are closer to the park boundary, and since this area is not served by a sewer system, it is highly possible that fecal pollution could occur in the park along Butcher Branch, especially during high runoff events following rainfall.

Because of the greater population density in Butcher Branch, erosion-caused sedimentation is likely to be higher in this drainage than in Craig Branch. However, the relatively sparse level of surface disturbance in both watersheds is not likely to result in much sedimentation except following intense rain events.

There are no other known sources of acid or other contaminants in either watershed. Since Butcher Branch flows through the old mining community of Kaymoor, there may exist as yet unknown sources of contamination.

The only other watercourses in this area are ephemeral tributaries to Butcher and Craig Branches, or that drain directly into the New River. These channels flow only immediately following rainfall or snowmelt events, are not monitored for water quality, and are unlikely to be cause for water quality concern.

In summary, despite the rather heavy-handed past land use of this area, the streams and their watersheds are in relatively good condition, with Craig Branch being closer to pristine.

### 3.1.4 Garden Ground Area

There are no perennial streams within this area, although the New River and major tributary Piney Creek skirt the area. Two small intermittent streams drain the edge of Garden Ground Mountain into the New River in the Terry area. Intermittent Batoff Creek drains into the lower reaches of Piney Creek, the largest tributary to the New River within New River Gorge National River, along the southern (and upstream) edge of this area.

The most upriver of the two intermittent Terry tributaries was only sampled following the 2001 floods, at which time its fecal coliform bacteria density was well within the West Virginia standard for contact recreation (NPS 2001). As with Butcher and Craig Branches, this sampling occurred after high waters had receded following the first flood. The other Terry tributary has not been sampled.

The park has not sampled Batoff Creek. However, it is on the West Virginia list of impaired streams (303d list) and a pollution budget (TMDL) was approved in 2008 (WV DEP 2008, Appendix B1-1). Batoff Creek is listed for being contaminated with iron and having low, or acidic, pH. This contamination probably indicates the influence of past mining activities.

Piney Creek enters the New River just upriver of this area, and regular sampling during the park's baseline water quality monitoring program indicates it to be often contaminated by fecal indicator bacteria. Between 1990 and 2006, 42 of 129 samples (33 percent) exceeded the West Virginia standard for contact recreation (Purvis and Wilson 2007). Piney Creek is on the 303d list for fecal coliform bacteria and iron, with a 2008 TMDL.

At the New River below Piney Creek (across the New River from, and close to the downstream extent of the Garden Ground area), between 2003 and 2006, two of 21 samples (ten percent) exceeded the contact recreation standard (Purvis and Wilson 2007). For the New River at Stone Cliff, three of 16 samples (19 percent) taken since 2007 exceeded the contact recreation standard (Purvis 2010). Between 1993 and 2006, 14 of 128 samples (11 percent) from the New River at Thurmond exceeded the contact recreation standard (Purvis and Wilson 2007).

The small communities of Terry Beach and Terry, at the upstream end of this project area, do not have sewer systems. Disposal of human waste is either by septic systems or other onsite methods. The proportion of residences served by such systems is not known, nor is it known what proportion of such systems are properly installed, maintained and functioning. Contamination of the New River by direct drainage of human waste is a definite possibility in this area.

Like the Craig Branch area, a number of small ephemeral channels drain directly into either Piney Creek or the New River from this area. Again, these channels flow only immediately following rainfall or snowmelt events, are not monitored for water quality, and are unlikely to be cause for water quality concern.

In summary, water quality within the Garden Ground area appears to be affected by past mining activities. This is reflected in Batoff Creek being listed as impaired for iron and pH. Other areas of past mining activity (e.g. old mine benches, side cast spoils, etc.) probably exhibit similar water quality issues, but the extent and magnitude of this problem is unknown because such sites are not monitored. Water quality along the periphery of the Garden Ground area suffers from contamination by human waste. This is most prevalent in Piney Creek, but also occurs to a lesser degree in the New River.

### 3.1.5 Data Related to Bicycle Use and Water Quality

Water quality concerns related to off-road bicycle use are derived primarily from erosion-caused sedimentation that could enter streams and water ways. Peer-reviewed research shows that impacts from bike use on properly designed and constructed sustainable trails is no greater than impacts from hiking or trail running, and generally less severe than impacts created by equestrian and motorized use (Cessford 1995, Goeft and Alder 2001, Marion and Olive 2006, Thurston and Reader 2001, White et al. 2006, Wilson and Seney 1994). In summary, these studies show that the greatest erosive potential for all activities occurs on wet trails. Mountain bikes tend to cause more erosion going uphill when the shearing force applied by the power wheel is greater than the shear strain of the soil, causing the wheel to slip, which usually occurs on a steeply graded section of trail, and the rider often steps off to walk in these circumstances. Bikes also tend to cause a high amount of erosion, particularly compared to pedestrian activities, when it is necessary for riders to come to an abrupt stop or brake hard, such as when approaching a blind turn, an unexpected change of direction or a steep section of downhill. Pedestrian trail use tends to cause more erosion going downhill, where hikers are exerting greater compaction forces with some possible slip beneath their shoes.

Sustainable trails are designed to combat erosion by building in trail features that manage trail users, water and gravity (Webber 2007, p. 112). These features include long sight lines and speed-limiting designs that prepare trail users for any abrupt change in direction or grade and allow them to see other oncoming trail users. Other features can include incorporating switchbacks with sweeping turns and mellow grades along steep side hills so that ascending trail users do not experience wheel slip and descending trail users can easily maintain a slow speed, reducing their potential to cause soil compaction from hiking downward or braking their bikes for speed control or to make sharp turns.

## 3.2 Streamflow Characteristics

Streamflow characteristics in the New River Gorge National River generally follow local precipitation patterns, with high flows in the winter and spring, and low flows in the summer and fall. Intermittent streams are likely to be dry in the late summer and early fall. Ephemeral channels may only flow a few days during a year.

Where there are logging and mining roads in the park that pre-date NPS ownership, streamflow characteristics, generally for intermittent or ephemeral channels, are often altered from their natural condition. These are sometimes used as informal routes for recreational activities, have in some cases been formalized and maintained as park roads or trails and are, in many cases, unused and being naturally reclaimed, though not necessarily rehabilitated. In flat and upland areas, these features cause pooling of water, which can, over time, result in large puddles that sometimes support riparian plants and amphibian habitat. Where these informal routes run along hill sides, ephemeral and some intermittent streams that flow down the hill can be captured by the grade of the human-made route, causing the stream to divert from its original course and run along the route for some distances before crossing on or below the route feature and adopting a new downhill course. This is particularly true of mine benches in the park, and can degrade the structural integrity of the route, causing erosion and, in some cases, structural failure of the route feature, though this is generally only an issue during exceptionally heavy rain and flood events.

### 3.2.1 Existing Trails and Administrative Roads

Where existing trails and administrative roads proposed for bicycle use cross or encounter stream channels, bridges, culverts and other features to protect streamflow characteristics are in place and maintained. Where intermittent or ephemeral streams cross existing trails and administrative roads on mine benches, there are incidences of stream capture, as described above. There are also cases in which the mine bench crosses intermittent and ephemeral stream channels where fill from the bench blocks natural stream flow, and water is blocked or diverted.

### 3.2.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

The New River, Panther Branch and Glade Creek are perennial. The Mill Creek drainage that the proposed Mud Turn Trail follows is intermittent. The proposed Brooklyn Miner's Connector Trail is located on a hillside and does not follow any named drainage.

### 3.2.3 Craig Branch Area

Butcher and Craig Branches are perennial. Other drainages in this area are ephemeral.

Most of the project area, and all proposed new trails, are on the rolling upland terrain above the canyon rim, so most existing streamflow issues come from pooling of water on existing informal routes, including old logging roads and user-created OHV routes.

### 3.2.4 Garden Ground Area

There are no perennial streams within this area. Along the periphery, the New River and Piney Creek are perennial. Two small intermittent streams drain into the New River in the Terry area, and another (Batoff Creek) drains into Piney Creek near its mouth. All other drainages in this area are ephemeral.

The project area includes rolling upland terrain on the plateau, as well as steep slopes dropping from the rim to the river of the gorge. There is a mine bench running along the upper contour of the gorge below the rim and cliff line. Streamflow issues common to most areas of the park, as discussed above, are present in the Garden Ground area.

### 3.2.5 Data Related to Bicycle Use and Streamflow Characteristics

Streamflow characteristics concerns related to off-road bicycle use are derived primarily from unsustainable trail design that causes pooling or stream capture, and from the channelization in linear tracks from bike tires. Peer-reviewed research shows that this channelization occurs from bike tires when trail surfaces hold water, and the trail tread remains wet; contrastingly, pedestrian activities and equestrian use cause pockets, or small-scale pooling, within wet or unconsolidated trail treads (Cessford 1995, Goeft and Alder 2001, Keller 1990, Marion and Olive 2006, Thurston and Reader 2001, White et al. 2006, Wilson and Seney 1994). Sustainable trail design, appropriate to the hydrologic conditions and soils of the area where trails would be built, can mitigate nearly all such impacts.

## 3.3 Vegetation

The New River Gorge National River is located within an expanse of mixed-mesophytic forest that is the largest remaining area of mid-Atlantic forest in the world, making it a globally important resource (Ritters et at. 2000). The nearly 1,400 vascular plants known for the park makes it one of the most diverse floras in the NPS. Within the park, the continuous span of mixed-deciduous forest (composed of both oak-hickory and mixed mesophytic forest types) is approximately 60 miles (96.6 km) long by two miles (3.2 km) wide, one of the largest in the nation (Ritters et al. 2000). In the park, approximately 84 percent of the land cover is forested, and 65 percent of the forestland is classified as interior forest based on categories described by Ritters et. al. (2000). For comparison, statewide, only 45 percent of the forestland would be classified as interior forest based on the same scale of analysis (WV Gap Analysis Program 2003).

Some areas of the park's forest remain largely unfragmented by roads, trails, utility corridors or developed land uses. These large blocks of physically unfragmented forest are largely intact natural landscapes and are of high conservation priority because they contain a diversity of plant species and support an important community of forest-interior birds. This rim to river unfragmented forest can only be found along 17.9 of the 106 miles (17 percent) of the New River Gorge shoreline within the park. Many globally rare vegetation communities are included within the project area's large, unfragmented forest blocks, particularly those in the Garden Ground, Mud Turn and Panther Branch areas.

Upland deciduous forest is the predominant natural vegetation type within the project areas. Three upland deciduous forest associations dominate, intergrading with one another and generally correlating with soil moisture and fertility gradients affected by topographic position, aspect and geology (Vanderhorst 2007). They include:

- Sugar maple-buckeye-basswood forest occupies moist, fertile sites on concave, lower and northerly facing colluvial gorge slopes on shale derived soils.
- Oak-hickory forest occupies drier, less fertile sites and predominates on plateaus with residual soils derived primarily from sandstone.
- Oak-hickory-sugar maple forest is intermediate and predominates on southerly facing, convex and upper colluvial gorge slopes, on northerly aspects and on plateaus.

Two additional deciduous forest associations occur less extensively in the project areas:

- Oak-ericad forest is somewhat less extensive compared to the major three associations and occurs on drier, less fertile sites than the oak-hickory forest.
- Chinquapin oak-black maple forest is an uncommon association restricted to areas with calcareous bedrock.

Less abundant than deciduous forests are natural upland forests with an abundant conifer component that occur in more specialized habitats (Vanderhorst 2007):

- Cliff top Virginia pine forest occurs on southerly slopes and sandstone outcrops.
- Hemlock-sweet birch-tulip poplar-giant rhododendron forest and the related deciduous tree-giant rhododendron forest are fairly abundant types which occur in moist sites (coves, ravines) with acidic, low fertility soils.
- Hemlock-chestnut oak/Catawba rhododendron forest less common and endemic to the cliff tops of the New River Gorge

In the absence of fires or other land disturbance, areas of forest and woodland associations adapted to more xeric conditions (cliff top Virginia pine forest, oak/ericad forest, oak-hickory forest) are likely to decrease over time. Areas of forest and woodland associations adapted to more mesic conditions (sugar maple-buckeye-basswood forest, oak-hickory-sugar maple forest, deciduous tree/giant rhododendron) are likely to increase. Boundaries between these associations are likely to move upslope. Areas of hemlock-sweet birch-tulip poplar forest/giant rhododendron forest would be expected to increase, but hemlock (*Tsuga Canadensis*) is currently threatened by hemlock wooly adelgid (*Adelges tsugae*), an exotic insect pest. Another recently introduced forest pest, known as the emerald ash borer (*Agrilus planipennis)*, threatens the extinction of both white and green ash trees, comprising approximately ten percent of the park's forest.

Past land use practices throughout the New River Gorge region resulted in most of the forest being logged for consumptive purposes. Entire forests were logged for support of the mining and railroad industries. The park today is a recovering forest with many scars remaining including mine roads, mine bench cuts and associated landslides, and current infrastructure such as electrical transmission corridors.

**Rare or Unusual Vegetation.** The New River Gorge National River lies at the core of a globally important forest and contains the most diverse flora of any river gorge in central and southern Appalachia (NPS 2009). There are many rare and/or severely threatened vegetation communities in the park (Sneddon 2010). Formal rankings have been established for 14 associations and range from

G1 (critically imperiled, very high risk of extinction) to G4 (apparently secure) (Table 3-1). Many of these communities contribute substantially to the regional biodiversity of plants and animals in the park, including the dry sandstone cliff, the cliff top Virginia pine woodland communities and the many riparian communities within the project area.

Of the park's globally rare vegetation communities, the cliff top, forest seeps and riparian communities are the most rare and under the greatest threat from invasive plants, invasive forest pests and recreational use. The Cliff Top Virginia Pine Forest occurs in 19 separate cliff top communities within the project areas. Riparian zones, while they consist of only two percent of the park's land base, contain 65 percent of the park's flora and are likely home to many rare plants.

**Table 3-1. Global Vegetation Associations and Conservation Rankings of Communities in the New River Gorge National River**

| Community Name | USNVC Association | Global Rank |
|---|---|---|
| **Upland Forests and Woodlands** | | |
| Chinquapin Oak – Black Maple Forest | *Quercus muehlenbergii - Quercus (alba, rubra) - Carya cordiformis / Viburnum prunifolium* Forest [CEGL004793] | G4? |
| Cliff Top Pitch Pine Woodland | *Pinus rigida – Quercus coccinea / Vaccinium angustifolium* Woodland [CEGL006557] | G4 |
| Cliff Top Virginia Pine Forest | *Pinus virginiana – Pinus (rigida, echinata) – (Quercus prinus) / Vaccinium pallidum* Forest [CEGL007119] | G3 |
| Eastern Hemlock – Chestnut Oak / Catawba Rhododendron Forest | *Quercus prinus / Rhododendron catawbiense – Kalmia latifolia Forest* [CEGL008524] | G4 |
| Yellow Birch Cold Cove Forest | *Betula alleghaniensis – (Tsuga canadensis) / Rhododendron maximum / Leucothoe* fontanesiana Forest [CEGL007861] | G3 |
| **Lichen and Sparse Vegetation** | | |
| Dry Sandstone Cliff | Appalachian – Alleghenian Sandstone Dry Cliff Sparse Vegetation [CEGL006435] | G4 |
| **Riparian Communities** | | |
| Black Willow Slackwater Woodland | *Salix nigra – Betula nigra / Schoenoplectus (pungens, tabernaemontani)* Wooded Herbaceous Vegetation [CEGL006463] | G1 |
| Eastern Red-cedar – Virginia Pine Flatrock Woodland | *Juniperus virginiana* var. *virginiana – Pinus virginiana – Quercus stellata / Amelanchier stolonifera / Danthonia spicata – Melica mutica* Woodland [CEGL008449] | G1 |
| Lizard's-tail Backwater Slough | *Peltandra virginica – Saururus cernuus – Carex crinita / Climacium americanum* Herbaceous Vegetation [CEGL007696] | G3 |
| Oak – Tuliptree / Mountain Silverbell Floodplain Forest | *Quercus (alba, rubra, velutina) / Halesia tetraptera* Forest [CEGL006462] | G1 |
| Riverscour Prairie | *Andropogon gerardii – Panicum virgatum – Baptisia australis* Herbaceous Vegetation [CEGL006283] | G3 |
| Sycamore – Ash Floodplain Forest | *Platanus occidentalis – Fraxinus pennsylvanica / Carpinus caroliniana / Verbesina alternifolia Forest* [CEGL006458] | G3 |
| Sycamore – River Birch Riverscour Woodland | *Platanus occidentalis – (Betula nigra, Salix* spp.) Temporarily Flooded Woodland [CEGL003725] | G3 |
| **Headwater Wetlands** | | |
| Forest Seep | *Acer rubrum – Nyssa sylvatica / Ilex verticillata – Vaccinium fuscatum / Osmunda cinnamomea* Forest [CEGL007853] | G1 |

**Species of Special Concern.** There are 78 plant species listed as being of special concern by the state of West Virginia known to occur in the park (Table 3-2). These include 63 plant species designated as very rare to extremely rare and imperiled (S2s) or critically imperiled (S1s) in the state.

Another 14 plants are designated as S3, or rare, and found locally in a restricted range. Newly discovered rare species are a common occurrence, such as the recently discovered rare yellow fringed orchid in the Craig Branch Area.

There is one historic record for the federally threatened Virginia spiraea (*Spiraea virginiana)*, which was once found along the river just upstream of Hawks Nest. Another federally listed plant is the endangered running buffalo clover (*Trifolium stoloniferum)*, which is found in the New River Gorge across from Cotton Hill. Habitat for both of these extremely rare plants exists in the park, but numerous surveys over the years have turned up negative for their occurrence within the New River Gorge National River.

**Table 3-2. Rare Plant Species Known to Occur in the New River Gorge National River**

| No. | Scientific Name | Common Name | Designation |
|---|---|---|---|
| 1 | Anemone quinquefolia var. minima | dwarf anemone | S1 |
| 2 | Arabis hirsuta var. pycnocarpa | hairy rock-cress | S2 |
| 3 | Arabis patens | spreading rock-cress | S2 |
| 4 | Aristida purpurascens var. purpurascens | purple needlegrass | S1 |
| 5 | Baptisia australis var. australis | wild false indigo | S3 |
| 6 | Calopogon tuberosus var. tuberosus | grass pink | S1 |
| 7 | Cardamine flagellifera | bitter cress | S2 |
| 8 | Carex aestivalis | summer sedge | S2 |
| 9 | Carex careyana | Carey's sedge | S1 |
| 10 | Carex comosa | bearded sedge | S2 |
| 11 | Carex emoryi | Emory's sedge | S2 |
| 12 | Carex interior | inland sedge | S1 |
| 13 | Carex mesochorea | midland sedge | S2 |
| 14 | Carex molesta | troublesome sedge | S3 |
| 15 | Carex nigromarginata | black-edge sedge | S3 |
| 16 | Carex seorsa | wesk stellate sedge | S1 |
| 17 | Carex styloflexa | bent sedge | S1 |
| 18 | Carex suberecta | praire straw sedge | S1 |
| 19 | Carex typhina | cat-tail sedge | S2 |
| 20 | Carex woodii | pretty sedge | S2 |
| 21 | Commelina erecta var. angustifolia | slender day-flower | S2 |
| 22 | Corallorhiza wisteriana | spring coralroot | S2 |
| 23 | Coreopsis pubescens var. robusta | star tickseed | S2 |
| 24 | Croton glandulosus var. septentrionalis | northern croton | S3 |
| 25 | Cuscuta indecora var. neuropetala | pretty dodder | S1 |
| 26 | Cymophyllus fraserianus | Fraser's sedge | S3 |
| 27 | Cyperus refractus | reflexed flatsedge | S3 |
| 28 | Cyperus squarrosus | awned cyperus | S3 |
| 29 | Desmondium lineatum | sand tick-trefoil | S1 |
| 30 | Desmodium pauciflorum | fewflower tick-trefoil | S1 |
| 31 | Eleocharis compressa | flat-stemmed spike-rush | S2 |
| 32 | Eleocharis intermedia | matted spike-rush | S1 |
| 33 | Eleocharis palustris | creeping spike-rush | S3 |
| 34 | Eriogonum allenii | yellow buckwheat | S2 |
| 35 | Eupatorium pilosum | vervain thoroughwort | S2 |
| 36 | Fibristylis annua | annual fimbry | S1 |
| 37 | Galactia volubilis | downy milkpea | S2 |
| 38 | Gentiana austromontana | Appalachian gentian | S1 |
| 39 | Helianthemum canadense | Canada frostweed | S2 |
| 40 | Helianthus laevigatus | smooth sunflower | S2 |
| 41 | Helianthus occidentalis ssp. Occidentalis | McDowell sunflower | S2 |
| 42 | Hibiscus laevis | halbred-leaved mallow | S2 |
| 43 | Hypericum virgatum | coppery St. John's-wort | S1 |

| | | | |
|---|---|---|---|
| 44 | Juncus dichotomus | forked rush | S1 |
| 45 | Lythrum alatum var. alatum | winged-loosestrife | S2 |
| 46 | Maianthemum stellatum | starflower false Solomon's-seal | S2 |
| 47 | Melica mutica | two-flower melic grass | S2 |
| 48 | Najas gracillima | slender water nymph | S2 |
| 49 | Oenothera pilosella | evening-primrose | S2 |
| 50 | Pinus resinosa | red pine | S1 |
| 51 | Piptochaetium avenaceum | blackseed needlegrass | S2 |
| 52 | Platanthera ciliaris | yellow fringed orchid | S3 |
| 53 | Platanthera psycodes | small purple-fringe orchid | S1 |
| 54 | Poa saltuensis | drooping bluegrass | S1 |
| 55 | Pogonia ophioglossoides | rose pogonia | S2 |
| 56 | Polygala curtissii | Curtiss' milkwort | S2 |
| 57 | Polygonum amphibium var. emersum | water smartweed | S2 |
| 58 | Pycnanthemum loomisii | Loomis' mountain-mint | S2 |
| 59 | Pycnanthemum torrei | Torrey's mountain-mint | S1 |
| 60 | Ranunculus pensylvanicus | Pennsylvania buttercup | S1 |
| 61 | Ranunculus pusillus var. pusillus | low spearwort | S1 |
| 62 | Rhynchospora recognita | globe beaked-rush | S2 |
| 63 | Salix lucida ssp Lucida | shining willow | S1 |
| 64 | Saxifraga careyana | Carey saxifrage | S3 |
| 65 | Schoenoplectus purshianus | weakstalk bulrush | S3 |
| 66 | Scutellaria saxatilis | rock skullcap | S2 |
| 67 | Sibara virginica | Virginia cress | S2 |
| 68 | Sida hermaphrodita | Virginia mallow | S3 |
| 69 | Silene nivea | snowy campion | S1 |
| 70 | Silphium perfoliatum var. connatum | Virginia cup-plant | S1 |
| 71 | Solidago simplex ssp randii | Rand's goldenrod | S1 |
| 72 | Spiranthes tuberosa | little ladies'-tresses | S3 |
| 73 | Sporobolus clandestinus | rough dropseed | S1 |
| 74 | Stachys nuttallii | Nuttall's hedge-nettle | S3 |
| 75 | Stachys tenuifolia var tenuuifoia | smooth hedge-nettle | S3 |
| 76 | Thalictrum clavatum | mountain meadow-rue | S1 |
| 77 | Triphora trianthophora | nodding pogonia | S2 |
| 78 | Vitis rupestris | sand grape | S2 |

*S1 – extremely rare and critically imperiled; five or fewer documented occurrences in West Virginia*
*S2 – very rare and imperiled; six to 20 occurrences statewide*
*S3 – either very rare and local throughout its range or found locally in a restricted range; 21 to 100 occurrences statewide*

**Non-Native and Invasive Species.** Invasive species management actions are described in the recently completed *Implementation Plan For Managing Invasive Exotic Vegetation, New River Gorge National River* (NPS 2010). This Implementation Plan took a broad view of the invasive exotic plant situation facing the New River Gorge National River. It also identified specific priorities and tools that could be employed to control invasive plants.

Throughout the project area, a higher presence of invasive plants is found along water, road sides, power line right-of-ways, tree-lined field edges and recent disturbance. Stream banks and floodplains afford the most luxuriant growth for native and non-native species and are often generally infested with non-native forbs and shrubs. Reconnaissance surveys conducted park-wide in 2007, indicated moderate-to-heavy area-specific infestations in forest settings that were once old fields or where the sun currently reaches the ground. The tree canopy layer generally has moderate infestation only along field edges and road right-of-ways, with much less impact upon intact stands. Generally, the more intact is the forest tree canopy, the fewer invasive plants are found at any canopy level.

According to many authorities, after habitat fragmentation, invasive species pose the greatest single threat to individual species' survival and maintaining biological diversity and ecosystem health in American forests and meadows (Westbrooks 1998; Cox 1999).

There are 210 non-native plants in the New River Gorge National River, documented in a 2000 version of NPSpecies (NPS 2004). As stated elsewhere, not all non-natives currently threaten the natural environment. Throughout the country, a subset of exotic plants poses invasive tendencies. Only 36 of all exotic plants at the park have been given the "invasive" notation in consultation among park staff and Mid-Atlantic Invasive Management Team staff. These are species that, according to NPS non-native and invasive plant species management decisions, would be targeted for eradication or control throughout the park (Table 3-3).

**Table 3-3. Invasive Plant Species in the New River Gorge National River**

| Scientific Name | Common Name | | Scientific Name | Common Name |
|---|---|---|---|---|
| Ailanthus altissima | Tree of heaven | | Lonicera morrowii | Morrow's honeysuckle |
| Alliaria petiolata | Garlic mustard | | Lonicera tatarica | Tartarian honeysuckle |
| Arctium minus | Common burdock | | Lysimachia nummularia | Moneywort |
| Artemisia vulgaris var. vulgaris | Mugwort | | Lythrum salicaria | Purple loosestrife |
| Celastrus orbiculata | Oriental bittersweet | | Melilotus officinalis | Yellow sweetclover |
| Commelina communis var. communis | Asiatic day-flower | | Microstegium vimineum | Japanese stilt grass |
| Coronilla varia | Crown vetch | | Paulownia tomentosa | Princess tree |
| Dioscorea oppositifolia | Chinese yam | | Phragmites australis | Phragmites reed |
| Elaeagnus umbellata var. parvifolia | Autumn olive | | Polygonum caespitosum var. longisetum | Oriental ladysthumb |
| Festuca arundinacea | Kentucky 31 | | Polygonum cuspidatum | Japanese knotweed |
| Glechoma hederacea | Ground ivy | | Pueraria montana var. lobata | Kudzu |
| Hedera helix | English ivy | | Rose multiflora | Multiflora rose |
| Hemerocallis fulva | Common day lily | | Rubus phoenicolasius | Wineberry |
| Iris pseudacorus | Yellow iris | | Sedum sarmentosum | Stonecrop |
| Lespedeza bicolor | Shrubby Lespedeza | | Spiraea japonica | Japanese spiraea |
| Lespedeza cuneata | Sericea | | Verbascum thapsus | Common mullein |
| Ligustrum vulgare | Privet | | Vinca minor | Periwinkle |
| Lonicera japonica | Japanese honeysuckle | | Wisteria sinensis | Japanese wisteria |

During the development of the *Implementation Plan*, the park was broken up into seven separate invasive plant management zones. Reconnaissance surveys for invasive plants were conducted within each zone and a narrative prepared for each area. Below is a description of the areas applicable to this project:

**Lower Gorge River Left (includes Craig Branch).** This compartment extends along the New River-left from the park's northern extent, south and upriver to Cunard Road. According to park records, this is one of the most infested compartments. The area is characterized by numerous abandoned coal mines and related land disturbance activities. Exotics have colonized former mines and old town sites at Fayette Station, Cunard, Kaymoor Top and Bottom, Elverton, Marr Branch and South Nuttall. Invasives are common along many hiking trails such as the Long Point, Fayetteville and Kaymoor Trails and the Craig Branch Trail/Administrative Road. Japanese knotweed, Japanese stiltgrass, Oriental bittersweet, princess tree and tree of heaven are common pests. The largest kudzu patch in the park is found at South Nuttall and stretches from the river's edge to rim of the gorge. Oriental lady's thumb was found at low to trace levels throughout the west portion of the Old Fayette Station Road corridor.

**Middle Gorge River Left (includes Garden Ground).** This compartment extends along the New River-left from Cunard Road, upriver (south) to Piney Creek. Reconnaissance for this compartment took place along state route 17, down to the Thurmond Bridge and along the road to Stone Cliff. The most troublesome invasives include Japanese knotweed, Japanese honeysuckle, tree of heaven, wineberry and ground ivy (in relative order). Tree of heaven is most dense along power line right-of-ways. At low to trace levels, there is princess tree, multiflora rose, mullein, purple loosestrife, privet and garlic mustard. Garden Ground Mountain was not part of the survey, therefore the extent of invasive plants on the plateau and along the river in this remote area is less understood.

### 3.3.1 Existing Trails and Administrative Roads

In designating existing trails and roads to include bicycle use, concerns arise from the potential increase in erosion and soil deposition outside the trail corridor that could be detrimental to plant communities.

Issues related to rare plants, rare plant communities and species of special concern to be considered in converting the allowed uses of existing trails and administrative roads from hiking only to hiking and biking, are whether biking would adversely affect native vegetation in the area more than hiking use already does. Issues related to non-native and invasive plant species to be considered are whether biking would enhance the spread of invasive along trail corridors more than hiking use already does, and what impacts that could have on native vegetation in the area.

### 3.3.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

Even though the preexisting features within with these three new trails are proposed are associated with past human disturbance, rare plants are frequently associated with them. The federally endangered running buffalo clover is located at a site just downstream of the park boundary along an old road trace, while other rare plants such as melic grass and the yellow fringed orchid, are known to occur within old road traces. Other linear features, such as mine benches and abandoned roads, are known to contain water holes supporting wetland vegetation; therefore, the hydrology of these human-created wet areas should be protected from trail impacts.

The Mud Turn and Panther Branch areas are best characterized as being dominated by riparian/floodplain vegetation, or cove forests in the case of the proposed Mud Turn Trail, located in the Mill Creek drainage. Mature riparian forests are dominated by sycamore, basswood, oaks, ashes, hemlock and sugar maples. Also found in the vicinity of these two project areas are small forest blocks approaching maturity of 100 years or more. The Panther Branch project area is located in an area of the park where the rare rim to river unfragmented forest is found. There are numerous forested seeps in both areas. Invasive plants are limited in these areas compared to other riparian habitats in the park.

The proposed Brooklyn Miner's Connector Trail is located on an east facing slope where the forest type is best described as the upland deciduous sugar maple-buckeye-basswood forest.

**Rare or Unusual Vegetation and Species of Special Concern.** Surveys have not been conducted to determine whether rare plants are present within the existing disturbance of the informal routes on which these three trails are proposed. Because some rare plant species prefer to grow in disturbed areas, pre-construction surveys may have a moderate to high probability of revealing rare plants in these project areas.

The Mud Turn and Panther Branch areas could contain both globally rare plant communities and sensitive riparian habitats. The proposed Panther Branch Connector Trail could traverse or border several riparian plant communities, including an example of the rare Appalachian Flatrock Woodland near the terminus of the trail.

The proposed 0.8-mile Brooklyn Miner's Connector Trail would traverse upland deciduous sugar maple-buckeye-basswood forest, avoiding any globally rare plant communities or sensitive riparian habitats.

**Non-Native and Invasive Species.** The proposed Mud Turn Trail along the Mill Creek drainage is expected to have a moderate to high number of invasive plants, especially at the top near an agricultural field and at the bottom where a large Japanese knotweed infestation exists. The large patch of Japanese knotweed has been treated with herbicides for several years but is still considered out of control. The proposed Panther Branch Connector Trail is less infested but still contains several populations of aggressive invaders that could spread along a newly disturbed trail corridor. The proposed Brooklyn Miner's Connector Trail is expected to have a moderate to high number of invasive plants.

### 3.3.3 Craig Branch Area

Plant communities in the Craig Branch area can be characterized as generally young (<75 years old), reflecting recent logging disturbance. The majority of this area was logged within the past ten years utilizing the "high-grading" method, where the highest valued, largest trees, such as oaks, hickories and maples, were harvested, leaving behind lower value tree species and stems with many defects. Some of the more common plant communities found at the site include sugar maple-buckeye-basswood and oak-hickory forest that dominate this block. There is also a large expanse of cliff top /hemlock-chestnut oak and cliff top Virginia pine forest that has escaped harvest for approximately 100 years. Extensive canopy disturbance resulted in an increase in cover by early successional and shade tolerant tree species. Following recovery of forest canopy cover, succession continues by the replacement of shade intolerant species with shade tolerant species. There are numerous wetland seeps, road ruts and riparian zones in the project area, containing many moisture loving plants.

A history of repeated logging and unregulated OHV use on the property before NPS acquisition left the property fragmented with uneven aged young forests intermixed with invasive plants except in the cliff top communities. NPS law enforcement efforts to stop OHV use have been challenging, as evidenced by continued use. The elimination of OHV use and the control of invasive plants pose a long term challenge for management.

**Rare or Unusual Vegetation and Species of Special Concern.** The only plant survey conducted in the Craig Branch area is the late season (August 2010) rare plant survey on the 11 miles of proposed trail described under Alternative B, "New Route Single Track Trail Construction" (see Section 2.6.2). The yellow fringed orchid (*Platanthera ciliaris)*, a rare plant designated at S3, was discovered growing in three populations in areas closely associated with disturbance along the proposed trail route. No other rare plants are known to occur in the project area, although suitable habitat exists for several plant species. The NPS anticipates conducting an early season rare plant survey along this same corridor in 2011.

There are three globally rare forest communities within the project area; two are located north of the Craig Branch Trail/Administrative Road near the rim of the gorge and include the Cliff Top Virginia Pine Forest and Eastern Hemlock-Chestnut Oak/Catawba Rhododendron Forest. The rare Forest Seep community type is also located within the project area.

**Non-Native and Invasive Species.** Newly disturbed areas in the Craig Branch project area are generally infested with exotic vegetation, especially along disturbed areas: transportation and utility corridors and areas adjacent to private residences. Aggressive invaders include Japanese knotweed, Japanese stiltgrass, autumn olive,multiflora rose, tree-of-heaven and honeysuckles.

### 3.3.4 Garden Ground Area

The natural resources of the Garden Ground area are some of the least understood in the park. Only two known vegetation surveys have been conducted in the area; 1) the Vegetation Classification and Mapping project (Vanderhorst 2007) and, 2) Floristic Survey of Proposed Stacked Loop Mountain Bike Trails at Garden Ground (Streets 2010). In general, the dominant forest communities are oak-hickory-sugar maple, sugar maple-buckeye-basswood, oak hickory and chinquapin oak-black maple woodland. Inclusions of oak ericad and cliff top Virginia pine are found along rock outcrops and cliffs. The best example of old growth hardwoods in the park are found in an 11-acre area above the former Hazard-Bragg farm. The Garden Ground project area is one of only three backcountry areas in the park where the unfragmented rim to river forested condition is found.

Disturbed areas primarily associated with prior mining activities are generally restricted to the plateau and mine bench below the rim. The plateau contains extensive canopy disturbance, resulting in an increase in cover by early successional and shade tolerant tree species. Following recovery of forest canopy cover, succession continues by the replacement of shade intolerant species with shade tolerant species. The Garden Ground area contains approximately 100 acres of reclaimed mine lands, containing a mixture of grassland, shrub and tree saplings. Invasive species are common on recently disturbed mine sites in upland areas and along the river shoreline between Terry and Whitehouse Beach.

**Rare or Unusual Vegetation and Species of Special Concern.** One of two plant surveys conducted in the Garden Ground area is the late season (August 2010) rare plant survey on 12 miles of proposed trail in the Terry Top section of the project area, described under Alternative B, "New Route Single Track Trail Construction" (see Section 2.6.2). No rare plant species were discovered. The NPS anticipates conducting an early season rare plant survey along this same 12-mile corridor in 2011, as well as additional surveys along additional miles of proposed trails in this project area. The Garden Ground project area contains abundant habitat for numerous species of special concern including Garden Ground Mountain, Stone Cliff, Big Stony Creek, rimrock forests, forest seeps and the riparian zone along the New River and its tributaries.

The only known old growth forest in the park – a chinquapin oak maple forest that may be several hundred years old – is located near the proposed new trail segment that would connect to the Stone Cliff Trail/Administrative Road. There are numerous large chinquapin oaks in this stand approaching three to four feet in diameter.

The area also contains the following four globally rare plant communities: Chinquapin oak-black maple forest; Cliff top Virginia Pine Forest; Eastern hemlock-Chestnut Oak/Catawba Rhododendron Forest; and Forest Seeps. The Garden Ground area contains one of the most extensive unfragmented cliff top forest areas in the park. Cliff top forests and forest seeps, while they occupy a small percentage of acreage in the park, contribute substantially to plant diversity.

**Non-Native and Invasive Species.** The Garden Ground area has not previously been surveyed for invasive plants. However, park lands in close proximity contain the following species that can be expected to occur along proposed trails: multiflora rose, mullein, purple loosestrife, privet, wineberry and ground ivy. The most troublesome exotic is the Japanese knotweed present near Terry and along the river at the former Hazard-Bragg Farm. Invasive species have colonized disturbance vectors such as mine benches, power line rights of way, roads and trails.

### 3.3.5 Data Related to Bicycle Use and Vegetation

Vegetation concerns related to off-road bicycle use include trampling, erosion and soil disturbance that could change vegetation composition along the trail, and the spread of invasive plant species along trail vectors.

Unlike other user groups, there is very little use of mountain bikes off-trail. In fact, for the majority of the mountain bikers, the trail is likely the most desirable place to ride for safety and pleasure. Hikers often wander off trail, regarding their own diffuse impact as negligible (Lathrop 2003).

Thurston and Reader (2001) applied five different intensities of experimental use to test lanes in Boyne Valley Provincial Park, Ontario, Canada. The intensities of treatments were 0, 25, 75, 200 and 500 passes each for hiking and mountain bicycling. Before and after these treatments they measured plant stem density, species richness and soil exposure. They made follow up measurements of these endpoints at two weeks and one year after treatment. They found no statistically significant differences between the mountain biking and hiking plots. Both stem density and species richness were reduced by nearly 100 percent at the highest treatment intensities, but recovered within the study period to pre-treatment levels. From this, they conclude that both mountain biking and hiking impose fairly similar short-term damage from trampling and that vegetation recovers quickly once either use is halted.

Erosion and soil disturbance were discussed in relation to water quality and streamflow characteristics (see Sections 3.1.5 and 3.2.5); where erosion occurs and soil disturbance occurs, it could change vegetation competition along the trail.

## 3.4 Wildlife and Habitat

**Mammals.** The park contains 91.5 percent (54 of 59 species) of the mammalian species known to occur in West Virginia. The park contains 77 percent (17 of 22 species) of the mammalian species of special concern in West Virginia.

**White-Tailed Deer.** The population of white-tailed deer in the park vicinity (WV DNR District IV) is approximately 33 deer per square mile of available deer habitat (WV DNR 2003). This density is considerably higher than estimates of pre-European settlement deer densities of approximately 8 to 20 deer per square mile on the Appalachian Plateau (Horsely et al. 2003). The WV DNR has recognized the population increase and has adjusted hunting regulations in an effort to control deer numbers (S. Pugh 2003) Annual harvest records for the park are unknown. In 2002, there were 29,927 deer harvested from WV DNR District IV, of which only 47 were recorded as being taken in the park. Hunters probably harvested more deer within the park, but failed to indicate locations on harvest report cards (Mahan 2004).

**Black Bear.** The black bear population in West Virginia is generally growing. The majority of the population increase is centered in the southern part of the state, including Raleigh, Fayette, Boone and Kanawha Counties. Recent studies in these counties indicate a very healthy bear population with an average litter size of about three cubs. WV DNR has expanded bear hunting opportunities to keep pace with the biological and sociological carrying capacities for bears in each region of the state. WV DNR recently opened a statewide archery season, additional gun hunting and a special November gun season in five southern counties, including Fayette and Raleigh, where bear numbers exceed management objectives. The actual population size and harvest numbers for black bear in the park are unknown.

**Small Mammals.** Ten species of small mammals (mice, voles, shrews and moles) have been trapped in the park (Buhlmann and Vaughan 1987). The long-tailed shrew (*Sorex dispar*), southern pygmy shrew (*S. hoyi winnemana*) and golden mouse (*Ochrotomys nuttalli*) are small mammals of special concern that have been documented in the park (McDonald and Harmon 1989, WV DNR 2003). Other rare species of small mammals such as the rock vole (*Microtus chrotorrhinus*), rock shrew (*S. dispar*) and water shrew (*S. palustris*) may occur in the park, as suitable habitat seems to be available.

**Fur-Bearing and Other Mammals.** Little is known about the distribution and density of populations of riparian and furbearing mammals, such as the northern river otter, beaver, mink and other weasels, muskrat and bobcat (*Felis rufus*). Beaver (*Castor Canadensis*), mink (*Mustela vison*), muskrat (*Ondatra zebithicus*) and river otter (*Lutta Canadensis*) have been reintroduced into the New River system (Purvis et al. 2002).

**Mammals Analyzed in Detail.** Several mammal species are of particular concern with regard to the actions proposed in the action alternatives.

**Federally-Listed Species.** Two mammal species are federally-listed as endangered. The federally endangered Indiana bat (*Myotis sodalist*) and the Virginia big-eared bat (*Cornynorhinus townsendii virginianus*) use abandoned mine portals as roosting sites and cliffs for foraging. The Indiana bat forms nursery colonies in trees beneath loose bark, especially on snags that are heated by sun exposure. Issues related to bats are discussed in greater detail below.

**Bats.** The park contains a regionally important assemblage of bats that includes eleven species that have been documented through various study methods. Bats in the park use abandoned mine portals as roosting sites and cliffs for foraging (Johnson 2003). Two federally endangered species of bats – Virginia big-eared bat (*Cornynorhinus townsendii virginianus*) and Indiana bat (*Myotis sodalis*) – have been identified as using abandoned mine portals in the park. In addition,

two state-rare species of bats, Rafinesque's big-eared bat (*Cornynorhinus rafinesquii*) and eastern small-footed bat (*Myotis leibii*), also have been identified as using abandoned mine portals (Castleberry et al. 2002). All eleven species of bats that occur in the park make use of trees for some purpose: for nursery colonies, hibernation roosts or feeding. The federally endangered Indiana bat forms nursery colonies in trees beneath loose bark, especially on snags that are heated by sun exposure.

White-nose syndrome (WNS) is a disease caused by the fungus *Geomyces destructans* and is responsible thus far for the death of over a million bats. First discovered in four caves in New York in the winter of 2006-2007, the disease and fungus have spread rapidly; last detected into Canada and recently as far west as Oklahoma. White-nose syndrome has not yet been detected in the park, but the West Virginia counties that lie adjacent and east of the park have confirmed cases. The emergence of this disease and its recent, devastating effect on bat populations adds further negative pressure to bat populations that were already in decline from other influences. Even populations of bat species once thought to be stable, such as little brown bats, are declining rapidly. This situation makes it critical that every possible protection be given to bat populations, their habitat, and potential habitat.

All project areas where new trail construction is proposed are located near abandoned coal mines in the park, which are known to be used by bats, including the federally endangered Indiana bat. It is important to manage these areas as potential habitat for bat nursery colonies, including taking care not to fell or disturb any Indiana bat maternity roosting tree. The same care should be exercised to protect the tree habitat of other bat species as well, especially trees potentially used for nursery colonies and hibernacula. While it is best for bat populations if new trail development does not occur within sight of abandoned mine portals, where this situation is unavoidable, it is important to control the portals with gates designed to allow for passage of wildlife in and out of the mine portals, but to keep visitors out of them, both for wildlife protection and visitor safety.

**Allegheny Woodrats.** The park contains globally important populations of Allegheny woodrats (*Neotoma magister*), a species that is under review for listing on the federal endangered species list by the USFWS. Though the population is thought to be stable in West Virginia, it is in decline throughout much of its range in the eastern United States (Balcom and Yahner 1996). Surveys indicate that some populations within the park have declined severely since 1999. Important habitat for the woodrat within the park includes cliffs, boulder fields and abandoned mines.

Proposed new trail construction also triggers concerns related to Allegheny woodrat habitat, which is limited to rocky areas in interior forest (Hassinger et al. 2008). Trail placement should avoid boulder fields, cliff bases (including mining high wall bases), and mine portals to the extent possible to protect Allegheny woodrats and their habitat. Although it is best for woodrats and bats for the trails not to be placed near abandoned mine portals, if a trail is placed within sight of a mine portal, the mine portal would be closed with a bat-friendly gate (bat-friendly gate designs also accommodate woodrats), so as to remain accessible to woodrats and other animals, and keep visitors out.

Predators of Allegheny woodrats do well in fragmented habitats, and make use of linear features such as roads and trails to travel. Species documented as preying on the Allegheny woodrat and Eastern woodrat (*Neotoma floridana*) and thought to occur in the park include: raccoon (*Procyon lotor*), great horned owl (*Bubo virginianus*), feral cat (*Felis catus*), striped skunk (*Mephitis mephitis*), eastern spotted skunk (*Spilogale putorius*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*) and black rat snake (*Elaphe obsolete*) (Hassinger et al. 2008). In addition to the direct predator risk to Allegheny woodrats, raccoons host a roundworm parasite (*Baylisascaris procyonis*) which is fatal to the woodrats when they ingest it from the raccoon feces or feces-contaminated habitats (LoGiudice 2001, 2003). Any food discarded along trails by human users can further attract raccoons to an area, thus increasing the problem. Hassinger et al. (2008) recommend avoiding the creation of permanent access, including trails, to mine portals and other woodrat habitat areas. In addition to the potential of trails to lead predators to woodrats, any area denuded of vegetation in the woodrat's home range increases its vulnerability to predation when it has to transverse the area.

**Birds.** Currently 233 species of birds are known to occur in the park (NPS 2003). This represents 74.4 percent (125 of 168 species) of the species found in West Virginia and 42 percent (25 of 59 species) of the species identified as state species of special concern (WV Gap Analysis Program 2003). Of the 233 species found in the park, approximately 93 were detected during breeding season and therefore may nest in the park (Pauley et al. 1997).

**Water Birds and Waterfowl.** The waterways of the park support species of birds that depend on good water quality (e.g., Louisiana water thrush, belted kingfisher). Water-dependent species found in the park, such as green herons (*Butorides virescens*), great blue herons (*Ardea herodias*), spotted sandpipers (*Actitis macularia*) and various species of waterfowl, use riparian corridors along tributaries and emergent weed beds for foraging habitat (Buhlmann and Vaughan 1987).

**Raptors.** Thirteen species of raptors have been documented in the park. Peregrine falcons (*Falco peregrines*), once a federally listed species and since delisted, have been sighted in the gorge and could potentially nest on the cliff faces in the park (Sullivan 1995). Peregrine falcons have been hacked in the park, and in 2009, a pair bred and nested within the park, but did not successfully fledge its young. Another raptor, the bald eagle (*Haliaeetus leucocephalus*), has been documented in the park (NPS 2003). In 2010, a bald eagle pair successfully nested in the park, fledging two eaglets.

**Wild Turkey.** Based on harvest records, wild turkey populations in West Virginia appear to be stable or expanding (WV DNR 2003). Biologists estimate that there are approximately 130,000 turkeys in West Virginia (WV DNR 2003). The last decade has ranked as the most productive turkey harvest period on record in West Virginia. In 2002, there were 19 turkeys harvested from the park (WVDNR 2003). Hunters may have harvested many more turkeys in the park but failed to indicate locations on harvest records.

**Birds Analyzed in Detail.** Neotropical migratory birds are of particular concern with regard to the actions proposed in the action alternatives.

**Neotropical Migratory Birds.** The park is globally important in providing critical habitat for neotropical migratory birds (neotropical migrants), especially the wood warblers (Family Parulidae). These species depend upon unfragmented mixed deciduous forests with well-developed canopies and gap dynamics (e.g., tree falls) in place. Cerulean warblers, a neotropical migrant that is in decline throughout the Northeast appears to have a concentrated distribution in and around the park (Rosenberg et al. 2000). Several other species of neotropical wood warblers found in the park, including Swainson's warbler (*Limnothlypis swainsonii*), wood thrush (*Hylocichla mustelina*), Kentucky warbler (*oporonis formosus*) and Worm-eating warbler (*Helmitheros vermivorus*) are either species of special concern in West Virginia (Swainson's warbler) or are on the Partners in Flight (PIF) watch list (wood thrush, Kentucky warbler, Worm-eating warbler) (USFWS 1999). The PIF watch list does not include federally threatened or endangered species; rather, it identifies those species that are still fairly common but which may probably someday become endangered or threatened (USFWS 1999). Several species on the watch list have declined precipitously over the past several decades, occupy habitats that are under severe threat, are found in low numbers or have such restricted ranges that their existence is tenuous (USFWS 1999).

Forest-interior bird species are area-sensitive species whose probability of occurrence increases as the forest area becomes larger; they need large contiguous blocks of forest to successfully breed. In a study of 75 species of forest birds that inhabit the Middle Atlantic States, Robbins et al. (1989) identified 26 species of area-sensitive birds (probability increasing with larger forest area), all of which occur in the park. Nineteen of these species were neotropical migrants, all of which occur in the park, and seven of which are park species of management concern (SOMC) due to declining populations from loss of suitable habitat in their wintering and breeding ranges.

In the physical sense, fragmentation is caused by a break in the forest, such as by roads, utility right-of-ways, suburban development and agriculture such that forest stands become separated or isolated from one another. Edge species tend to thrive on the edges of habitats, such as between a forest and field. Area-sensitive forest interior species need the interior forest habitat to

successfully breed. Forest-interior bird species may not compete well with edge bird species (Ambuel and Temple 1983) and suffer from predation and nest parasitism from some edge bird species such as blue jays and brown-headed cowbirds, respectively.

There is evidence that, although a forest trail may not make a break in the canopy, use of the trail by humans, predators and edge bird species can act as a fragmenting force to the forest-interior species using the area. In a study by Miller et al. (1998) on recreational multi-use trails (hiking, pet walking, biking and horseback riding), bird species composition was found to be different adjacent to trails in both forested and grassland habitats. Forest-interior bird species were less common near forest trails, with the zone of trail influence extending to about 75 meters (246 feet) on each side of the trail. One bird species was found at reduced numbers up to 100 meters from trails. Within the forest, edge bird species were more abundant near trails, and nest predation was greater near trails than in the forest interior without trails. Based on the daily nest survival rates presented by Miller et al. (1998) and assuming a 28-day period for egg incubation and young rearing in the nest before fledging, the calculated nest survival 200 meters from forest trails was about 57 percent, while nest survival near a trail was about 32 percent. Zande el al. (1984) found that, with increased recreational use of trails, the density of birds sensitive to disturbance went down. Hickman (1990) reported that, in a study of forest trails that did not break the canopy of the deciduous forest, several edge species known to cause declines in the reproductive success of forest-interior bird species were attracted to trails: blue-jay, brown-headed cowbird and the American robin. In addition to avian predation of nests, trails serve as travel routes for mammalian predators, thereby increasing the risk of nest predation near trails. Four bird species sensitive to forest fragmentation and occurring in the park (Black-and-white warbler, Worm-eating warbler, ovenbird and hooded warbler) nest on or near the ground, leading to possible increased predation risks (Wilcove 1985).

Aside from the species dependent upon mature, unfragmented forests, some bird species depend upon small (<1 ha {2.47 ac}) forest gaps created by tree falls and other natural and/or human induced disturbances (e.g., logging, land clearing around abandoned mine sites). These forest gaps contain early successional vegetation communities and add vegetative and structural diversity to the forest landscape. The golden-winged warbler (*Vermivora chrysoptera*), a species of special concern in West Virginia and declining throughout the eastern U.S., is a species that depends on these gaps dynamics and is currently found in the park (Pauley 1993, Pauley et al. 1997, Canterbury et al. 2002).

Hemlock stands provide another important habitat component for rare species of birds at the park (Wood 2000). The Swainson's warbler and Louisiana water thrush (*Seiurus motacilla*), two species that are either species of special concern or listed on the PIF watch list in West Virginia, nest along streams in forests with some hemlock and/or rhododendron component (Wood 2000, O'Connell et al. 2003).

**Reptiles.** Thirty-eight species of reptiles have been documented in the park (NPS 2003). Approximately 79.5 percent (31 of 39 species) of the reptiles of West Virginia are predicted to occur in the park, and 62 percent (ten of 16) of the reptile species of special concern are predicted to occur in the park.

**Turtles.** Two subspecies of the painted turtle (*Chrysemys picta marginata* and *C. p. picta*) occur in the park. It is one of the few areas where these subspecies interbreed, making the park regionally important for painted turtles (Buhlmann and Vaughan 1987). The eastern river cooter (*Chrysemys concinna*), a species of special concern in West Virginia, is native in the park. One other turtle species of special concern, the common map turtle (*Graptemys geographica*), occurs in the park.

**Lizards and Snakes.** Timber rattlesnakes (*Crotalus horridus*) are known from several locations in the park, including Stone Cliff, Glade Creek and Grandview, as well as Babcock State Park where there are den sites. Large populations of fence lizards (*Sceloporus undulates*), five-lined skinks (*Eumeces fasciatus*) and copperheads (*Agkistrodon contortrix*) are also present. Three other reptile species of special concern occur, including the broad-headed skink (*Eumeces*

*laticeps*), eastern worm snake (*Carphophis amoenus*) and rough green snake (*Opheodrys aestivus*).

**Amphibians.** Continuous forest, abandoned mine portals and river/stream systems of the park provide habitat for a diverse, nationally important assemblage of amphibians. Forty-eight species of amphibians have been documented in the park (NPS 2003). These species represent 82 percent (37 of 45 species) of the amphibian species known from West Virginia and 60 percent (10 of 17 species) of the state species of special concern (WV Gap Analysis Program 2003).

**Salamanders.** An outstanding diversity of woodland salamanders occur in the park (Pauley et al. 1997), typical of the southern Appalachian which contain the most diverse temperate salamander communities in the world (Southern Appalachian Biodiversity Institute 2003). Tributaries of the New River contain a high species richness of salamanders within the park, as do abandoned mines.

The black-bellied salamander (*Desmognathus quadramaculatus*), a species of special concern in West Virginia, is at the northernmost portion of its range in the park and more common there than previously thought (McDonald et al. 1989). Cave salamanders, another species of special concern in West Virginia, use abandoned coal mines (Pauley et al. 1997, Bryan et al. 1999) and other habitat (e.g., fractured rock) in the park. Wet sandstone cliffs are critical habitat for the rare green salamander (*Aneides aeneus*) and the common slimy salamander (*Plethodon glutinosus*) (Buhlmann and Vaughan 1987, Pauley 1993, Pauley et al. 1997). Dowdy Creek appears to be an especially important, high quality stream supporting both black-bellied and spring salamanders (*Gyrinophilus porphyriticus*) (Buhlmann and Vaughan 1987).

The mudpuppy (*Necturus maculosus*), a large aquatic salamander has been captured in the park. Intensive searches have failed to document the presence of the eastern hellbender (*Cryptobranchus alleganiensis*) – another large aquatic salamander.

**Frogs and Toads.** Little is known about the distribution and abundance of frogs and toads in the park.

**Amphibians Analyzed in Detail.** Amphibians, generally, are of particular concern with regard to the actions proposed in the action alternatives. For the purposes of analysis, individual species are not differentiated, as the amphibian habitat in question is similar throughout the project area, and numerous species would experience similar impacts.

It is important to protect habitat and breeding habitat for amphibians (frogs, toads and salamanders). Any seeps, wetlands or existing water holes that act as breeding pools for amphibians in old roads, mine benches, OHV tracks or other features need to be maintained without placing new trails through them. These habitat features occur in all of the project areas where new trail construction is proposed.

### 3.4.1 Existing Trails and Administrative Roads

In designating existing trails and administrative roads to include bicycle use, concerns for wildlife involve whether the change in use from hiking to include biking could cause any additional disturbance to wildlife. Species and habitat encountered by existing trails and administrative roads encompass all those discussed above, with different trails and trail segments encountering different, localized habitat.

In summary, the species and habitat to be analyzed in relation to existing trails and administrative roads include:

- Bats
- Allegheny woodrats
- Neotropical migratory birds
- Amphibians

### 3.4.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

All wildlife habitat discussed above that could be impacted by proposed new trail construction may be located in these project areas.

In summary, the species and habitat to be analyzed in the Mud Turn, Panther Branch and Brooklyn Mine areas include:

- Bats
- Allegheny woodrats
- Neotropical migratory birds
- Amphibians

### 3.4.3 Craig Branch Area

No abandoned mine portals are located in this project area, though trees here could be used by bats for roosting, nurseries or hibernation. Pools for amphibian habitat are located in this area, as is habitat for neotropical migratory birds. This area does not contain any known or suspected Allegheny woodrat habitat, therefore no impacts to this species are expected from any of the alternatives described in Chapter 2.

In summary, the species and habitat to be analyzed in the Craig Branch area include:

- Bats
- Neotropical migratory birds
- Amphibians

### 3.4.4 Garden Ground Area

All wildlife habitat discussed above that could be impacted by proposed new trail construction is located in this project area. Because the Garden Ground area has a backcountry designation, the large unfragmented forest blocks upon which forest-interior bird species depend are highly valued.

In summary, the species and habitat to be analyzed in the Garden Ground area include:

- Bats
- Allegheny woodrats
- Neotropical migratory birds
- Amphibians

### 3.4.5 Data Related to Bicycle Use, Wildlife and Habitat

The effects that bicycle use on trails could have on birds and other wildlife in comparison to pedestrian use in the park is not clear. Existing scientific literature is not extensive or conclusive enough in this area to make a definitive determination. In a study by Taylor and Knight (2003), bison (*Bison bison*), mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*) did not respond differently to mountain biking versus hiking. The authors pointed out, however, that because bikers travel at greater speeds than hikers, they have the opportunity to disturb more wildlife per unit time than hikers. Papouchis et al. (2001) reported that desert bighorn sheep reacted more strongly to hikers than mountain bikers, but this was apparently due to hikers being more prone to going off trail and trying to approach the sheep. In a study of seven dabbling duck species, Pease et al. (2005) found that the birds responded similarly to disturbances from people walking and biking. In a study of the male alpine chamois (*Rupicapra r. rupicapra*), a goat-antelope species of European mountains, animals responded more strongly to joggers and mountain bikers than hikers, but only in the late morning (Gander and Ingold, 1997). Finally, travel time of North American elk (Cervus elaphaus) in response to recreational disturbance was highest during exposure to OHVs, followed by exposure to mountain biking, then hiking and then horseback riding. Additionally, there was evidence that elk did not habituate to OHV riding, biking or hiking (Naylor et al. 2009). Thus, while bikers may travel over

more ground per unit time and increase their disturbance of wildlife, hikers may be more likely to leave the trail and increase their disturbance of wildlife.

## 3.5 Cultural Resources

**Prehistory.** Four contexts provide a framework for the prehistoric Native American cultural resources within the boundaries of the New River Gorge National River: 1) Paleo-Indian; 2) Archaic; 3) Woodland; and 4) Late Prehistoric/Proto-Historic. Additional information on these contexts can be found in the archeological overview assessments done by Pollack and Crothers (2005) and Fuerst (1981).

**Prehistoric Paleo-Indian Context.** The first human occupants in the New River Gorge area were Paleo-Indian hunters who arrived about 13,000 years ago. Two features of the gorge area heavily influenced prehistoric use of the region, making it an extremely interesting location archeologically (Pollack and Crothers 2005). Native Americans who inhabited the area in prehistoric times dating back over 13,000 years ago were primarily attracted by the abundance of natural resources in its uplands and riparian areas. Level ground in the uplands on either side of the New River also provided natural north-south travel corridors connecting prehistoric cultures in the Southeast and Ohio River Valley.

Clovis projectile points, which are representative of the early Paleo-Indian period, have been recovered. Late Paleo-Indian Plano, Hardaway and Hardaway-Dalton spear points have also been found in the park.

**Prehistoric Archaic Context.** Environmental changes at the end of the glacial era 10,000 years ago led the Native Americans of the New River Gorge area and the rest of eastern North America to adopt a more localized pattern focused on the hunting of deer, turkey, shellfish and other animals and the gathering of nuts and other wild plant foods. Between 8,000 and 3,000 years ago, people began domesticating native plants such as squash, gourd, sunflower, sumpweed, goosefoot and maygrass. Hunter-gatherer populations also increased in size and became more settled into river drainages. The chronology of the Archaic period is marked by the appearance of a wide variety of notched, bifurcated, broadspear and stemmed spear point types. There are many Archaic sites located within the park.

**Prehistoric Woodland Context.** At the start of the Woodland period 3,000 years ago, the Native American people of eastern North America began making pottery and burying their dead in mounds. Adena and Hopewell mound builders in the Kanawha and upper Ohio valleys of West Virginia constructed elaborate burial mounds and earthworks. Evidence of their Early to Middle Woodland mound building in the New River Gorge area is limited to a few sites within the park. Early to Middle Woodland sites, however, are fairly common in the park. The subsistence economy of the Adena, Hopewell, and that of the Late Woodland Buck Garden and Radford peoples who lived in and around the gorge, involved hunting, nut gathering and the cultivation of domesticated native crops and possibly corn. In addition to their distinctive pottery types and mortuary rituals, Native American Woodland peoples in the area made many different types of stemmed and notched spear points. Late in the period, the bow and arrow replaced the spear. Important Woodland resources in the park include at least nine sites.

**Late Prehistoric/Proto-Historic Context.** Around A.D. 900 to 1000, Native American peoples in the lower New River region became village farmers focused on growing fields of corn on fertile soils along the New River.

Intermontane and Dan River Cultures upstream of the gorge included prehistoric cultures of the Ridge and Valley province of the upper Tennessee River system and the upper reaches of the Roanoke River Valley. After A.D. 1200, an important Fort Ancient Bluestone phase farming community was established in the Bluestone Lake area immediately upstream from the gorge. Downstream of the gorge in the Kanawha and Ohio River Valleys, prehistoric groups had more affinities with the Fort Ancient Culture Area groups. While the cultures represented tribal societies of similar sociopolitical complexity, they were distinguished from one another by differences in material culture, subsistence patterns and village organization (Pollack and Crothers 2005). Non-local goods found at sites

upstream and downstream of the gorge – in the form of marine shell and copper artifacts – suggest that some Fort Ancient groups participated in long distance exchange networks, especially after A.D. 1400 (Pollack and Crothers 2005).

In the lower New River region, the Proto-Historic Period dates from the late 16th to early 17th centuries, and marks the undocumented contact between Euro-Americans and the area's indigenous Native American peoples. The glass beads, copper and brass items found at archeological sites in the region are indicators of the Proto-Historic trade and exchange between Native Americans and Euro-Americans. During the Proto-Historic and contact periods, Native American societies were profoundly affected by influenza and other diseases that Europeans brought from the Old World. Evidence of the settlements of historical tribes in the region, however, is sparse, and does not warrant the formation of an historic context for the contact period. There are seven very important Late Prehistoric/Proto-Historic resources in and around the park.

The presence of historic trails that appear to have some antiquity and traverse the uplands in the vicinity of the gorge also suggests some level of interaction among groups living to the south and north (Pollack and Crothers 2005). Primary trails crossed the gorge area, but did not follow the New River itself due to the natural obstacles. Secondary trails also crossed the gorge, fording the river at different places.

**Recorded Archeological Sites and Distribution Patterns.** Archeological investigations conducted since the late 1800s have documented 355 prehistoric archeological sites within the park or within one kilometer of the park boundary (Pollack and Crothers 2005). Most of the sites have not been formally evaluated to determine their eligibility for inclusion in the National Register of Historic Places. Currently, although several are identified as highly important archeological resources (Fuerst 1981), none are nominated to, or have formally been determined, eligible for the National Register.

The park's prehistoric sites tend to occur in five geologic and physiographic settings (Pollack and Crothers 2005):

- large floodplains and relatively flat slopes close to water with old alluvial and colluvial deposits;
- cliff-forming Raleigh and Nuttall sandstone members of the New River Formation;
- upland settings associated with ridge tops, overlooks and the level landforms at stream junctures;
- major tributary valleys of the New River; and
- some features of the New River, such as major falls and shoals, that may have attracted prehistoric groups.

Based on the number of identifiable components found at the 355 sites, the prehistoric activities in the New River Gorge area seem to have peaked during the Late Archaic Period (3000-1000 B.C.) and then gradually declined through the Late Prehistoric Period (A.D. 1000-1700) (Pollack and Crothers 2005). The most intensive utilization occurred during the Late Middle and Late Woodland Periods. The sites utilized included small upland camps, rock shelters, mounds, large bottomland camps and perhaps some villages. The most common site type recorded is an open habitation without subsurface features (139 sites or 39 percent), typically characterized by a surface scatter of chert flakes. Most of these sites are located upstream from Sandstone Falls, on wider floodplain areas and terraces. The second most commonly found site is a rock shelter (107 sites or 30 percent). Through time there was an increase in the use of rock shelters, with Woodland and Late Prehistoric groups using these types of sites to a greater extent than earlier groups. Other site types include multiple activity areas that were used for tool manufacture and rejuvenation, and hunting and gathering camps. Only one earth and stone mound has been documented in the park. Because no Paleo-Indian sites have been excavated in West Virginia, the two Paleo-Indian sites recorded in the park would be very important if further research determines that the sites have intact Paleo-Indian components (Pollack and Crothers 2005).

**History.** Five contexts provide a framework for describing and understanding the historic resources within the boundaries of the New River Gorge National River: 1) Coal Industry; 2) Railroad Industry; 3) Lumber Industry; 4) Euro-American Settlement and Agriculture; and 4) Recreation and State Parks (Marshall 1981; Unrau 1996; Workman et al. 2005; Stahlgren et al. 2007).

The majority of the park's historic resources are the ruins of the New River communities where the thousands of miners and their families worked and lived in the gorge between 1872 and 1962. These communities and their associated industrial buildings and structures are essentially archeological sites. With few exceptions, they are complexes or localities – rather than individual sites – where clusters of domestic and industrial sites related to mining, railroading, lumbering and farming can be found.

The historic significance of the New River Gorge's "ghost towns" varies based on their historic figures and the extent of their archeological resources and community functions. An important coal mining town like Nuttallburg, for example, was associated with Henry Ford and has the well-preserved archeological remains of dwelling houses, a company store, school, church and cemetery. It also has a full array of primary and secondary production facilities including mine openings, conveyor system, powerhouse, railroad sidings and coke ovens that possess a high level of integrity (Unrau 1996). Other less extensive complexes, like the historic lumber mill at Hamlet, are important because of their uniqueness and preservation.

The NPS has completed preliminary inventories and field studies for many of the park's historic site complexes. The most comprehensive field studies were done by Workman et al. (2005) and Stahlgren et al. (2007), and included literature review and field reconnaissance of dozens of historic site complexes. Findings from this study concluded that all of the sites likely contain historic archeological resources, although they vary dramatically in terms of the potential significance of the resources. Three site complexes were found to be potentially nationally significant, possessing a high level of integrity, and intrinsically important to the mission of the park: Nuttallburg, Thurmond and Babcock State Park (Workman et al. 2005). Twenty-four sites were found to be potentially significant on the regional or local level and/or to lack high integrity; they may be intrinsically important to the mission of the park. Seven sites were found to be of lower potential significance and integrity and are not important to the park's mission. Many other smaller sites with potential for intact archeological resources occur throughout the park, including community sites as well as individual sites. Sites have been documented only through limited archival research and field survey.

**Historic Structures.** Buildings and structures found in the park are a reflection of its industrial, cultural and building arts heritage, road building prowess and the rugged terrain of the gorge. Notable historic structures include industrial structures related to coal mining and railroading and the communities that housed the people who worked the mines, cut the timber and operated the railroad. Notable structures also include the farmsteads and community buildings built in the gorge by settlers and their descendents prior to and during the period of industrialization.

Structures on the park's List of Classified Structures (NPS 2006b) all evidence local and state significance, except for one – the Nuttallburg Coal Mining Complex and Town Historic District – which has been determined by the West Virginia State Historic Preservation Officer and the Keeper of the National Register to be of national significance. Further documentation could, however, reveal that some additional sites have national significance.

Four historic districts wholly or partially within the park are listed on the National Register of Historic Places:

- **Hinton Historic District**, located in downtown Hinton, representative of the major building booms of the 1880s to 1920s, composed of commercial and residential buildings with minimum contemporary architecture (only the Hinton Depot is located within the park boundary);
- **Thurmond Historic District**, a railroad town in the heart of the New River Gorge and the primary railroad center for the New River Gorge coal field during its peak production period in the late 1890s through the 1920s; notable for its association with the C&O Railroad and the coal mining industry and for its railroad architecture, vernacular worker housing and simple commercial buildings typical of a West Virginia boomtown during the 1884 to 1950 industrial period;
- **Kaymoor Historic District**, an important industrial site representative of the New River coal field industrial complex and related company town in operation from 1899 through 1962; a few industrial structures still standing; and

- **Nuttallburg Coal Mining Complex and Town Historic District**, one of the most complete early 20th century coal-related industrial sites in the United States; owned by Henry Ford during the 1920s, the complex is nationally significant for its association with Ford's revolutionary experiment to streamline and vertically integrate all levels of industrial production; largely unaltered since that time; remaining standing structures include the Nuttall Mine headhouse, conveyor, tipple and power house.

There are several individual properties within the historic districts that are listed or determined eligible for the National Register of Historic Places. Many other structures are found throughout the park that are notable for their association with the events and lives of people who have lived in the gorge, for their ability to inform our understanding of the park's history, or that are excellent examples of a particular type, period or method of construction.

### 3.5.1 Existing Trails and Administrative Roads

**Prehistoric Resources.** Prehistoric archeological sites or resources on or beneath existing trails and administrative roads proposed for bike use would either be protected by having been buried with a packed or hardened surface above them, or they may already have been heavily damaged or destroyed by the original trail or road construction.

**Historic Resources.** Existing trails and administrative roads proposed for bicycle use may, in some cases, be associated with historic contexts, areas or features within the park, such as historic mining towns and sites. For example, the Kaymoor Trail is located in and near the Kaymoor Historic District, and allows visitors to visit and learn about some of the remaining industrial structures. Historic features may include the roads or routes themselves, retaining walls, culverts and other road elements.

### 3.5.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

**Prehistoric Resources.** These three proposed new trails would follow coal and rail industry routes that would have heavily damaged or destroyed any potential prehistoric archeological sites when they were originally constructed.

**Historic Resources.** The abandoned road running along the Mill Creek drainage on which the proposed Mud Turn Trail would be located dates back to the 1800s when farm owners on the rim used it to access the river. The foundation of a log cabin is located roughly one switchback along the road below the mine bench and is likely associated with the initial settlement of the Grandview area. The name Mud Turn is a historic name given to the old road because of a particular turn along the route.

The proposed Panther Branch Connector Trail would be located on an abandoned state road and a short section of old rail bed from which the tracks were pulled in the 1940s, between Glade Creek and Panther Branch. The old road dates back to approximately the early 1900s. A grist mill was once located on a waterfall on Panther Branch, near the elevation of the proposed trail; the millstone is no longer on site.

The proposed Brooklyn Miner's Connector Trail would be located in the vicinity of a coal mine conveyor system and constructed upon roads in use for coal mining operations until the 1950s.

Historic roads and railroad grades in the park can include historic archeological resources, such as retaining walls and culverts. They can also access numerous historic sites and structures, and usually themselves represent historic circulation routes.

### 3.5.3 Craig Branch Area

**Prehistoric Resources.** Archeological investigations of this area have identified a high density of ridge top sites and rock shelters with components dating back to the Early Archaic Period (Fuerst 1981; Pollack and Crothers 2005).

**Historic Resources.** No known historic buildings or structures are present along the proposed trails in the Craig Branch area under either Alternative B, "New Route Single Track Trail Construction," or Alternative C, "Existing Disturbance Single Track Trail Construction." An historic road, the Kaymoor-Brown Road (Pollack and Crothers 2005), a circulation element of a vernacular cultural landscape, originates on private property at the Kaymoor No. 1 Road (County Road 9/2) a short distance from its intersection with Gatewood Road (County Road 9). From there the road wends its way, largely intact, through a mature stand of rhododendron along Butcher Branch before crossing into the adjoining Craig Branch drainage. This historic road is now the Craig Branch Trail/Administrative Road.

**Surveys.** A Phase One archeological survey was conducted in 2010 on the 11 proposed new trail miles in the Craig Branch area that are described in Alternative B, "New Route Single Track Trail Construction," (see Section 2.6.4). Many known sites and other potential locations are located close to the proposed new trail routes. Pedestrian survey documented dozens of potential archeological site locations that are comparable to high probability settings in the Dowdy Creek drainage (Bodor and Torp 2008). Shovel testing and surface collection at a handful of these locations identified two archeological sites. This survey did not reveal any previously unknown historic sites along the proposed trail routes.

### 3.5.4 Garden Ground Area

**Prehistoric Resources.** Archeological investigations of this area have identified two rock shelters and one upland stream juncture site with components dating back to the Late Archaic Period (Fuerst 1981).

**Historic Resources.** Historic maps and aerial photographs taken in 1945 suggest that the land use on Garden Ground primarily consisted of a dispersed agricultural community. Associated with this community were a small number of churches, cemeteries, schools and farms with pastures and orchards on land for which the McKell family of Glen Jean, West Virginia held the mineral rights. The coal mining operations that the family ran were located on the north side of Garden Ground overlooking Dunloup Creek, and included Cadle Ridge and the Swell Knob or Dun Glen mines. The latter operation had a small community at the headhouse level and a local narrow gauge railroad. The southern Garden Ground area was above coal mining operations at Terry and Stonewall. Historic maps indicate that Garden Ground had a small number of roads that linked its agricultural community to the coal mining operations, Terry and the Bennett and Gwinn farms along the New River.

**Surveys.** A Phase One archeological survey was conducted in 2010 on 12 miles of proposed trail in the Terry Top section of the project area, described under Alternative B, "New Route Single Track Trail Construction" (see Section 2.6.4). All three of the previously-identified rock shelters and numerous potential archeological sites are located fairly close to these proposed trail segments. Pedestrian survey also identified dozens of high probability site locations (cf. Bodor and Torp 2008). Although most of these can be avoided through minor trail realignment, shovel testing and surface collection identified one archeological lithic scatter.

This survey did not identify any standing historic buildings, structures or ruins. A row of wooden posts associated with a rutted road, barbed wire fencing and several road sections that match the routes of historic roads were identified. Some paths that descend the rim toward the New River may represent miner trails like the one that starts at Kaymoor Top. At several places along the mine bench and historic roads are old appliances, trash and abandoned cars that date to between the late 1940s and early 1960s. Some of these refuse dumps are contemporaneous with the extensive strip mining that began in the late 1940s and continued until the re-contouring of the land was completed around 1980.

### 3.5.5 Data Related to Bicycle Use and Cultural Resources

Cultural resource concerns regarding trail use are more related to trail construction than they are to the type of use permitted on the trail surface. Once a trail is constructed, cultural resources within the construction corridor are either adversely impacted from ground disturbance, or they are protected through the hardening of the surface above them. Cultural sites along the trail corridor could be impacted, such as through vandalism, by visitors no matter what their form of transportation. Trail users on bicycles can cover more distance per unit time than hikers, so bikers may encounter more

cultural sites than hikers, though that circumstance does not relate to site impacts. It may well result in more opportunities for biking visitors to learn about the history of the New River Gorge.

## 3.6 Park Facilities and Operations

**Facilities.** The park has two primary visitor centers, the Canyon Rim Visitor Center on the north end of the New River Gorge Bridge and the Sandstone Visitor Center in the southern region of the park, just off of interstate 64 near Hinton. Another smaller visitor center is located at Grandview, along with Theatre West Virginia; this area was once Grandview State Park, but became part of the New River Gorge National River in 1990. There is also a visitor contact station located at Thurmond that is open during limited hours in the summer season. Other facilities are less developed and dispersed throughout the park, including trailheads, river access, scenic overlooks, restored and interpreted historic structures and towns.

**Operations.** At the New River Gorge National River, just as throughout the NPS, there has been a trend of increasing costs for daily operations and a decline in inflation-adjusted budgetary allocations. Other costs that have been absorbed by the park include unfunded retirement and health benefit increases and mandates for homeland security and information technology security. This means that the park has not been able to replace staff vacancies that have arisen over the past several years. In addition, inflation on fixed costs items, such as utilities, supplies and materials have also meant that permanent and seasonal staff has been reduced. Of the 160 full-time employees in the park's approved organizational chart, only 118 were filled at the time of publication of the 2010 Draft GMP. The unfilled positions are needed to staff, protect and maintain the trails, campgrounds, visitor centers and grounds comprising the park, and to complete necessary science, resource management and stewardship work. A complicating factor is that the New River Gorge National River, by legislation, also manages the Gauley River National Recreation area and the Bluestone National Scenic River. Although there is separate funding for these parks, the funding does not cover their costs of operation, and the New River Gorge National River budget subsidizes them.

### 3.6.1 Existing Trails and Administrative Roads

**Facilities.** Existing park trails and administrative roads are largely remnants of roads and railroad beds from the time before the park was established or had acquired land within its boundaries. These old routes were created primarily for logging and mining, though some tracks were developed for recreational purposes by local people on foot, OHV, motorbike or bicycle. Once the park was established and the NPS acquired the land, these existing routes were adopted as park trails and administrative roads. The NPS has constructed several new trails, most notably the Fayetteville Trail complex – including the Fayetteville Trail, the Town Park Loop and the Timber Ridge Trail – which was designed and built with assistance from volunteers and the International Mountain Biking Association (IMBA).

The trails proposed for bicycle use (Table 2-1) are a mix of frontcountry and backcountry trails and administrative roads. The frontcountry and backcountry trails are single track trails of varying widths with natural dirt surfaces, some built upon existing old road traces, some newly constructed. The trails/administrative roads are wide enough for at least one vehicle to pass and gravel surfaces. These gravel surfaces are often difficult for novice bicyclists to travel, because the gravel behaves somewhat like marbles underneath bike tires. The width of these roads encourages higher speeds than bicyclists, particularly beginners, would reach on single track trails.

Trailheads are provided for most park trails, including those proposed for bicycle use. A large gravel parking area at the Fayetteville Town Park serves the Fayetteville area trail network, connecting directly to the Park Loop and Fayetteville Trails, which then connect to the Kaymoor, Timber Ridge and Long Point Trails and the Craig Branch Trail/Administrative Road. No NPS restrooms are provided at this trailhead, but the Fayetteville Town Park does have facilities that are open seasonally. The Kaymoor Trail can be accessed directly from the Wolf Creek Trailhead, which consists of two pull out areas along Fayette Station Road that accommodate a total of approximately ten cars.

The Kaymoor Top Trailhead, which includes a parking area for about ten cars and a portable toilet, accesses the Fayetteville Trail and Craig Branch Trail/Administrative Road, which connect to other trails in the Fayetteville area.

The Southside Trail can be accessed from a trailhead at Brooklyn which has a small gravel parking lot, at boat ramp and a primitive campground with three individual campsites. A portable toilet is seasonally available at this location.

The Thurmond Trailhead for the Rend Trail/Administrative Road has a small gravel parking area and vault toilet along the road that accesses the town of Thurmond. Further along this road is the Stone Cliff Trailhead, which supports a parking area for approximately 25 cars, a vault toilet, river access facilities and a primitive campground with eight individual campsites.

The Keeney Creek Trail/Administrative Road has a handful of roadside pull-offs for visitors to use for parking on its uphill end near Winona. At the end of this road there is parking available at the new Nuttallburg Trailhead, which is also the access point for the Nuttallburg Mine and Nuttallburg Tipple Trails/Administrative Roads. The former town of Nuttallburg has recently been reclaimed from the vegetative growth that has obscured the building foundations, and interpretive information is being developed. The tipple and conveyer will be restored, a project that is in process at the time of publication of this document. Restrooms are not currently offered at this location.

The Terry Top Trail/Administrative Road has no formal trailhead, though there is space to park as many as three cars off of the gravel access road, in front of the gate that blocks public vehicular access to the administrative road.

The Little Laurel Trail/Administrative Road has two trailheads. The trailhead above the rim of the gorge is highly developed at the Grandview area picnic Shelters #3 and #4 with paved parking and restrooms. The trailhead at the bottom of the gorge is a gravel parking lot with no facilities at the start of the Glade Creek Road.

**Operations.** Existing trails are maintained by the NPS, with some volunteer assistance. Administrative roads and other developed facilities, such as trailheads and vault toilets, are maintained by the NPS.

Law enforcement rangers regularly patrol trailheads and occasionally patrol park trails, though trail patrols are a much lower priority for public safety and resource protection than numerous other assigned duties. Because of the staff and funding constraints on the park, it is challenging for rangers to enforce the prohibition of bicycle use on existing park trails; this is part of the reason that the NPS only learned of the extent of this use in the park during the planning processes for the 2010 Draft GMP and this EA.

### 3.6.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

**Facilities.** The area where the proposed Mud Turn Trail would connect to the Glade Creek Road near the bottom of the gorge has a parking area large enough for six cars and no additional facilities. The upper end of the Mud Turn Trail would connect to the Grandview area of the park. Facilities at Grandview include parking, bathrooms, picnic areas, a small visitor center, as well as the Theatre West Virginia amphitheater. There are both paved and unpaved trails in the Grandview area.

The proposed Panther Branch Connector Trail would originate from the Glade Creek Trailhead, which has a parking area for approximately six cars, a picnic area, a vault toilet, a boat ramp and a primitive campground with five individual sites and six walk-in campsites.

The proposed Brooklyn Miner's Connector Trail would originate at the Southside Trailhead at Brooklyn, with parking for approximately six cars. The adjacent Brooklyn Campground has three primitive campsites, a boat launch and portable toilets. This proposed trail could also be accessed from the existing Brooklyn Mine Trail/Administrative Road, which has a parking lot near the top of gorge with parking for approximately ten cars and a pull-out across the road with parking for approximately two cars.

**Operations.** The park does not maintain the existing informal routes within which these three proposed trails would be located; nor do law enforcement rangers generally patrol these areas. Existing facilities and access points are maintained and patrolled, including the Glade Creek Road and Glade Creek Trailhead, Grandview, the road to Brooklyn, the Southside Trailhead and the Brooklyn Mine Trail/Administrative Road and its trailhead.

### 3.6.3 Craig Branch Area

**Facilities.** The Craig Branch Trail/Administrative Road runs through the Craig Branch project area, the only park facility within the project area boundaries (Figure 1-5). Adjacent to the project area, in the Kaymoor Top area, there are several facilities, including a parking lot that accommodates approximately ten cars and serves as a trailhead for four park trails. From this trailhead, visitors access several rock climbing areas, as well as the Fayetteville area trail network, including the Fayetteville Trail, Butcher Branch Trail, Kaymoor Miners Trail, Craig Branch Trail/Administrative Road and all the trails to which these connect. At the head of the Kaymoor Miners Trail, the NPS provides a portable toilet.

A private campground is located at Kaymoor Top, used primarily by rock climbers. This campground offers tent camping, parking (included for campers, pay for day use) and a portable toilet.

**Operations.** The Craig Branch Trail/Administrative Road and all the park facilities in the Kaymoor Top area are regularly maintained; the Kaymoor Top area is regularly patrolled by law enforcement rangers. The remainder of the Craig Branch area is very difficult for park rangers to patrol, as the informal routes (logging roads and user-created OHV routes) cannot be accessed by motor vehicle, and pedestrian patrols are extremely time consuming. Additionally, the NPS property in this area is bordered by numerous private residences. For these reasons, the NPS has found it extremely challenging to put a stop to the prohibited OHV use that occurs throughout the project area on the informal routes. The NPS has contacted most of the park's neighbors, and OHV use has declined since the property came into NPS ownership in 2005, but residual use exists, and the NPS does not have the staff or resources to dedicate to frequent patrols of this area of the park where no visitor facilities are currently provided and the land, having been recently logged, offers few fundamental or high-priority natural resources to protect.

### 3.6.4 Garden Ground Area

**Facilities.** There are NPS facilities located within the Garden Ground area at the northern end of the project area and along the river at the Stone Cliff Campground. Facilities include a primitive campground with eight sites, a vault toilet, commercial and private use boat ramps, a parking area large enough for approximately 25 cars and the Stone Cliff trailhead. The Stone Cliff and Terry Top Trails/Administrative Roads are also located within the project area.

**Operations.** The Stone Cliff area facilities are regularly maintained, and the trailhead and campground are regularly patrolled by law enforcement rangers. The Terry Top Trail/Administrative Road is regularly maintained, though because it is not often used by many park visitors, it is not frequently patrolled by law enforcement rangers. The bulk of the Garden Ground area, where no park facilities exist, is rarely accessed by park staff. Some OHV use is known to occur in this area, though, as with the Craig Branch area, it is difficult to enforce the prohibition on this use, and staff and operations resources are generally assigned to higher priority areas and issues within the park.

### 3.6.5 Data Related to Bicycle Use and Park Operations and Facilities

As bikes are permitted on park trails, the NPS becomes responsible for the maintenance of new impacts to the trail facilities and for enforcement of visitor and resource protection.

## 3.7 Visitor Use, Experience and Access

**Area Management.** According to the 2010 Draft GMP (Section 2.8 – Alternative 5 – Exploration Experiences – Preferred Alternative), frontcountry and backcountry zones would be managed differently, resulting in different visitor use and experiences.

In frontcountry zones, large block of contiguous forest would be protected with some minor, site-specific forest fragmentation. Visitor use would be moderate, with moderate-impact recreation occurring that would have negligible to minor impacts on overall forest values. Trails in a frontcountry zone would accommodate a moderate intensity of use by a broad range of users, have a maximum width of 30 to 36 inches and may have uneven surfaces.

Backcountry zones would be managed to protect large contiguous tracts of intact forest with negligible site-specific impacts. Visitor use would be low, and low-impact recreation would occur that would have negligible to minor impacts on overall forest values. Trails in backcountry areas would be designed for low use by highly experienced hikers and, in some cases, bicyclists. Trails would not exceed 18 to 24 inches in width and could have a rugged surface with exposed obstacles, such as rocks and roots.

**Visitor Activities.** Visitors come to the park to participate in a wide variety of recreational activities, including but not limited to whitewater boating, rock climbing, rappelling, hiking, trail running, mountain biking, camping, scenic driving, picnicking, birding, fishing and hunting. They also participate in educational programs and explore the many cultural resources in the park to understand the history of farming, mining and logging in the area.

Guided commercial activities in the park include whitewater rafting, rock climbing, rappelling, mountain biking, hiking and walking on the cat walk beneath the New River Gorge Bridge.

Numerous special events are held in the park annually, including a major rock climbing festival and several adventure races that involve activities like whitewater boating, orienteering, mountain biking and trail running. Bridge Day is also a major event in the park, attracting thousands of visitors to celebrate the New River Gorge Bridge; festival participants can walk on the bridge and B.A.S.E. jump or rappel from it.

**Annual Visitation.** During the early years of the park – from 1984 to 1993 – the number of visitors grew rapidly from about 0.2 million to 1.0 million people per year. Since 1993, annual visitation has hovered around 1.0 to 1.2 million, with slightly more visitors coming to the park in the late 1990s and early 2000s when compared to recent years since 2002.

It is worth noting that actual visitation to the park is probably higher than officially recorded by the NPS because visitor counting procedures do not include visitor use in remote areas of the park.

**Seasonal Visitation.** Summer is the time of year when the most people visit the park. Approximately 51 percent of the visitation occurs in June, July and August, with July being the busiest month. Larger numbers of visitors also come to the park during the spring (May) and the fall foliage season (October). Visitation is the lowest in the winter months from December through February, with the quietest time during January.

**Visitor Profile.** Visitation to the New River Gorge region can be generally divided into three distinct visitor markets:

- **Local residents** who make regular use of the park and who live in the four-county region of Fayette, Nicholas, Raleigh and Summers Counties.
- **Regional residents** who take day trips to the park and who live within 100 miles of Beckley, but outside the park's resident counties.
- **Non-resident tourists** who either stay overnight or visit as a part of longer trips and who live outside the 100-mile radius of Beckley.

The current base of non-resident tourists is estimated to be the number of counted visitors to the New River Gorge who either stayed overnight or passed through. In 2004, these non-resident tourists accounted for 74 percent of all visitation. Applying this figure to the 1.18 million estimated 2007 annual visitors to the New River Gorge, about 874,000 non-resident tourists visit the New River Gorge each year. These visitors are better educated and more affluent than the local resident base. In addition to being the target audience for tourism in the area, these individuals are increasingly becoming the target market for vacation and retirement home developments in Southern West Virginia.

The age distribution of visitors to the park reflects national age profiles. The largest share of visitors (35 percent) is in the baby boom generation from age 41 to 60 (Manni et al. 2005). Just 12 percent of visitors are age 61 or older, suggesting that there may be more opportunities to draw older visitors in the future (Manni et al. 2005).

Visitors to the park tend to be better educated than the overall traveling public. Nearly half of visitors to the New River Gorge have at least a college education, indicating a well-educated (and affluent) visitor base (Manni et al. 2005). Eighteen percent of visitors have graduate degrees and another 29 percent have bachelor degrees.

**First-Time Versus Repeat Visitors.** Almost half of the visitors to the New River Gorge have been there before. Ten percent have visited the park from five to ten times before, and 14 percent have been there 11 times or more (Manni et al. 2005). About a quarter of the park's visitors have previously made two, three or four visits to the park. For slightly over half of visitors it is the first time that they have been to the New River Gorge.

**Visitor Group Size and Travel Party Type.** Groups visiting the park tend to be large, with 34 percent of parties containing five or more people and an overall average of 5.5 persons per party (Manni et al. 2005). However, 36 percent were parties of one or two people.

About two-thirds of visitors came in family groups or in groups composed of families and friends. Just 20 percent came as friends, demonstrating the family-oriented appeal of the area. Only 12 percent came to visit friends or family, unlike other parts of West Virginia where this market segment is near 40 percent of all visitors.

For about half of park visitors, the New River Gorge is their primary travel destination, and for about a third, it is one of several travel destinations on their trip. About 20 percent of visitors arrive at the park without having planned to do so.

**Visitor Length of Stay.** Visitors to the park are transient by comparison to other national park units, many while "stopping by" spontaneously while on a road trip to other destinations. A part of one day is all that most visitors currently spend at the New River Gorge (Manni et al. 2005). Visits lasting less than an hour are typical for about 25 percent of visitors. Only about 25 percent of visitors spend more than five hours in the park. For those staying more than one day, 66 percent are there for two days, and about ten percent spend more than five days in the park.

**Classic Visitor Experiences.** For most visitors to the park, the spectacular terrain of the gorge, the free-flowing New River and the tranquil setting interspersed with the remnants of the gorge's human history – offer appealing opportunities for a variety of recreation and learning experiences. There is a broad mix of opportunities, ranging from highly developed areas, where the visitors' experiences are guided by park facilities and interpretive signs, to areas that feel very remote and offer primitive experiences.

Some of the more developed areas where visitors most often go – where they know they may most easily experience the best of the gorge and typically where the NPS has facilitated access and provides visitor services and interpretation – include the Canyon Rim Visitor Center, Grandview, Sandstone Falls, the Sandstone Visitor Center, Endless Wall, Kaymoor, Nuttallburg, Fayette Station Road and Thurmond.

**Access.** Access to most of the facilities and visitor opportunities in the park is dispersed and informal. Visitors must travel on narrow, mountainous roads through towns, small communities and private properties to experience the park. While it can sometimes be daunting for visitors to locate and reach their desired trailhead or other park destination, it also gives them a sense of the local area and the scope of the terrain in and around the gorge.

### 3.7.1 Existing Trails and Administrative Roads

**Area Management.** Existing park trails (Table 3-4) are located in both frontcountry and backcountry areas of the park. The park's administrative roads are open to vehicular use only for NPS administrative purposes. Many administrative roads are open for public use as trails, some of which are open for bicycle use (Table 3-5).

**Table 3-4. Official Trails of the New River Gorge National River**

| Trail or Administrative Road | Mi. | Trail Standard |
|---|---|---|
| **High Use Trails and Administrative Roads** | | |
| Kaymoor | 8.6 | frontcountry/ admin road |
| Glade Creek | 5.6 | frontcountry/ admin road |
| Long Point | 1.6 | frontcountry |
| Rend | 3.4 | admin road |
| Sandstone Falls Boardwalk | 0.2 | fully accessible |
| Southside | 7.0 | frontcountry/ admin road |
| Fayetteville | 4.0 | backcountry |
| Park Loop | 1.1 | backcountry |
| Timber Ridge | 1.0 | backcountry |
| Brooklyn Mine | 2.7 | admin road |
| Grandview Rim | 1.6 | developed/ frontcountry |
| Burnwood | 1.2 | frontcountry |
| Canyon Rim Boardwalk | 0.1 | fully accessible/ developed |
| Bridge Buttress | 0.2 | frontcountry |
| Endless Wall | 2.4 | frontcountry |
| Grandview Walkways | 1.5 | fully accessible/ developed |
| Tunnel | 0.5 | frontcountry |
| Sandstone Falls Overlook | 0.1 | developed |
| Junkyard | 0.3 | climbing spur |
| **Medium Use Trails** | | |
| Kaymoor Miners | 0.9 | backcountry |
| Castle Rock | 0.6 | backcountry |
| Big Branch | 2.0 | backcountry |
| Butcher Branch | 0.8 | backcountry |
| Arbuckle Connector | 0.3 | backcountry |
| Island Loop | 0.5 | frontcountry |
| Big Buck | 0.9 | frontcountry |
| Craig Branch | 2.4 | admin road |
| **Low Use Trails** | | |
| Church Loop | 0.1 | backcountry |
| Little Laurel | 2.7 | admin road |
| Kates Plateau | 5.1 | backcountry |
| Stone Cliff | 2.7 | admin road |
| Gwinn Ridge | 1.5 | backcountry |
| New River Bridge | 0.9 | backcountry |
| Woodland Loop | 0.6 | frontcountry |
| Polls Plateau | 4.9 | backcountry |
| Keeney Creek | 3.0 | admin road |
| Nuttall Mine | 0.5 | admin road |
| Nuttallburg Tipple | 0.8 | admin road |
| Nuttallburg Town Connector | 0.3 | frontcountry |
| Kates Falls | 0.2 | backcountry |
| Terry Top | 1.7 | admin road |
| **Trails in Development** | | |
| Hawks Nest Connector | 3.5 | frontcountry |

According to the 2010 Draft GMP, off-road bicycling is an appropriate use on park trails in the following cases:

- On a variety of trail types in frontcountry zones generally, and in river corridor zones, historic resource zones and park development zones on a limited basis
- On single track trails in backcountry zones
- On the proposed Through the Park Trail

Trails on which bicycle use would be allowed would be multi-use trails, also allowing pedestrian activities. Generally, horse use and bicycle use would not be allowed on the same trails, though some exceptions may be determined through future planning processes.

Promulgation of a special regulation allowing for bicycle use on designated trails is required to lift the prohibition on mountain biking in the park.

**Existing Use.** The 76 miles of existing trails and administrative roads officially recognized by the park receive a variety of uses. Visitors participate in hiking, trail running, mountain biking and horseback riding within this trail system. Trails are also used for secondary activities, such as access to fishing, rock climbing, scenic overlooks, historic resources, bird watching and hunting.

A handful of park trails are accessible for people with disabilities, primarily in developed areas of the park, such as visitor centers and the Grandview area.

Pedestrian activities may occur on any park trails, bicycle use is allowed on some park administrative roads, pursuant to the Superintendent's Compendium (Table 3-5). Horseback riding is allowed on the Brooklyn Mine Trail/Administrative Road, the only trail in the park on which horses and pack animals are allowed.

**Table 3-5. Trail Segments Open for Bicycling**

| Administrative Road (Trail Name) | Miles |
|---|---|
| Kaymoor, between the junction of Craig Branch Trail and Butcher Branch | 2.2 |
| Craig Branch | 2.4 |
| Southside, from Brooklyn Trailhead to Red Ash Island | 1.4 |
| Rend | 3.4 |
| Keeney Creek | 3.4 |
| Little Laurel | 2.6 |
| Nuttall Mine | 0.5 |
| Nuttallburg Tipple | 0.8 |
| Terry Top | 1.7 |

Recreational bicycle use occurs on some other park trails and trail segments, primarily in the Fayetteville area, including some of the trails proposed for bicycle use (Table 2-1). The park's capacity to enforce this prohibited recreational use is constrained by staffing and funding limitations. Mountain biking has been a popular activity in the New River Gorge region since the time the park was created, and hikers, bikers and trail runners have been sharing trails both in and out of park boundaries for about 30 years. There is no recorded evidence of conflicts regarding bicycle use on trails in the area.

Guided commercial tours are permitted for bicycling on the park's administrative roads that are designated for bicycle use, for horseback riding on the Brooklyn Mine Trail/Administrative Road, for rock climbing (for which park trails are used to access climbing areas) and for hiking on park trails generally. Special events occur on park trails and administrative roads by permit for adventure racing, trail running and mountain biking.

**Visitor Experience.** Visitors using existing trails and administrative roads primarily experience an exploration of the forested land around the gorge, from plateau to mine bench to river. Visitors are occasionally treated to views of the gorge, and in the winter when the trees are bare of leaves, visitors may notice some of the features normally hidden by the forest canopy, such as cliff lines, mine benches and historic structures. Some park trails have interpretive signage along them to educate visitors about the natural and cultural resources they encounter. On many trails throughout the park, even on the most popular ones, there are ample opportunities to experience solitude during any season.

**Access.** Access to park trails is dispersed around the park and the greater New River Gorge region. Access to the trails proposed for bicycle use (Table 2-1) varies from easy-to-find in population centers to narrow, unsigned, steep mountain roads.

The Fayetteville Town Park Trailhead is located in the town of Fayetteville; it is easy to access, but not well signed as an NPS facility. The Wolf Creek Trailhead is easily accessible, but mostly visible to visitors who travel to the bottom of the gorge on Fayette Station Road; most of this road is for one-way traffic only, and while the trailhead is on the southern side of the gorge, it can only be accessed by car from the northern side of the gorge. To reach Kaymoor Top by car, visitors must drive on narrow, winding roads about five miles from the town of Fayetteville, including the Kaymoor No. 1 Road, which is not well-maintained and only one lane wide in most places. All of these trailheads and associated trails can also be accessed through the Fayetteville area trail network.

The Brooklyn access to the Southside Trail can be reached by driving down the Cunard Road, beyond the river access for the popular whitewater boating section of the lower gorge. This access is well signed, and it crosses through several small communities on narrow mountain roads. This trail does not connect to other park trails.

The existing park trail system does not connect to the Rend or Stone Cliff Trails/Administrative Roads. Driving access to the trailheads for these trails is signed, but it can be difficult for visitors to find the route.

The trailheads for the Keeney Creek, Nuttallburg Mine and Nuttallburg Tipple Trails/Administrative Roads can be incredibly difficult for visitors to locate, as they are accessed through a number of small communities in an area that feels very remote along roads that are steep, narrow and unsigned.

Driving access to the Terry Top area is not currently signed and would be very challenging for visitors who do not frequent the area to find. It is located off of several progressively more narrow paved roads which lead to an unnamed gravel road, from which the Terry Top Trail/Administrative Road originates. While these unsigned roads may be difficult to find, they are very close to major roads and near the city of Beckley.

### 3.7.2 Mud Turn, Panther Branch and Brooklyn Mine Areas

**Area Management.** All three of these proposed new trails would be located within backcountry zones. The Draft GMP proposes the development of a Through the Park Trail, of which the Panther Branch Connector and Brooklyn Miner's Connector Trails would be component sections.

**Existing Use.** The Mud Turn and Panther Branch areas are used for hunting during legal hunting seasons. A short section of the proposed Panther Branch Connector Trail, closest to end of Glade Creek Road, serves as fishing access from the Glade Creek Trailhead.

A short section of the proposed Brooklyn Miner's Connector Trail is explored on occasion by visitors using the Southside Trailhead and the Brooklyn Campground.

**Visitor Experience.** There are few park facilities available to visitors in the Mud Turn, Panther Branch or Brooklyn Mine areas. Trailheads for nearby trails provide parking and a handful of amenities, but to explore the corridors of the proposed trails is a primitive experience and, despite all three areas' proximity to roads, visitors to these places may feel as though they are very remote.

**Access.** The Grandview area of the park is easily accessible for visitors driving to the park. The roads are well signed from interstate 64, providing visitors with easy access to the upper end of the proposed Mud Turn Trail. Access to the lower end of the proposed Mud Turn Trail and to the access for the proposed Panther Branch Connector Trail is via Glade Creek Road. This long, narrow gravel road first requires visitors to descend a steep, winding and poorly signed road into the gorge.

Access to these proposed trails would require driving, with the exception that the Panther Branch Connector Trail could be accessed from its connection with the Glade Creek Trail.

Direct road access to the proposed Brooklyn Miner's Connector Trail would require the use of a steep and winding road into the gorge and the Cunard River Access and Brooklyn Campgrounds. Driving access to the existing Brooklyn Mine Trail/Administrative Road is located at the top of the aforementioned steep section of road. This trail/administrative road could also be accessed on foot or bicycle from the Kaymoor Trail.

### 3.7.3 Craig Branch Area

**Area Management.** The Craig Branch area is proposed by the 2010 Draft GMP as a frontcountry zone.

The land was privately owned by the Berwind Land Company until 2005, and public access to the land was relatively unrestricted. Prior to NPS acquisition of the property, hunting, OHV riding, hiking, mountain biking and commercial horseback riding tours were all occurring there, mostly using the existing network of informal routes, including old logging and mining roads and OHV tracks (approximately ten miles of user-created OHV routes). Hunting and hiking are still allowed on the property. Permanent tree stands are not permitted, and many that were in the area, prior to NPS ownership have been removed, though a handful can still be found.

Commercial horseback riding tours are not permitted by the park within the project area.

**Existing Use.** Existing use of the Craig Branch area is informal. Hunting and hiking use occur, and a small amount of mountain biking occurs here, though the old roads and OHV tracks are not desirable for riding. OHV use is prohibited on NPS lands, and when the NPS acquired the property for the Craig Branch area, law enforcement rangers talked with most of the adjacent landowners and many others nearby to explain the change in land management policies from the access allowed by the previous owners. This decreased OHV use of the area, though some still occurs. Enforcement is challenging because park law enforcement resources are spread thin, and the area is easily accessible from numerous privately-owned access points. The existing user-created OHV routes in the Craig Branch area are represented in Figure 3-1.

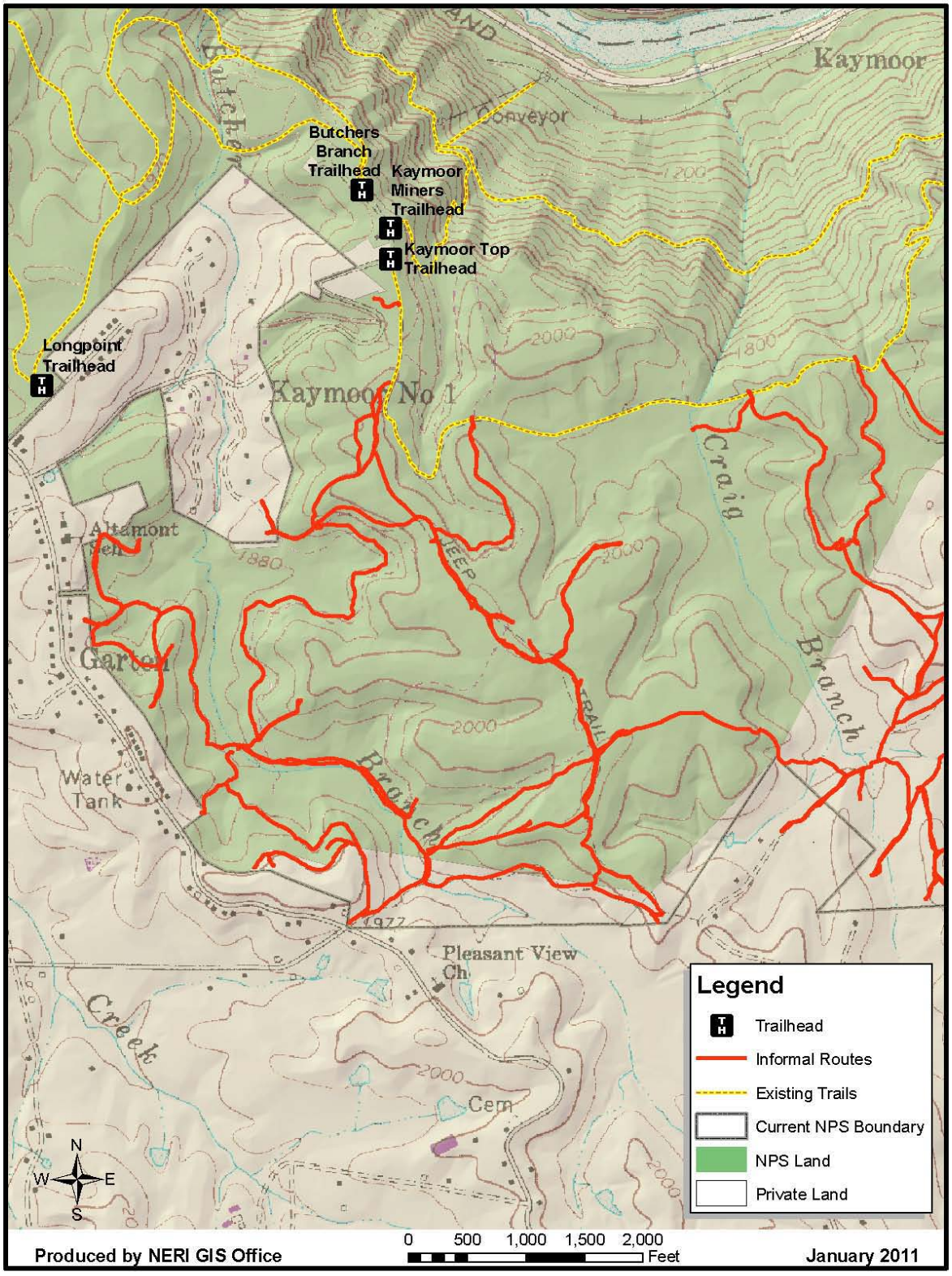
The Craig Branch Trail/Administrative Road crosses through the project area. It is used as a road for NPS administrative purposes only and is gated at the public access point. Visitors use it as a trail for hiking, trail running and mountain biking, and commercial mountain biking tours are permitted on it. This administrative road is open for mountain bike use, as identified in the Superintendent's Compendium.

**Visitor Experience.** The Kaymoor area, adjacent to the Craig Branch area, has a variety of park facilities and recreational opportunities, and provides a frontcountry experience where visitors are likely to encounter other visitors. There are also several interpretive signs in the Kaymoor area so that visitors can learn more about its history. The Craig Branch project area has a similarly frontcountry feel, as a result of its proximity to the Kaymoor area and the fact that it is bordered by numerous private residences. The project area itself has no developed facilities, but many informal routes, mostly old logging roads and OHV routes, provide visitors with fairly clear paths on which to explore the area. Natural and cultural resources in this area that are fundamental to the values of the New River Gorge National River can be difficult to find, as many of these have been impacted by the past logging and mining in this area, and those surviving are often tucked away in thickets of rhododendron that are nearly impassable.

**Access.** The Craig Branch area can be accessed by numerous private landowners whose property is located adjacent to NPS property, mostly along Gatewood Road. The park owns a right of way on a privately owned gravel road into the Craig Branch area along Gatewood Road which accesses a log landing. This is not a viable public access point because the gated road is narrow, and roughly the first 50 feet of it are shared with a private driveway that accesses two houses.

Primary public access to this area originates from Kaymoor Top. To reach Kaymoor Top by car, visitors must drive on narrow, winding roads about five miles from the town of Fayetteville, including the Kaymoor No. 1 Road, which is not well-maintained and only one lane wide in most places. The project area can also be reached by trail from Fayetteville, Fayette Station and Cunard.

**Figure 3-1. Existing Informal Routes in the Craig Branch Area (OHV, User-Created)**



### 3.7.4 Garden Ground Area

**Area Management.** The Garden ground area is proposed by the 2010 Draft GMP as a backcountry zone.

The land was privately owned, mostly by the Erskine Company, until the late 1980s when it was purchased by the NPS. Prior to NPS acquisition of the property, public access to the land was virtually unrestricted. Hunting, OHV riding and visitation to the cemetery on Terry Top were the main public activities in this area under private ownership.

**Existing Use.** Use of the Garden Ground area is informal and relatively sparse. Hunting and cemetery visitation still occur under NPS ownership. This area is hunted heavily, and is likely to receive higher than normal use during the 2010 hunting season because of the purchase of a large tract of adjacent property by the Boy Scouts of America (BSA). The previous landowner allowed public hunting on the land, but the BSA has closed the area to public access. Many of those hunters may be displaced into the Garden Ground project area. Residual OHV use also occurs in the Garden Ground area, despite NPS prohibitions of OHV use in the park. Enforcement of this activity is very challenging, given the size of the Garden Ground area, difficulties in accessing parts of it that are far from roads, and funding and staffing limitations on park law enforcement resources. The existing user-created OHV routes in the Garden Ground area are represented in Figure 3-2.

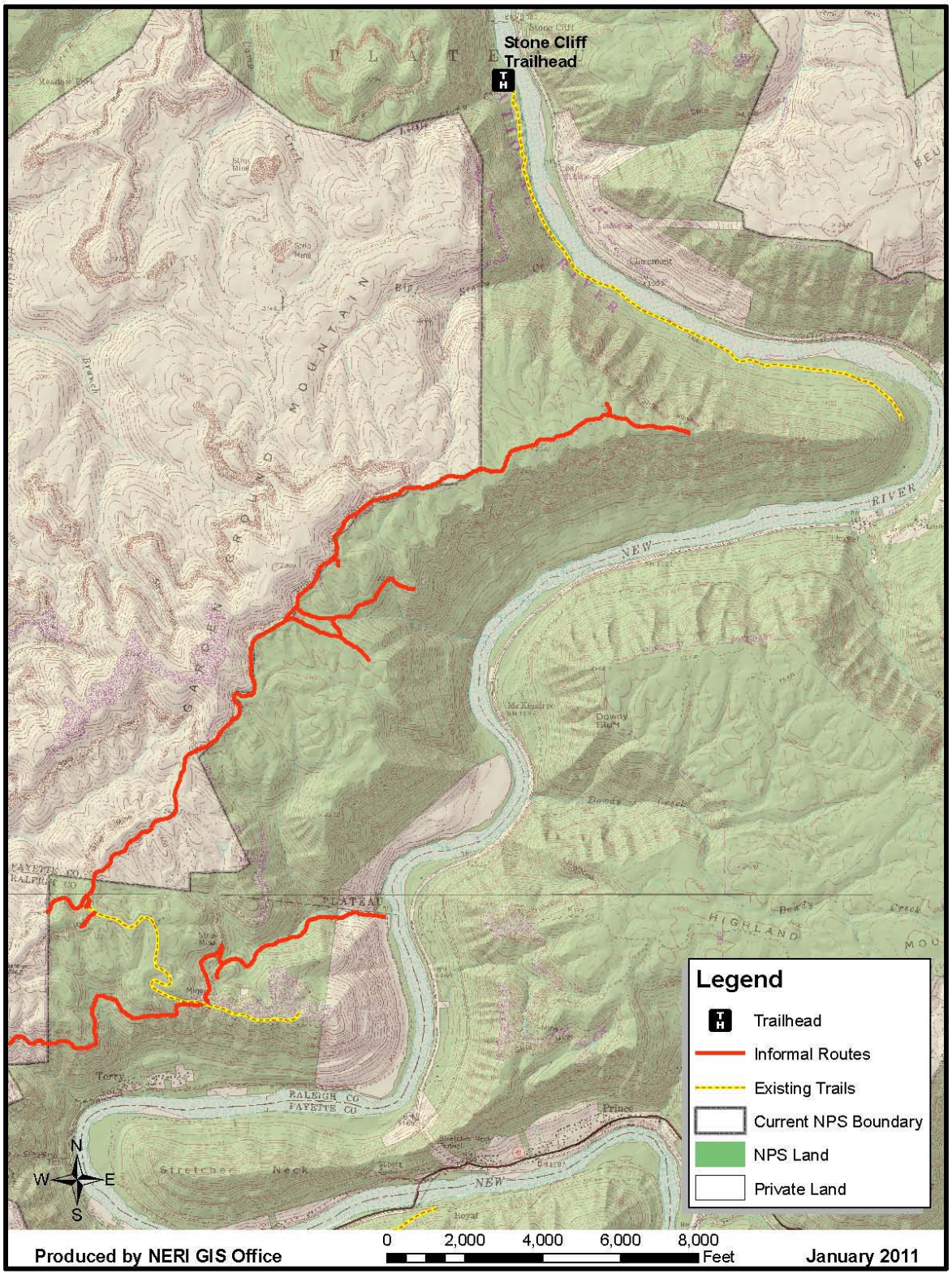
The Terry Top and Stone Cliff Trails/Administrative Roads are both located within the Garden Ground area, and both receive a relatively low amount of use. The Terry Top Trail/Administrative Road is gated at the public access point, but visitors are allowed vehicular access by permit to reach the cemetery at the end of the administrative road. It is identified in the Superintendent's Compendium as being open for mountain bike use. The Stone Cliff Trail/Administrative Road begins at the gate located at the south end of the Stone Cliff Campground and extends upstream approximately 2.7 miles to an old farm site.

While the amount of use on the Stone Cliff Trail/Administrative Road is relatively low, the campground and river access receive a high amount of day and overnight use throughout the spring, summer and fall.

**Visitor Experience.** The Garden Ground area is an excellent place in the park to experience solitude and primitive recreational opportunities. Despite its proximity to Beckley and short distance away from major roads, the area feels very remote and is not widely visited, including the existing trails within the area (the Terry Top and Stone Cliff Trails/Administrative Roads). Many examples of the park's fundamental natural and cultural resources and values can be discovered in this area, but no interpretation of them is currently provided.

**Access.** The Garden Ground area is accessed primarily from the town of Terry and Terry Top, found at the southern end of the project area, followed by the Stone Cliff area. The existing park trail system does not connect directly to this area, so hiking or biking access is not ideal. Driving access to the Stone Cliff Trailhead is signed, but it can be difficult for visitors to find the route. Driving access to the Terry Top area is not signed and would be very challenging for visitors who do not frequent the area to find, although it is located very close to major roads and not far from the city of Beckley. Access to the Terry Top Trail/Administrative Road is located off several progressively narrower paved roads.

**Figure 3-2. Existing Informal Routes in the Garden Ground Area (OHV, User-Created)**



## 3.8 Socioeconomics

The post-coal regional economy is shifting to one based not only on coal but on destination tourism and retirement living. Its natural beauty and the opportunities for outdoor recreation are the major attractions to vacationers and adventurers. Trail opportunities within the park and especially those connecting communities to the park have proven very popular with both visitors from out of state and local visitors. Efforts in nearby Oak Hill, WV to convert a rail grade to a multi-purpose trail have proven to be extremely successful and serve as a model for the surrounding communities.

The three population centers that are most likely to see socioeconomic impacts from the project are Fayetteville and Mount Hope in Fayette County and Beckley in Raleigh County. Since 2000, the population of Fayette County has decreased several percent, while Raleigh County has increased just slightly. The area's median household income as of 2000 was about $26,000, compared with $29,700 for West Virginia and $42,000 for the United States as a whole. In Fayette County, 18.2 percent of families and 21.7 percent of individuals live below the poverty level, and minorities constitute less than ten percent of the population. In Raleigh County, 14.6 percent of families and 18.5 percent of individuals live below the poverty level, and minorities constitute barely more than ten percent of the population (U.S. Census Bureau 2000).

Health conditions in these areas are generally poor; obesity rates and rates of physical inactivity are high. In a 2009 report, the Trust for America's Health found that West Virginia has the third highest percentage of obese adults in the country (as compared to the other 49 states), and the eighth highest percentage of obese children ages ten to 17 (Trust for America's Public Health 2010). The same report demonstrated that West Virginia has an 11.7 percent adult diabetes rate, a 34.1 percent adult hypertension rate, a 30.8 percent adult physical inactivity rate and a 10.3 percent rate of fruit and vegetable intake, which is almost four percent lower than the national average.

### 3.8.1 Fayetteville Socioeconomic Conditions

The town of Fayetteville, located in Fayette County with a population of about 2,700, is the New River Gorge area's socioeconomic center for recreation and tourism opportunities (U.S. Census Bureau 2009). It has been recognized in numerous publications as a favored place to visit and to live among the outdoor recreation community. In 2006, Budget Travel Magazine lauded Fayetteville as one of the "coolest small towns in the U.S.A.", celebrating the town's locally-owned businesses and opportunities for whitewater rafting, rock climbing and mountain biking (Kuntz). That same year, Outside Magazine identified Fayetteville as one of the nation's adventure meccas, highlighting the New River Gorge whitewater boating, mountain biking and rock climbing opportunities (Siber 2006). In 2010, Fayetteville was again recognized by Outside Magazine as the runner up for best whitewater town in the country; rock climbing, mountain biking and hiking opportunities were also mentioned (Sweeney).

Many Fayetteville businesses exist because of the tourism and outdoor recreation industries associated with recreation resources available in the park. Restaurants, boutique-style shops, campgrounds, hotels, gas stations and convenience stores depend heavily on tourists visiting the area, and secondarily on outdoor recreation enthusiasts who have moved to the area because of the recreation opportunities and industry. Several outdoor gear shops sell equipment for the outdoor activities popular in the New River Gorge, including two stores that focus exclusively on bicycling, primarily mountain biking. Numerous businesses provide commercial guide services for the area's premier recreation activities, as well as for horseback riding. Whitewater rafting companies have grown into full-scale resorts offering lodging, dining, spa services and numerous on-site adventure activities in conjunction with their in-park guide services, including mountain biking rental and tours.

A growing segment of Fayetteville's professional economy is developing from people who have moved to the area because of the outdoor recreation opportunities and have established either remote-work and telecommuting jobs with companies based in other locations, or they have started their own professional businesses, including those that specialize in web design, marketing, community development, magazine production, photography and other similar services.

The Craig Branch project area and many of the existing trails and administrative roads proposed for bicycle use are in close proximity to Fayetteville.

### 3.8.2 Mount Hope Socioeconomic Conditions

The city of Mount Hope, located in Fayette County with a population of about 1,300, is an economically depressed community that has lost many of its citizens and businesses since around the 1950s when its industrial boom ended (U.S. Census Bureau 2009). The median household income of $18,375 in Mount Hope is among the lowest of communities in Fayette and Raleigh counties, and the percentage of individuals living below the poverty level (36 percent) is among the highest (U.S. Census Bureau 2000). A handful of local businesses in the city support the local population, but the town does not currently benefit from the outdoor recreation and tourism industry that is based in the Fayetteville and Beckley areas. However, Mount Hope is the nearest gateway community to both the NPS Garden Ground project area and the BSA Summit Bechtel Family National Scouting Reserve, two projects forecasted to improve local economic conditions by increasing employment and spending in the area.

### 3.8.3 Beckley Socioeconomic Conditions

The city of Beckley, located in Raleigh County with a population of about 16,800, is a major economic and population center in southern West Virginia (U.S. Census Bureau 2009). The city's economy is based around industry and retail, though regional tourism is a strong factor, including outdoor recreation and heritage tourism. Beckley is home to Tamarack, a showcase for West Virginia's art, crafts, music and food. Beckley also contains a large concentration of hotels, restaurants, shopping and other visitor services. Beckley has several businesses supporting the outdoor recreation and tourism industry, including bicycle equipment sales and services.

The existing park trails and administrative roads located close to Beckley are regularly used by park visitors. The Garden Ground project area is close to Beckley and would likely receive regular visitation from local residents. The proposed Mud Turn and Panther Branch Connector Trails are located very close to Beckley and are similarly expected to receive even more regular use from both out of state and local hikers and bikers.

# 4 ENVIRONMENTAL CONSEQUENCES

In Chapter Four, as required by NEPA, potential impacts are described in terms of type, context, duration and level of intensity. These terms are defined below. Overall, these impact analyses and conclusions are based on a review of existing literature and park studies, information provided by on-site experts and other agencies, professional judgment and park staff knowledge and insight.

**Measuring Impacts.** Definitions used to evaluate the nature of impacts are as follows:

**Type.** Impact types include beneficial or adverse.

**Beneficial.** A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

**Adverse.** A change that declines, degrades and/or moves the resource away from a desired condition or detracts from its appearance or condition.

**Context.** The affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as a whole or any combination of these. Context is variable and depends on the circumstances involved with each impact topic.

**Duration.** The time period for which the impacts are evident. Duration is described as short-term or long-term, and is variable with each impact topic. Generally, short-term impacts are those that would be temporary, such as effects associated with construction, and long-term impacts are those that would last a more substantial amount of time and could be permanent in nature. More specific definitions of impact duration related to each impact topic will be provided.

**Intensity.** A measure of the severity of an impact. The intensity of an impact may be negligible, minor, moderate or major. Because definitions of impact intensity vary by impact topic, more specific definitions are provided separately for each impact topic analyzed. Adverse impacts are addressed according to intensity, while beneficial impacts are described qualitatively without levels of intensity.

**Direct.** Impacts on the resource actually caused by the actions proposed, generally at the immediate site of the action and at the time of the action. Direct impacts can extend into the future, and can be permanent or temporary.

**Indirect.** Impacts on the resource that occur as a result of a "side-effect" of a direct impact, but generally occur removed in time or space from the actions proposed.

**General Methodology for Analysis.** The following elements were used in the general approach for establishing impact intensities and measuring the effects of the alternatives on each category:

- General analysis methods as described in guiding regulations, including the context and duration of environmental effects
- Basic assumptions used to formulate the specific methods used in this analysis
- Thresholds used to define the level of impact resulting from each alternative
- Methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting park resources
- Methods and thresholds used to determine if impairment of specific resources would occur under any alternative

**Cumulative Impacts.** NEPA regulations require an assessment of cumulative impacts in the decision-making process for all federal projects. Cumulative impacts are defined as follows:

Cumulative impacts are incremental impacts of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can

result from individually minor, but collectively moderate or major actions that take place over a period of time. (40 CFR 1508.7)

Cumulative impact analysis was accomplished using four steps:

1. Fully identify resources affected by any of the alternatives (i.e., the impact topics).
2. Identify an appropriate spatial and temporal boundary for each resource. These boundaries are noted in the analysis of each impact topic.
3. Determine which actions may affect the resources identified.
4. Summarize the cumulative impact.

The following terminology is used to define the contribution of each alternative to cumulative impacts:

**Imperceptible.** The incremental effect contributed by the alternative to overall cumulative impacts is such a small increment that it is impossible or extremely difficult to discern.

**Noticeable.** The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impacts.

**Appreciable.** The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

Table 4-1 summarizes the actions that could contribute to cumulative impacts on park resources analyzed as impact topics. Because some of these actions are in the early planning stages, the evaluation of the cumulative impact is based on a general description of the projects. These actions were identified through the internal and external project scoping processes.

**Table 4-1. Actions Included in the Cumulative Impact Analysis**

| Actions | Summary Description | Timeline |
|---|---|---|
| NPS Actions | Mine Portal Gating – Gates were installed on ten mine portals to allow wildlife to pass in and out, but to prevent visitor access. This project was accomplished with one-time funding through the American Recovery and Reinvestment Act of 2009. | 2010 |
| | Bridge Walk – The NPS and the State of WV authorized commercial use of the catwalk beneath the New River Gorge Bridge for guided tours. | 2010 through future |
| | Nuttallburg Visitor Use Area – The Park is developing this use area by restoring historic structures, providing interpretation and providing new trails to explore the former town of Nuttallburg. | In process |
| | Vault Toilet Installation at Trailheads – The NPS is installing new vault toilets at many existing trailheads to replace the seasonal portable toilets usually provided. | In process |
| | New Trail Development – The Draft GMP, pending approval, provides for development of a Through the Park Trail, a third stacked loop trail system and trails that connect to surrounding communities and public lands, most of which would likely have both hiking and biking use | Future |
| Land Use | OHV Use – OHVs have been used on private land within park boundaries for many years. This use has continued illegally on some lands that have since been acquired by the NPS. | Past and continuing |
| | Mining – Much of the land within NPS boundaries has been deep mined and/or strip mined in the past 150 years. | Past through around the mid-20th century |
| | Logging – Much of the land within NPS boundaries has been logged within the past 150 years. | Past and continuing |
| | Water Pollution – Industrial chemicals, household and industrial waste and raw sewage have been discharged into the New River Watershed along the river and its tributaries. | Past and continuing |

| | | |
|---|---|---|
| | Beury Mountain State Wildlife Management Area – Approximately 6,000 acres was purchased by the Nature Conservancy and transferred to the State to create a new WMA adjacent to Babcock State Park and the NPS. | 2008 and 2010 |
| Development | Fayetteville Area Residential Development – New residences are being sold and constructed in several residential and residential-commercial developments in the area, including the Wild Rock community, Bridgeview Estates and Wolf Creek Park. | Past and continuing |
| | Private Recreational Development – Adjacent landowners, Wild Rock and ACE Whitewater have constructed hiking and biking trails and anticipate the development of more of the same. Additionally, adjacent rafting company/resorts may develop other new recreational opportunities. | Past and continuing |
| | US 19 Commercial Corridor – Various commercial developments are being constructed along US 19 between Oak Hill and Fayetteville, including a WalMart Supercenter, Lowes, Sheetz gas station, fast food restaurants and other retailers. | Past and continuing |
| | Fayetteville Area Defunct Residential Developments – Several planned residential developments failed financially, and the land was sold. The land was purchased in part by the NPS, in part by private landowners. Plans for this private land within NPS boundaries are unclear, but do not seem to include residential development at the time of publication of this document. | 2005 through 2010 |
| | The Summit: Bechtel Family National Scouting Reserve – The Boy Scouts of America are developing nearly 10,000 acres adjacent to the Garden Ground Area of the park to host a year round high adventure camp and the BSA National Jamboree every four years. | 2010 through future |
| Transportation System Improvements | Beckley Inter-Modal Project – There are plans for a joint transportation and economic development improvement project in downtown Beckley, including a new city hall, cultural center and inter-modal facilities with a three-level underground parking garage. | Future |
| | East Beckley Bypass – There are plans for a five lane facility with partially controlled access from Eisenhower Drive in Beckley to US 19 in Bradley. | Future |
| | Beckley Z-Way – There are plans for a 10.3-mile new roadway connection from Shady Springs to Van Kirk Drive in Raleigh County. | Future |
| | New River Parkway – There are plans for the reconstruction of River Road as a ten-mile parkway through the New River Gorge National River connecting Hinton and Interstate 64. The plans include a new bridge crossing over the New River. | Future |
| Municipal Utilities and Infrastructure | Fayette County Regional Water and Distribution System – Regional water plants and distribution systems are being developed around Fayette County. | 2005 through future |
| Mined Land Reclamation | Claremont Reclamation Project – An 80-acre reclamation project within the NPS boundary but not on NPS land is planned within the park by the WV Department of Environmental Protection, including the destruction and burial of concrete structures, recontouring of existing gradients, reestablishment and stabilization of drainage ways, revegetation and treatment of acid mine drainage. | Future |
| | Other Reclamation Projects – Numerous mined land reclamation projects are taking place in Fayette and Raleigh Counties, including a variety of activities similar to those in the Claremont Reclamation Project. | Past and continuing |

1

## 4.1 Water Quality

### 4.1.1 About the Analysis

**Applicable Regulations and Guidelines.** Achieving and maintaining clean water are governed nationwide by the Clean Water Act, as administered by the U.S. Environmental Protection Agency. In West Virginia, specific oversight responsibility is delegated to the West Virginia Department of Environmental Protection.

**Methodology and Assumptions.** Evaluation of impacts is based on existing water quality information, where available, and best professional judgment of water quality status based on similar local areas where information is not available. Potential impacts are limited to sanitary water quality as it applies to water contact recreation and to increased sedimentation resulting from erosion.

**Impact Intensity.** Water quality impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Negligible impact for contact recreation occurs where geometric mean density of fecal coliform bacteria does not change more than five percent. Negligible impact for sediment occurs where mean concentration or delivery volume does not change more than five percent. Negligible impacts do not cause the parameter of concern to exceed Federal or West Virginia water quality standards or guidelines.

**Minor.** Minor impact for contact recreation occurs where geometric mean density of fecal coliform bacteria does not change more than ten percent. Minor impact for sediment occurs where mean concentration or delivery volume does not change more than ten percent. Minor impacts do not cause the parameter of concern to exceed Federal or West Virginia water quality standards or guidelines.

**Moderate.** Moderate impact for contact recreation occurs where geometric mean density of fecal coliform bacteria does not change more than 15 percent. Moderate impact for sediment occurs where mean concentration or delivery volume does not change more than 15 percent. Moderate impacts may cause the parameter of concern to exceed Federal or West Virginia water quality standards or guidelines on rare occasions and/or under unusual circumstances.

**Major.** Major impact for contact recreation occurs where geometric mean density of fecal coliform bacteria does not change more than 20 percent. Major impact for sediment occurs where mean concentration or delivery volume does not change more than 20 percent. Major impacts cause the parameter of concern to frequently and consistently exceed Federal or West Virginia water quality standards or guidelines.

**Duration, Short-Term.** Short-term impacts to water quality last less than one week.

**Duration, Long-Term.** Long-term impacts to water quality last more than one week.

### 4.1.2 Alternative A – No Action Alternative: Impacts to Water Quality

Under the No Action Alternative in all project areas, water quality status would not change from the present situation in any noticeable capacity. Where prohibited OHV use occurs in the Craig Branch area, and NPS staff have the funding and capacity to more stringently enforce the use, less sedimentation could be realized as a result of discontinuance or decreases in repeated use. However, the informal routes would not be rehabilitated under this alternative, and while the existing issues of erosion would not be exasperated, erosion would still continue from the vegetation loss and movement of water and soil that has already occurred.

**Cumulative Impacts.** Most of the waterways in the New River Gorge Region are affected to some extent by the past, present and future actions listed in Table 4-1. Evidence to this is the fact that the New River and most of its tributaries within the park exceed water quality standards for measures such as fecal coliform, sediment load and heavy metals. The No Action Alternative would adversely,

but negligibly, contribute to the overall cumulative impacts associated with runoff from existing trails, OHV routes, logging roads and other disturbances.

**Conclusion.** Under this alternative, negligible long-term adverse impacts to water quality from sedimentation would continue to occur in the Craig Branch area due to existing informal routes (logging roads and user-created OHV routes) not being properly designed for drainage and sediment control.

### 4.1.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Water Quality

Under Alternative B (the Preferred Alternative), overall water quality status would likely experience negligible change from the present situation. Sediment impact could be adverse in the Garden Ground area, along the proposed Mud Turn and Panther Branch Connector Trails and from existing trails that would permit use of bicycles. The impact would be beneficial in the Craig Branch area. Sanitary impacts would be beneficial due to the installation of restroom facilities at trailheads.

**Bicycle Use on Existing Trails and Administrative Roads.** Expansion of trails open to bicycles could lead to increased sediment delivery in several areas of the park, resulting in negligible long-term adverse impacts. Restroom facilities already exist at or near most trailheads for existing trails and administrative roads, so there would likely be no impact on sanitary water quality.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** Development of the proposed Mud Turn Trail could lead to increased sediment delivery in the Mill Creek area. Developing the proposed Panther Branch Connector Trail could lead to increased sediment delivery along an area that drains directly into the New River. Developing the proposed Brooklyn Miner's Connector Trail could lead to slight increased sediment delivery from runoff during rain events. The possibility of sediment delivery along the three proposed trails would be minimized by adherence to sustainable trail design and appropriate maintenance. Sustainable trail design and maintenance on the three proposed trails would also minimize the potential for bicycle use to result in any different amount of erosion than hiking by mitigating the need for quick changes of speed or direction that cause wheels to lock, slide and shear soils in the trail tread. The adverse impacts in all of these areas would be negligible and long-term.

Restroom facilities already exist at or near trailheads for the three proposed trails, so there would be no impact on sanitary water quality.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Developing the proposed trail system could lead to some sediment delivery from the new trails, although this would be minimized by adherence to sustainable trail design and appropriate maintenance. Sustainable trail design and maintenance on the proposed trail system would also minimize the potential for bicycle use to result in any different amount of erosion than hiking by mitigating the need for quick changes of speed or direction that cause wheels to lock, slide and shear soils in the trail tread. The adverse impacts of this action upon water quality would be negligible and long-term. However, rehabilitation of existing informal routes (old logging roads and user-created OHV routes) would remove more substantial sources of sediment than the proposed trail system would create, sources that can now enter Butcher and Craig Branches, and eventually the New River. The overall resulting impacts to water quality from sedimentation in the Craig Branch area would be negligible to minor long-term beneficial impacts.

Addition of restroom facilities would improve sanitary water quality in Butcher and Craig Branches and the New River, resulting in negligible, long-term beneficial impacts.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Development of new trails where none now exist could lead to increased sediment delivery to Batoff and Piney Creeks, unnamed streams in the Terry area and to the New River. The increase in sediment delivery would be minimized by adherence to sustainable trail design and appropriate maintenance. Sustainable trail design and maintenance on the proposed trail system would also minimize the potential for bicycle use to result in any different amount of erosion than hiking by mitigating the need for quick changes of speed or direction that cause wheels to lock, slide and shear soils in the trail tread. The adverse

impacts of this action upon water quality would be negligible and long-term. Rehabilitation of informal routes would reduce the existing sources of sedimentation in the Garden Ground area, though likely not so substantially as to have much noticeable benefit on water quality. Overall impacts to water quality from sedimentation in the project area would remain adverse, negligible and long term.

New restroom facilities would improve sanitary water quality in Batoff and Piney Creeks, unnamed streams in the Terry area and to the New River, resulting in negligible, long-term beneficial impacts.

**Cumulative Impacts.** Under this alternative, there may be an imperceptible long-term improvement in sediment delivery to, and fecal coliform bacteria density in, water courses in the New River Gorge National River. This would create imperceptible benefits in the overall adverse cumulative impacts of the past, present and future actions listed in Table 4-1.

**Conclusion.** Under this alternative, there would likely be a negligible long-term improvement in water quality within New River Gorge National River.

### 4.1.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Water Quality

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Using the existing road beds to develop hiking and biking trails in this area would neither improve nor degrade water quality. Any gains that would accrue through reclamation of road segments not being used for trails would be offset by the continued use of other road segments that are too steep to prevent erosion and resultant sedimentation, or that are poorly drained. While the NPS would make every effort to develop trails on existing routes as sustainable as possible, some of the design elements required may be beyond the scope of what the NPS can afford, which would result in higher maintenance needs to retain sustainable trail qualities. Because of this, the use of such road beds with unsustainable alignments for new trail development could continue to result in some sediment release into Butcher and Craig Branches and the New River. Bicycle use on the proposed trails under these circumstances may result in slightly greater erosion than hiking, because the use of existing informal routes could force the NPS to incorporate trail features that may cause bicyclists to stop or change direction abruptly, shearing soils in the trail tread. The adverse impacts to water quality from sedimentation would be negligible and long-term. However, rehabilitation of existing informal routes (old logging roads and user-created OHV routes) that would not be used for new trail construction would remove some substantial sources of sediment from the project area that can now enter Butcher and Craig Branches, and eventually the New River. The overall resulting impacts to water quality from sedimentation in the Craig Branch area could be negligible long-term beneficial impacts.

Addition of restroom facilities would improve sanitary water quality in Butcher and Craig Branches and the New River, resulting in negligible, long-term beneficial impacts.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Trail development in the Garden Ground area could lead to increased sediment delivery to Batoff and Piney Creeks, unnamed streams in the Terry area and to the New River. The use of existing informal routes, including old road beds, user-created OHV routes and the mine bench, would neither improve nor degrade water quality. Any gains that would accrue through reclamation of road segments not being used for trails would be offset by the continued use of other road segments that are too steep to prevent erosion and resultant sedimentation, or that are poorly drained. While the NPS would make every effort to develop trails on existing routes as sustainable as possible, some of the design elements required may be beyond the scope of what the NPS can afford, which would result in higher maintenance needs to retain sustainable trail qualities. Because of this, the use of such road beds with unsustainable alignments for new trail development could continue to result in some sediment release, which could be particularly problematic for the proposed trail segment using the existing mine bench, depending on the hydrology and stability of the bench. Bicycle use on the proposed trails under these circumstances may result in slightly greater erosion than hiking, because the use of existing informal routes could force the NPS to incorporate trail features that may cause bicyclists to stop or change direction

abruptly, shearing soils in the trail tread. The adverse impacts to water quality from sedimentation would be negligible and long-term.

New restroom facilities would improve sanitary water quality in Batoff and Piney Creeks, unnamed streams in the Terry area and to the New River, resulting in negligible, long-term beneficial impacts.

**Cumulative Impacts.** Under this alternative, there may be an imperceptible long-term improvement in sediment delivery to, and fecal coliform bacteria density in, water courses in the New River Gorge National River. This would create imperceptible benefits in the overall adverse cumulative impacts of the past, present and future actions listed in Table 4-1.

**Conclusion.** Under this alternative, there could be a negligible long-term improvement in water quality within New River Gorge National River.

### 4.1.5 Comparison of the Alternatives – Impacts to Water Quality

Alternative A, the No Action Alternative, would not result in any improvement to water quality, particularly resulting in long-term, negligible, adverse impacts from continued erosion and sediment delivery problems in the Craig Branch area. Alternative B, "New Route Single Track Trail Construction," offers the greatest potential for water quality improvement of the two action alternatives, especially in terms of sediment delivery to water courses in New River Gorge National River. The lesser improvement of Alternative C, "Existing Disturbance Single Track Trail Construction," is due to the greater mileage of new trails proposed for construction and the difficulties associated with developing sustainable trails on the alignments of existing unsustainable informal routes.

## 4.2 Streamflow Characteristics

### 4.2.1 About the Analysis

**Applicable Regulations and Guidelines.** Management Policies (NPS 2006a, Sec. 4.6.6) guide the NPS to "minimize human-caused disturbance to the natural upland processes that deliver water, sediment and woody debris to streams", including "runoff, erosion, and disturbance to vegetation and soil caused by fire, insects, meteorological events and mass movements."

**Methodology and Assumptions.** Evaluation of impacts is based on existing streamflow information, where available, and best professional judgment of streamflow characteristics based on similar local areas where information is not available.

**Impact Intensity.** Streamflow characteristics impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Negligible impacts to streamflow characteristics occur when maximum or minimum flows do not change by more than two percent, and the shape of the unit hydrograph does not change in a perceptible manner.

**Minor.** Minor impacts to streamflow characteristics occur when maximum or minimum flows do not change by more than four percent, and the shape of the unit hydrograph does not change in a perceptible manner.

**Moderate.** Moderate impacts to streamflow characteristics occur when maximum or minimum flows do not change by more than six percent, and the any change in the shape of the unit hydrograph is barely perceptible.

**Major.** Major impacts to streamflow characteristics occur when maximum or minimum flows change by more than six percent, or if the unit hydrograph changes in an easily perceptible manner.

**Duration, Short-Term.** Short-term impacts to streamflow characteristics last less than one month.

**Duration, Long-Term.** Long-term impacts to streamflow characteristics last more than one month.

### 4.2.2 Alternative A – No Action Alternative: Impacts to Streamflow Characteristics

Under the No Action Alternative, status of streamflow characteristics would not change from the present situation for any of the areas. Within the project areas, some alterations to local streamflow exist from previous construction of roads, mine benches and other linear features where they cross stream channels. The placement of fill or undersized stream crossings reduce and, in some cases, divert the stream flow, creating long-term negligible adverse impacts. Other roads built without consideration to runoff have channelized and increased drainage from some locations within the project areas. Under this alternative, rehabilitation of such features in the project areas would not occur, and the adverse impacts they create would continue to be negligible and long-term.

**Cumulative Impacts.** Most of the waterways in the New River Gorge Region are affected to some extent by the past, present and future actions listed in Table 4-1. Existing human-created features on the land, primarily from past logging and mining activities, have diverted many of the park's streams, especially those considered intermittent and ephemeral, from their natural channels and impacted the flow rates through sedimentation, fill and other alterations. The No Action Alternative would adversely, but negligibly, contribute to the overall cumulative impacts on streamflow characteristics from existing trails, OHV routes, logging roads and other disturbances.

**Conclusion.** Under this alternative, negligible, long-term adverse impacts to streamflow characteristics would continue to occur in the Craig Branch area due to existing informal routes (logging roads and user-created OHV routes) not being properly designed for drainage. Where existing administrative roads on which bicycle use is allowed hold water, there could be negligible, localized, long-term adverse impacts from channelization of water caused by bike tires upon the relatively flat road surfaces.

### 4.2.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Streamflow Characteristics

Under Alternative B (the Preferred Alternative), streamflow characteristics would likely experience negligible change from the present situation. Increased runoff into channels could occur in the Garden Ground area, along the proposed Mud Turn and Panther Branch Connector Trails and from existing trails that would permit use of bicycles. Decreased runoff could occur in the Craig Branch area as existing poorly designed and constructed roadbeds are rehabilitated.

**Bicycle Use on Existing Trails and Administrative Roads.** Expansion of trails open to bicycles could lead to altered water delivery to streams in several areas of the park, particularly in locations where trails retain water and channeling could occur from bike tires through these areas, resulting in localized, long-term, negligible adverse impacts.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** Development of the proposed Mud Turn Trail could lead to altered delivery of water to Mill Creek, and then on to the New River. Developing the proposed Panther Branch Connector Trail could lead to quicker delivery of rainfall into the New River along this route. Developing the proposed Brooklyn Miner's Connector Trail could lead to slight altered delivery of water from runoff into the New River during rain events. The possibility of alteration of water delivery along the three proposed trails would be minimized by adherence to sustainable trail design and appropriate maintenance, so the adverse impacts in all of these areas would be negligible and long-term. Sustainable trail design and maintenance on the three proposed trails would also minimize the potential for bicycle use to result in any different amount of altered delivery of water than hiking by mitigating features that create erosion and the possibility of standing water on trail surfaces that allow for channelization by bike tires.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Development of sustainable trails and rehabilitation of existing informal routes (old logging roads and user-created OHV routes) in the Craig Branch area would recondition many of the features that have altered runoff and water flows from their natural paths. While streamflow characteristics may not be entirely restored to their pre-industrial conditions, they would be treated in such a way as to promote a more natural drainage and delivery of rainfall for the area. Sustainable trail design and maintenance on the proposed trail system would also minimize the potential for bicycle use to result in any different amount of altered delivery of water than hiking by mitigating features that create erosion and the possibility of standing water on trail surfaces that allow for channelization by bike tires. Overall impacts to streamflow characteristics in the Craig Branch area would be beneficial

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Development of new trails where none now exist could lead to altered delivery of water to Batoff and Piney Creeks, unnamed streams in the Terry area and to the New River. Most of the changes in water delivery would be minimized by adherence to sustainable trail design and appropriate maintenance. Sustainable trail design and maintenance on the proposed trail system would also minimize the potential for bicycle use to result in any different amount of altered delivery of water than hiking by mitigating features that create erosion and the possibility of standing water on trail surfaces that allow for channelization by bike tires. Rehabilitation of informal routes would reduce the existing sources of sedimentation in the Garden Ground area, though likely not so substantially as to have much noticeable benefit on water quality. Overall impacts to water quality from sedimentation in the project area would remain adverse, negligible and long term.

**Cumulative Impacts.** Under this alternative, there may be localized, imperceptible, long-term changes in streamflow characteristics of smaller drainages within the New River Gorge National River. This would contribute imperceptibly to the overall adverse cumulative impacts of the past, present and future actions listed in Table 4-1.

**Conclusion.** Under this alternative, there would likely be negligible long-term adverse changes in streamflow characteristics of certain small drainages within the New River Gorge National River.

### 4.2.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Streamflow Characteristics

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Using the existing road beds to develop hiking and biking trails in this area would neither improve nor degrade streamflow characteristics. Any gains that would accrue through reclamation of road segments not being used for trails would be offset by the continued use of other road segments that are too steep to prevent erosion and altered water delivery, or that are poorly drained. While the NPS would make every effort to develop trails on existing routes as sustainable as possible, some of the design elements required may be beyond the scope of what the NPS can afford, which would result in higher maintenance needs to retain sustainable trail qualities. Because of this, the use of such road beds with unsustainable alignments for new trail development could continue to result in some altered water delivery into Butcher and Craig Branches. Bicycle use on the proposed trails under these circumstances may result in slightly greater erosion than hiking, as well as channelization of water from bike tires in perpetually wet areas of the trail tread. The adverse impacts to water streamflow characteristics would be negligible and long-term. However, rehabilitation of existing informal routes (old logging roads and user-created OHV routes) that would not be used for new trail construction would remove some substantial causes of altered water delivery from the project area that currently impact Butcher and Craig Branches. The overall resulting impacts to streamflow characteristics in the Craig Branch area could be negligible long-term beneficial impacts.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Trail development in the Garden Ground area could lead to increased alteration of water delivery. The use of existing informal routes, including old road beds, user-created OHV routes and the mine bench, would neither improve nor degrade streamflow characteristics. Any gains that would accrue through reclamation of road

segments not being used for trails would be offset by the continued use of other road segments that are too steep to prevent erosion and resultant sedimentation, or that are poorly drained. While the NPS would make every effort to develop trails on existing routes as sustainable as possible, some of the design elements required may be beyond the scope of what the NPS can afford, which would result in higher maintenance needs to retain sustainable trail qualities. Because of this, the use of such road beds with unsustainable alignments for new trail development could continue to result in some altered water delivery, which could be particularly problematic for the proposed trail segment using the existing mine bench, depending on the hydrology and stability of the bench. Bicycle use on the proposed trails under these circumstances may result in slightly greater erosion than hiking, as well as channelization of water from bike tires in perpetually wet areas of the trail tread. The adverse impacts to streamflow characteristics would be negligible and long-term.

**Cumulative Impacts.** Under this alternative, there may be localized, imperceptible, long-term changes in streamflow characteristics of smaller drainages within the New River Gorge National River. This would contribute imperceptibly to the overall adverse cumulative impacts of the past, present and future actions listed in Table 4-1.

**Conclusion.** Under this alternative, there would likely be negligible, long-term adverse changes in streamflow characteristics of certain small drainages within New River Gorge National River.

### 4.2.5 Comparison of the Alternatives – Impacts to Streamflow Characteristics

Alternative A, the No Action Alternative, would not result in any improvement to streamflow characteristics, particularly resulting in long-term, negligible, adverse impacts from continued erosion and water delivery problems in the Craig Branch area. Alternative B, "New Route Single Track Trail Construction," offers the greatest potential for streamflow improvement of the two action alternatives. The lesser improvement of Alternative C, "Existing Disturbance Single Track Trail Construction," is due to the greater mileage of new trails proposed for construction and the difficulties associated with developing sustainable trails on the alignments of existing unsustainable informal routes.

## 4.3 Vegetation

### 4.3.1 About the Analysis

**Applicable Regulations and Guidelines.** Federal laws, regulations and NPS policies related to vegetation management and plant communities include the following:

- Executive Order #13112 on Invasive Species
- Endangered Species Act of 1973, as amended
- Federal Insecticide Fungicide, and Rodenticide Act of 1972, as amended

NPS Management Policies (2006a):

- Section 4.4.2.3 Management of Rare, Threatened or Endangered Plants
- Section 4.4.1.3 Defining native and exotic species
- Section 4.4.4 Management of Exotic Species

**Methodology and Assumptions.** The potential to impact park flora and their associated plant communities are identified in relation to the proposed project and the anticipated use of the trails planned for construction, proposed for conversion or already existing. Analysis focused on plant species known to occur in the park and known to use the vegetation community types (Vanderhorst 2007) that occur in the project areas. Vegetation studies within the park have identified the presence of specific rare species and globally rare plant communities that were analyzed. Potential impacts to these species and their communities are based on available scientific literature and the professional judgment of park staff.

An analysis is presented for individual plant communities and species where the analysis is based on the design and construction constraints described in Chapter 2. Specific analysis of individual plants and vegetation communities is presented for an area where its circumstances are unique. The

assignment of the anticipated impact designation is based on the assumption that identified mitigation measures and design constraints described in Chapter 2 would be adhered to.

**Impact Intensity.** Vegetation impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Management actions would result in impacts on plants that would be so slight that they would not be of any measurable or perceptible consequence to the species or vegetation communities.

**Minor.** Management actions would result in a detectable effect that would be localized, small and of little consequence to the species' population or vegetation communities.

**Moderate.** Management actions would result in a clearly detectable effect that would be localized, with consequences to the species' population or community.

**Major.** Management actions would result in an obvious detectable effect that would have substantial consequences to plant populations or rare vegetation communities. The change would most likely result in severe adverse and possible permanent consequences upon the species or communities.

**Duration, Short-Term.** The impact would be temporary, lasting one year or less, such as impacts associated with construction.

**Duration, Long-Term.** The impact would last more than one year and could be permanent in nature. Although an impact may only occur for a short duration at one time, if it occurs regularly over time, the impact may be considered to be a long-term impact.

### 4.3.2 Alternative A – No Action Alternative: Impacts to Vegetation

**Bicycle Use on Existing Trails and Administrative Roads.** Hiking use of trails and roads would continue, with no increase in disturbance to plants anticipated. If current management were continued, then a local, long-term, negligible, indirect impact would be expected on rare plants and rare plant communities.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** Because no new trail construction would occur, globally rare communities in these areas would be protected from increased visitor use. If current management were continued, then local, long-term, negligible, indirect impacts would be expected on rare plants and rare plant communities.

**Craig Branch Area.** Despite the prohibition on OHV use in the park, the NPS would continue to face the same challenges of enforcement that it faces under current management, and under Alternative A, the No Action Alternative, the NPS would not be providing facilities for uses of the area is has deemed appropriate, nor would rehabilitation of existing informal routes occur. Where the OHV use might continue, the existing resource would continue to be exasperated in the Craig Branch area, thereby increasing forest fragmentation, soil erosion, compaction and vegetation trampling. The natural recovery of OHV trails without interdiction measures, or with limited interdiction measures according to the capacity of the NPS to enforce the prohibited OHV use, would likely take decades to recover, leaving the disturbed areas prone to the invasion of aggressive exotic plants. Any seeps, wetlands or existing water holes would continue to be targeted by OHV users, leading to further degradation of these sensitive aquatic resources. If current management were continued, then a local, long-term, minor, direct impact would be expected to rare plants and rare plant communities in the Craig Branch area.

**Garden Ground Area.** As in the Craig Branch area, should any residual OHV use continue in the Garden Ground area, it could lead to increased forest fragmentation, soil compaction and erosion, spread of invasive plants and vegetation trampling that would be detrimental to rare plant communities. Globally rare cliff top plant communities, including rhododendron thickets located in remote parts of the Garden Ground area would continue to be less frequented by park visitors and

OHV users. Forest seeps would continue to be frequently targeted by uncontrolled OHV use. Invasive plants would continue to spread along vectors created by OHVs, while the ability to mobilize resources to treat exotics in this area would continue to compete with higher priority habitats in other areas of the park. If current management were continued, then a local, long-term, minor, indirect adverse impact would be expected on globally rare plant communities.

**Cumulative Impacts.** Property adjacent to the Garden Ground area was recently purchased by the BSA from previous owners who had conducted resource extraction activities, both timber and coal, for many years, including the NPS Garden Ground project area prior to acquisition by the NPS. Portions of the project area were mined for coal and the land left abandoned, while other sections of mined land in the project area above Terry was reclaimed in the late 1980s with exotic plants. With the BSA developing their land as an outdoor recreation center, access of OHVs to the Garden Ground area should be substantially reduced in the future. Invasive plants would remain a major concern in the Terry Top area and along mine benches throughout the project area. Any reduction in use of the area by OHVs should help reduce the impacts to vegetation and soils, and abate the spread of invasive plants. The backcountry of the Garden Ground area has a limited social trail network used primarily by hunters. However, with the large BSA development being constructed immediately adjacent to the Garden Ground area, dispersed exploration of this area by scouts could be expected. If trails are not constructed under this alternative to control the use patterns of these expected visitors, then proliferation of social trails randomly placed could result in disturbance to many rare plant communities. The rim to river unfragmented forest would remain intact. Globally rare cliff top communities would remain remote habitats generally free from recreational development and its associated impacts on vegetation, soil compaction and erosion, and invasion of exotic plants. Numerous social trails and roads located on former mine benches and logging skid roads would continue to serve as vectors for the spread of invasive plants.

The impacts of the No Action Alternative in conjunction with past and current land management practices would result in a cumulative local, long-term, negligible, indirect impact on globally rare plant communities the areas where the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails are proposed in the action alternatives, and along existing trails and administrative roads. Impacts of the No Action Alternative in conjunction with past and current land management practices on rare plants and globally rare plant communities are expected to result in cumulative local, long-term, minor, direct impacts in the Craig Branch area. The No Action Alternative in the Garden Ground area would contribute adverse impacts to globally rare cliff top communities and forest seep communities that would be localized, long-term, negligible and direct, which would contribute imperceptible impacts to the overall cumulative impacts of all actions considered for this component of analysis.

**Conclusion.** If current management were continued, then local, long-term, negligible, indirect impacts would be expected on globally rare plant communities, including rare plants, for the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector areas and all existing trails and administrative roads. Due to continued, although prohibited OHV use in the Craig Branch area, a local, long-term, minor, direct, adverse impact to globally rare forest seeps would be expected. With the construction of BSA facilities adjacent to the Garden Ground area, but no additional trails to be constructed under this alternative, the OHV access to Garden Ground could decrease, thus lessening the anticipated impact to rare cliff top plant communities and rare plants in this area, resulting in adverse impacts that would be local, long-term, negligible and direct. The anticipated cumulative impacts in the Craig Branch area would be long-term, minor, adverse and direct on rare plants and globally rare plant communities. For existing trails and administrative roads, as well as the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector areas, a cumulative long-term, negligible, indirect adverse impact on plants and communities would be expected. The No Action Alternative would contribute a noticeable adverse impact in the Craig Branch area (rare plants, rare plant communities and invasive plants) to the total cumulative impact and an imperceptible impact otherwise to the total cumulative impact.

### 4.3.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Vegetation

**Bicycle Use on Existing Trails and Administrative Roads.** Issues related to rare plants and rare plant communities to be considered in converting the allowed uses of existing trails and administrative roads from hiking only to hiking and biking, are whether biking would adversely affect native vegetation in the area more than hiking use already does.

The effect that converting existing trail use to include biking would have on rare plants and rare plant communities is little understood. Riparian zones, cliff tops and cool cove forests are typically the most popular terrestrial habitats frequented by park visitors, which has led to trampled vegetation, especially in heavily used areas.

While bikers are likely to travel over longer distances than hikers per unit time and increase their impacts to plants and soils, hikers are more likely to travel off-trail and increase their impacts to vegetation and soils. Based on the research summaries (see Section 3.3.5) and current level of bike use at the park, the addition of biking to the selected existing trails and administrative roads would likely have a local, long-term, negligible, indirect impact on vegetation and rare plant communities.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** Conventional wisdom suggests that converting existing disturbances, such as abandoned roads, within floodplains or riparian zones to trails is environmentally preferred when compared to new construction in previously undisturbed habitat, but this may not always benefit rare plants, some of which are associated with disturbed areas. Therefore, there may be cases when protection of rare plants is accomplished by rerouting trails outside of old road traces in order to avoid these sensitive resources. The actions proposed under Alternative B, "New Route Single Track Trail Construction," states that surveys could be conducted and identified rare plants would be avoided during trail design and prior to construction.

The construction of approximately 2.75 miles of backcountry trail for the proposed Mud Turn Trail would remove understory vegetation along a five-foot wide corridor within a moist cove mixed hardwood/hemlock forest along a perennial stream. There are considerable invasive species at the top and bottom of the proposed trail that would likely use the newly constructed trail as a vector into the forest interior. There is a two acre population of Japanese knotweed at the bottom of the proposed trail, near the mouth of Mill Creek, which has the potential to spread up the drainage along the newly constructed trail. The park's exotic plant team has been treating this population for three years and is yet to consider its population under control.

The construction of approximately three miles of backcountry trail for the proposed Panther Branch Connector Trail would remove understory vegetation along a five-foot wide corridor within a riparian zone that sits along the inside edge of a section of the park's unfragmented forest that stretches from the rim to the river of the gorge. This riparian zone provides essential connectivity for species that must utilize the river and uplands for different parts of their life cycle. Riparian zones are typically the most popular terrestrial habitats frequented by park visitors, which has led to trampled riparian vegetation in other areas of the park, especially in heavily used areas. Near the terminus of the proposed trail is found a rare Appalachian flatrock plant community, one of only four known in the park. Invasive plant density is low in this area, but that condition could change with exotic plants colonizing areas disturbed by trail construction and increased visitor use. However, the trail would also allow easier access to exotic plant crews treating invasives.

The construction of the proposed 0.8-mile Brooklyn Miner's Connector Trail would remove understory vegetation along a five-foot wide corridor within an upland deciduous sugar maple-buckeye-basswood forest. There are considerable populations of invasive species at the top and bottom of the proposed trail that would likely use the newly constructed trail as a vector into the forest interior.

If construction of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails does not occur within or directly adjacent to rare plant communities, and streams or wetlands are bridged (no culverts), and invasive plants are treated, then impacts of this project to vegetation are expected to be localized, long-term, minor and indirect.

Construction of the trails would permanently remove vegetation from the area of the trail tread. Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar local, long-term, negligible, indirect impact on vegetation and rare plant communities to the impacts discussed for allowing bicycle use on existing park trails and administrative roads.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Approximately half the distance of the proposed 11-mile stacked loop trail system would traverse a forest disturbed by logging sometime during the past decade. The other half of the trail would travel through a mixed forest with hemlock, oak and hickory, with patches of rhododendron understory. The section of trail proposed north of the administrative road and west of Craig Branch would be routed through mature second growth mixed hardwood forest. Trail construction would result in the clearing of about 11 acres of forest understory.

Trail routes through the rare plant communities of riparian forest, specifically cliff top forests and forest seeps that have been recommended for protection, would be limited to two stream crossings, one over Craig Branch and another on Butcher Branch. Proposed trail segments that encounter rare plants would be rerouted to avoid them; the 2010 late season rare plant survey identified several recommended reroutes within the 200-foot corridor, and a 2011 early season survey could be conducted so that rare plants identified at that time could also be avoided. Impacts to riparian zones, forest seeps and rare plants would be short-term, adverse, negligible and indirect.

Cliff top habitat would be impacted by trail construction only along two short segments that access the cliff edge without traveling along it, resulting in a local, long-term, adverse, minor, impact to globally rare cliff top communities.

Once proposed trails are constructed, it can be expected that invasive plants would spread along them through transport by trail users, which could result in long-term, direct, minor to moderate impacts to the native flora. However, treatment of invasive plant species is also proposed under Alternative B, "New Route Single Track Trail Construction." The effectiveness of mechanical control methods are limited to generally small woody exotics (multiflora rose, wineberry, tree-of-heaven, etc.) and a few forbs such as garlic mustard, but not an effective means for controlling Japanese knotweed, Japanese stiltgrass and most other forbs. In addition, mechanical pulling of woody stems is limited to trees less than 4 inches DBH. Ground disturbance associated with the invasive plant treatment actions could result in short-term, minor adverse impacts to native plant species. However, there would be long-term beneficial impacts that result from the removal of invasives from the Craig Branch area.

Alternative B, "New Route Single Track Trail Construction," also proposes to rehabilitate dozens of miles of existing informal routes, including OHV trails and logging roads, by de-compacting soils and raking duff onto disturbed areas to facilitate natural regeneration. Effective rehabilitation of these existing routes would be critical to the long-term sustainability of the diverse forest vegetation community in the Craig Branch area by substantially reducing erosion, restoring forest structure and establishing continuous ground cover. Because of the ground disturbance associated with rehabilitation, short- to long-term, minor adverse impacts would result to vegetation for several years. However, there would be long-term beneficial impacts that result from rehabilitation of existing routes.

Construction of the trail system would permanently remove vegetation from the area of the trail tread. Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar local, long-term, negligible, indirect impact on vegetation and rare plant communities to the impacts discussed for allowing bicycle use on existing park trails and administrative roads.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Approximately 33 miles of new trail would be constructed within the 3,500 acres of the Garden Ground area, which contains 11 plant communities, the park's only old growth forest, the largest segment of river to rim unfragmented forest in the park, and four globally rare plant communities.

Segments of the proposed trail system may approach several of the area's globally rare plant communities, though the communities are largely avoided. Where vistas are available along the trail, short trail segments may cross through cliff top communities in order to reach the cliff at one point, but these trails would not be constructed parallel to the cliff line, minimizing the impacts to these plant

communities as much as possible. Adverse impacts on globally rare plant communities in the Garden Ground area are expected to be local, long-term, minor and direct.

Proposed trail segments that encounter rare plants would be rerouted to avoid them; the 2010 late season rare plant survey conducted on the 12 miles of proposed trail segments in the Terry Top area did not identify any rare plants. Based on the diversity of habitats, unfragmented rim to river forests, forest seeps, riparian zones and rare plant communities, rare plants are likely to be discovered during subsequent surveys, but because they would be avoided during trail design and through design reroutes prior to construction, impacts could be short-term, adverse, negligible and indirect.

Once proposed trails are constructed, it can be expected that invasive plants would spread along them through transport by trail users, which could result in long-term, direct, minor to moderate impacts to the native flora. However, treatment of invasive plant species is also proposed under Alternative B, "New Route Single Track Trail Construction." The effectiveness of mechanical control methods are limited to generally small woody exotics (multiflora rose, wineberry, tree-of-heaven, etc.) and a few forbs such as garlic mustard, but not an effective means for controlling Japanese knotweed, Japanese stiltgrass and most other forbs. In addition, mechanical pulling of woody stems is limited to trees less than 4 inches DBH. Ground disturbance associated with the invasive plant treatment actions could result in short-term, minor adverse impacts to native plant species. However, there would be long-term beneficial impacts that result from the removal of invasives from the Garden Ground area.

Any rehabilitation of existing informal routes that occurs to deter this prohibited use in the project area would include de-compacting soils and raking duff onto disturbed areas to facilitate natural regeneration. Effective rehabilitation of informal routes would promote the long-term sustainability of vegetative communities in the Garden Ground area by reducing erosion, restoring forest structure, establishing continuous ground cover and preventing further damage to these areas by continued OHV use. Because of the ground disturbance associated with rehabilitation, short- to long-term, minor adverse impacts would result to vegetation for several years. However, there would be long-term beneficial impacts that result from rehabilitation of existing routes.

Construction of the trail system would permanently remove vegetation from the area of the trail tread. Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar local, long-term, negligible, indirect impact on vegetation and rare plant communities to the impacts discussed for allowing bicycle use on existing park trails and administrative roads.

**Cumulative Impacts.** In the Craig Branch area, a history of repeated logging and unregulated OHV use on the property before NPS acquisition left the property fragmented with uneven aged young forests intermixed with invasive plants except in the cliff top communities. NPS law enforcement efforts to stop OHV use have been challenging, as evidenced by continued use. The elimination of OHVs and the control of invasive plants pose a long term challenge for management. Property adjacent to the Garden Ground area was recently purchased by the BSA from previous owners who had conducted resource extraction activities, both timber and coal, for many years, including the NPS Garden Ground project area prior to acquisition by the NPS. Portions of the project area were mined for coal and the land left abandoned, while other sections of mined land in the project area above Terry was reclaimed in the late 1980s with exotic plants. With the large BSA development being constructed immediately adjacent to the Garden Ground area and developing it as an outdoor recreation center, access of OHVs to the Garden Ground area should be substantially reduced in the future. Invasive plants would remain a major concern in the Terry Top area and along mine benches throughout the project area. With the BSA immediately adjacent to the Garden Ground area and new multiple stacked loop trails being proposed under this alternative, use of the new trails could be heavy, which could lead to increase disturbance to vegetation, rare plant communities and likely serve as vectors facilitating the spread of invasive plants, adversely impacting previously undisturbed forest interior native vegetation. However, the reduction in use of the area by OHVs through rehabilitation and removal of the informal routes they use should help reduce cumulative impacts to vegetation, soils and spread of invasive plants. Multiple stacked loop trails are proposed in or near rare cliff habitats, forested seeps and riparian zones, thus contributing to disturbance to these globally rare habitats more than if the stacked loop concept were abandoned for a single loop trail that would stay closer to the BSA property line, avoiding forest seeps and cliff top communities while moving the lower trail upslope to avoid riparian habitats. Some trails under this proposal are planned along existing old

roads (i.e. the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails), which have reclaimed naturally after decades of inactivity and contain rare plant communities and habitat for rare plants. Opening these features to new trails and increased visitor use has the potential to adversely impact rare flora.

The impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with past and current land management practices would result in a cumulative local, long-term, negligible, indirect impact on globally rare plant communities along existing trails and administrative roads proposed for conversion to bike use. Impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with past and current land management practices on rare plants and globally rare plant communities could result in cumulative local, long-term, minor, direct impacts in the Craig Branch area. Alternative B, "New Route Single Track Trail Construction," proposed in the Garden Ground area would contribute adverse impacts to globally rare cliff top communities and forest seep communities that would be localized, long-term, moderate and direct. Alternative B, "New Route Single Track Trail Construction," could contribute noticeable adverse impacts in Craig Branch (cliff top), Garden Ground (cliff top, forest seeps and riparian communities) and Panther Branch (riparian and flatrock) communities to the total cumulative impacts on globally rare plant communities.

**Conclusion.** In an effort to minimize impacts of Alternative B, "New Route Single Track Trail Construction," on rare plants, rare plant surveys are included in the actions proposed, recommended for both early and late growing seasons, prior to trail construction in order to account for trail rerouting to avoid rare plants. Under this alternative, impacts to globally rare plant communities could be local, long-term, minor, direct and adverse in the Garden Ground area. Impacts to globally rare plant communities in the Craig Branch area would be local, long-term, minor and adverse, while they would be local, long-term, minor, adverse and indirect for the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails. Conversion of some trails and administrative roads to bike use would result in local, long-term, negligible, indirect adverse impacts on rare plant communities.

### 4.3.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Vegetation

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction."

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Trail construction of approximately 4.5 miles would utilize former logging roads in forests disturbed by logging during the past decade. Conversion of these roads to trails would result in the clearing of a five-foot corridor of understory woody vegetation along the proposed trail routes. No new trail construction would occur within the interior of either the mixed forest with hemlock, oak, hickory and patches of rhododendron understory, or the mature second growth mixed hardwood forest.

Under Alternative C, "Existing Disturbance Single Track Trail Construction," no trails would be proposed in the area north of the administrative road; therefore, no rare cliff top plant communities would be impacted. The riparian forest along Craig Branch and Butcher Branch would be avoided by trail construction, and forest seeps would be protected. Trail routes through these rare plant communities would be limited to ephemeral stream crossings that maintain wetland hydrology (bridges would be preferred over culverts). If chosen, rare plant surveys could be conducted along the proposed new trail routes in order to avoid any identified rare plants during construction. Alternative C, "Existing Disturbance Single Track Trail Construction," could have a local, long-term, indirect, beneficial impact to rare plants and globally rare plant communities.

Because the rehabilitation of existing informal routes, including user-created OHV routes and old roads, not converted to trails and the treatment of invasive plants proposes the same action under both Alternative B, "New Route Single Track Trail Construction," and Alternative C, "Existing Disturbance Single Track Trail Construction," impacts related to these actions would be the same in the Craig Branch area. In both instances, ground disturbance associated with the invasive plant treatment actions could result in short-term, minor adverse impacts to native plant species. However,

there would be long-term beneficial impacts that result from the rehabilitation of existing roads and OHV tracks and removal of invasives.

Construction of the trail system would permanently remove vegetation from the area of the trail tread. Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar local, long-term, negligible, indirect impact on vegetation and rare plant communities to the impacts discussed for allowing bicycle use on existing park trails and administrative roads (see Section 4.3.3).

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Approximately 45 miles of new trail would be constructed within the 3,500 acres of the Garden Ground area, which contains 11 plant communities, the park's only old growth forests, the largest segment of rim to river unfragmented forest in the park, and four globally rare plant communities.

Segments of these trails, constructed as much as possible withing the existing disturbed areas of informal routes, including old logging roads, mine benches and user-created OHV routes, could traverse the area's globally rare plant communities, including as many as two stands of the Chinquapin Oak-Black Maple Forest (0.2 miles of trail), 21 stands of the Cliff Top Virginia Pine Forest (0.95 miles of trail), ten stands of the Eastern Hemlock-Chestnut Oak/Catawba Rhododendron Forest (0.5 miles of trail) and three stands of the Forest Seep community (0.6 miles of trail). Most of these plant communities are currently inaccessible, but the proposed new trails would increase access and recreational use within them, possibly introducing new threats of trampling or invasive introduction. If all of these communities are encountered in an effort to keep the trail on existing informal routes, then the project could have a local, long-term, moderate, direct, adverse impact to forest seeps, cliff top Virginia pine, and Eastern Hemlock-Chestnut Oak/Catawba Rhododendron rimrock communities.

Proposed trail segments that encounter individual rare plants would be rerouted to avoid them; the 2010 late season rare plant survey conducted on the 12 miles of proposed trail segments in the Terry Top area did not identify any rare plants. Based on the diversity of habitats, unfragmented rim to river forests, forest seeps, riparian zones and rare plant communities, rare plants are likely to be discovered during subsequent surveys, but because they would be avoided during trail design and through design reroutes prior to construction, impacts could be short-term, adverse, negligible and indirect.

Because the rehabilitation of existing informal routes, including user-created OHV routes and old roads, not converted to trails and the treatment of invasive plants proposes the same action under both Alternative B, "New Route Single Track Trail Construction," and Alternative C, "Existing Disturbance Single Track Trail Construction," impacts related to these actions would be the same in the Garden Ground area. In both instances, ground disturbance associated with the invasive plant treatment actions could result in short-term, minor adverse impacts to native plant species. However, there would be long-term beneficial impacts that result from the rehabilitation of existing roads and OHV tracks and removal of invasives.

Construction of the trail system would permanently remove vegetation from the area of the trail tread. Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar local, long-term, negligible, indirect impact on vegetation and rare plant communities to the impacts discussed for allowing bicycle use on existing park trails and administrative roads (see Section 4.3.3).

**Cumulative Impacts.** Cumulative impact analysis for Alternative B, "New Route Single Track Trail Construction," and Alternative C, "Existing Disturbance Single Track Trail Construction," is largely the same regarding prior logging and continued OHV use in the Craig Branch Area, impacts of the purchase by the BSA and development of an outdoor recreation center adjacent to the Garden Ground project area, development of the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and opening of existing trails and administrative roads to bicycle use.

The impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with past and current land management practices would result in a cumulative local, long-term, negligible, indirect adverse impact on globally rare plant communities along existing trails and administrative roads proposed for conversion to bike use, while the proposed new Mud Turn and Panther Branch Connector Trails would result in local, long-term, minor, indirect adverse impacts.

Impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with past and current land management practices on rare plants and globally rare plant communities could result in cumulative local, long-term, negligible, indirect, beneficial impacts in the Craig Branch area. Alternative C, "Existing Disturbance Single Track Trail Construction," proposed in the Garden Ground area could contribute adverse impacts to globally rare cliff top communities and forest seep communities that would be localized, long-term, moderate and direct. Alternative C, "Existing Disturbance Single Track Trail Construction," would contribute beneficial impacts in Craig Branch (cliff top and forest seeps), but noticeable adverse impacts in Garden Ground (cliff top, forest seeps and riparian communities) and Panther Branch (riparian and flatrock communities) to the total cumulative impacts on globally rare plant communities.

**Conclusion**. In an effort to minimize impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," on rare plants, rare plant surveys are included in the actions proposed under this alternative, prior to trail construction in order to account for trail rerouting to avoid rare plants. Under this alternative, impacts to globally rare plant communities could be local, long-term, moderate, direct and adverse in the Garden Ground area. Impacts to globally rare plant communities in the Craig Branch area would be local, long-term, negligible and beneficial.

### 4.3.5 Comparison of the Alternatives – Impacts to Vegetation

**Bicycle Use on Existing Trails and Administrative Roads.** Because hiking use of trails and roads would continue, with no increase in disturbance to plants anticipated, and bicycle use would not be allowed, a local, long-term, negligible, indirect impact would be expected on rare plants and rare plant communities under Alternative A, the No Action Alternative. Under both action alternatives, the addition of biking to the selected existing trails and administrative roads would likely have a local, long-term, negligible, indirect, adverse impact on vegetation and rare plant communities.

**Mud Turn, Panther Branch and Brooklyn Mine Connector Areas.** Because no new trail construction would occur under Alternative A, the No Action Alternative, globally rare communities in these areas would be protected from increased visitor use, resulting in local, long-term, negligible, indirect impacts on rare plants and rare plant communities. Both action alternatives propose construction of the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails on existing abandoned roads; impacts to vegetation resources would likely be localized, long-term, minor and indirect.

**Craig Branch Area.** Alternative A, the No Action Alternative, would include no trail construction, no rehabilitation of existing routes or treatment of invasives and could result in some continued OHV use of the Craig Branch area. Impacts to rare plants and rare plant communities would be local, long-term, minor, direct and adverse. Alternative B, "New Route Single Track Trail Construction," would include construction of about 11 miles of new trail, clearing of about 11 acres of forest understory, as well as the rehabilitation of existing routes and likely deterrence of continued OHV use through the rehabilitation and removal of existing informal user-created routes. Impacts to native plants from rehabilitation and invasive treatment would be long-term and beneficial, while impacts to rare plants would be short-term, adverse, negligible and indirect, and impacts to globally rare cliff top communities would be local, long-term, minor and adverse. Alternative C, "Existing Disturbance Single Track Trail Construction," would include construction of approximately 4.5 miles of new trail by converting existing logging roads, clearing of a five-foot corridor of understory woody vegetation. Alternative C, "Existing Disturbance Single Track Trail Construction," could have a local, long-term, indirect, beneficial impact to rare plants and globally rare plant communities because new trail construction would only occur in the previously logged section of the project area. Impacts regarding rehabilitation and invasive treatment would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction," as under Alternative B, "New Route Single Track Trail Construction."

**Garden Ground Area.** Alternative A, the No Action Alternative, would include no trail construction, no treatment of invasives or rehabilitation of existing informal routes, and could result in some continued OHV use of the Garden Ground area. Impacts to globally rare plant communities would be local, long-term, minor, indirect and adverse. Alternative B, "New Route Single Track Trail Construction," would include construction of about 33 miles of new trail, resulting in minor local, long-term, direct adverse impacts to globally rare plant communities. Alternative B, "New Route Single

Track Trail Construction, would include invasive treatment and rehabilitation of existing informal routes, resulting in long-term, beneficial impacts for native vegetation. Impacts regarding rehabilitation and invasive treatment would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction, as under Alternative B, "New Route Single Track Trail Construction." Alternative C would include construction of about 45 miles of new trail, resulting in moderate local, long-term, direct adverse impacts to globally rare plant communities.

## 4.4 Wildlife and Habitat

### 4.4.1 About the Analysis

**Applicable Regulations and Guidelines.** Federal laws, regulations and NPS policies related to wildlife and its habitat include the following:

- Endangered Species Act of 1973, as amended
- Bald and Golden Eagle Protection Act
- Migratory Bird Treaty Act
- Lacey Act
- National Park Service Management Policies 2006

**Methodology and Assumptions.** Potential impacts to wildlife and its associated habitat are identified in relation to the proposed project and the anticipated use of the trails proposed for construction, proposed for conversion or already existing. The analysis is focused on species known to occur in the park and on species known to use the habitat types that occur in the project areas. Wildlife surveys within the park have identified the presence of specific species within the groups analyzed: federally-listed threatened and endangered species, including non-listed bats, Allegheny woodrats, amphibians and neotropical migratory birds. Potential impacts to these species are based on available scientific literature and the professional judgment of park staff.

A general analysis is presented for applicable groups where the analysis is based on the following of certain design and construction constraints described in Chapter 2. Specific group analysis is presented for an area where its circumstances are unique. The assessment of impacts assumes that the mitigation measures and design constraints described in Chapter 2 are incorporated.

**Neotropical Migratory Birds (Craig Branch and Garden Ground Areas).** To assess the effects that new and/or existing trails (and roads) would have on forest-interior birds in the project areas, two key factors were analyzed. One was the amount of area directly influenced by the trail's presence and use. The second was the amount that the trails would divide the forest into smaller blocks. These analyses are based on the research summarized in Section 3.4.

To analyze the expected impacts that the proposed stacked loop trails would have on the area-sensitive bird species of the area, the estimated minimum area requirements for breeding as reported by Robbins et al. (1989; Table 4-2) were compared with the sizes of the forest blocks that would remain after the construction of the proposed trails. This analysis was also applied to the existing informal routes (user-created OHV trails and logging roads) for Alternative A, the No Action Alternative. Forest blocks were determined by applying the proposed trail network to the area, and buffering the trails with a 75 meter (246 foot) zone on each side of the trails (hence 150 meters total width); this buffer area represents the zone of influence of the trail on forest interior bird species (Figures 4-1 through 4-12; Table 4-3). In the study by Robbins et al. (1989), forest tracts were identified as distinct if having 100 meters or more separation from adjacent forest tracts. So although the "fragmentation by trail use" being considered in this analysis is not completely analogous to the physical fragmenting features from the Robbins et al. (1989) study, the analysis using breeding bird area requirements is valuable in determining which bird species are most likely to be adversely affected by the proposed project. This analysis also aids in determining which bird species may have limited breeding opportunities in the project areas from currently existing features. For Alternative A, the No Action Alternative, existing roads, trails, and user-created OHV routes were analyzed. For the action alternatives, existing roads, existing trails, and proposed trails were analyzed, but user-created OHV routes were not since it was assumed

that they would be reclaimed or barricaded from usage. For the bird analysis, the 550-acre Craig Branch project tract was extended toward the river to utilize a physical barrier (the mine bench trail) as an outer boundary rather than an arbitrary map line. The resultant tract size analyzed was 789 acres.

**Table 4-2. Minimum Breeding Area Requirements of Neotropical Migratory Bird Species Considered in the Analysis**

| Species | Minimum Breeding Area (acres) |
|---|---|
| Black-throated blue warbler | 2,471.1 |
| Cerulean warbler* | 1,729.7 |
| Northern parula | 1,284.9 |
| Canada warbler* | 988.4 |
| Louisana waterthrush* | 864.9 |
| Black-and-white warbler | 543.6 |
| Worm-eating warbler* | 370.7 |
| Veery | 49.4 |
| Kentucky warbler* | 42.0 |
| Acadian flycatcher* | 37.1 |
| Blue-gray gnatcatcher | 37.1 |
| Scarlet tanager | 29.7 |
| Ovenbird | 14.8 |
| Red-eyed vireo | 6.2 |
| Wood thrush* | 2.5 |
| Rose-breasted grosbeak | 2.5 |
| Great crested flycatcher | 0.7 |

*Asterisks (*) indicate bird species that are on the park's Species of Management Concern List. All shown species breed in the park. Data is from Robbins et al. (1989).*

**Impact Intensity.** Wildlife and habitat impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Management actions would result in impacts on wildlife that would be so slight that they would not be of any measurable or perceptible consequence to the species' population.

**Minor.** Management actions would result in a detectable effect that would be localized, small and of little consequence to the species' population.

**Moderate.** Management actions would result in a clearly detectable effect that would be localized, with consequences at the population level.

**Major.** Management actions would result in an obvious detectable effect that would have substantial consequences to wildlife populations at the regional level. The change could result in severely adverse and possible permanent consequence upon the species.

**Duration, Short-Term.** The impact would be temporary, lasting one year or less, such as impacts associated with construction.

**Duration, Long-Term.** The impact would last more than one year and could be permanent in nature. Although an impact may only occur for a short duration at one time, if it occurs regularly over time the impact may be considered to be a long-term impact.

### 4.4.2 Alternative A – No Action Alternative: Impacts to Wildlife and Habitat

**Federally-Listed Threatened and Endangered Species, Including Non-listed Bats.** The Indiana bat and Virginia big-eared bat are federally-listed endangered species which occur in the park. This analysis includes non-listed bat species as well, because of the similarity in habitat needs.

Under Alternative A, the No Action Alternative, some prohibited OHV use could continue in the Craig Branch area because of the difficulty of enforcing the use and because the informal routes being used would not be rehabilitated, and to a less concentrated extent in the Garden Ground area. If this ongoing disturbance has prevented bats from using any roost trees, the situation would most likely continue. With the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails not being constructed, no disturbance to bats would be expected. Existing trails would remain designated for hiking, and no additional disturbance to bats would be expected. If current management were continued, then a local, long-term, indirect, negligible impact would be expected on federally-listed threatened and endangered species, including non-listed bats.

**Bicycle Use on Existing Trails and Administrative Roads.**

**Allegheny Woodrats.** Hiking use itself on the existing trails and roads is not known to have any adverse affects on the woodrats or their habitat, although discarding food along trails can. See the Cumulative Impacts paragraph in this section (Section 4.4.2) and Section 3.4.5 under Allegheny Woodrats for a discussion on how the existence of these trails and roads on mine benches could impact woodrats. Under this alternative, a local, long-term, indirect, negligible impact on Allegheny woodrats would be expected on woodrats along existing trails and administrative roads.

**Amphibians.** If trails continue with designation as hiking only, then increased disturbance to amphibians by bikes going through standing water would not occur. If current management were continued, then a local, long-term, indirect, negligible impact would be expected on amphibians on existing trails and administrative roads.

**Neotropical Migratory Birds.** Hiking use of trails and roads would continue, with no increase in disturbance to area-sensitive birds anticipated. If current management were continued, then a local, long-term, indirect, negligible impact would be expected on neotropical migratory birds on existing trails and roads.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.**

**Allegheny Woodrats.** With trails not being constructed for the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, woodrat habitat should not be affected.

**Amphibians.** With trails not being constructed for the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and little use of these areas currently occurring, amphibians should experience no appreciable disturbance. If current management were continued, then a local, long-term, indirect, negligible impact would be expected on amphibians in these areas.

**Neotropical Migratory Birds.** With trails not being constructed for the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and little use of these areas currently occurring, area-sensitive birds should experience no appreciable disturbance. If current management were continued, then a local, long-term, indirect, negligible impact would be expected on neotropical migratory birds in the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector areas.

**Craig Branch Area.**

**Amphibians.** Because some OHV use could continue in the Craig Branch area, breeding pools and wetlands in the area may continue to see disturbance, thereby reducing amphibian productivity. OHVs traveling through breeding pools disrupt breeding adults and result in direct

mortality of adults, eggs and young. If current management were continued, then a local, long-term, indirect, minor adverse impact would be expected on amphibians in the Craig Branch area.

**Neotropical Migratory Birds.** Because some OHV use could continue, the Craig Branch area may maintain the degree of fragmentation of the forest, both by the heavy disruptive use and by maintaining the physical openings in the forest. An analysis of the existing OHV trails and administrative road on the 789 acres of the Craig Branch area demonstrates that area-sensitive birds' use of the area as breeding habitat is limited by the use of the existing features (Figures 4-1 and 4-2). Large contiguous forest blocks are desirable as breeding habitat for area-sensitive neotropical migratory birds. The user-created OHV routes and Craig Branch Trail/Administrative Road divide the area into eight smaller forest blocks that are greater than one acre. The Veery could utilize two, possibly three, of these blocks for breeding habitat, and four other area-sensitive species could utilize four blocks (Kentucky warbler, Acadian flycatcher, Blue-gray gnatcatcher and scarlet tanager, as well as birds with smaller area needs; Table 4-2). Although these species can utilize the smaller blocks, the forest area that is available without disturbance by trails or roads is limited. Of the 789 acres, 473 acres, representing 60 percent of the project area, are within 75 meters of trails or roads and therefore subject to disturbance, edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). To understand what area-sensitive bird species are currently unable to use the area as breeding habitat that otherwise could, comparison can be made based on assuming that all user-created OHV routes were reclaimed and only the existing roads divided the tract. The resultant two forest blocks would then be 648 acres and 81 acres. The Worm-eating warbler and Black-and-white warbler would then potentially be able to use the 648 acre block as breeding habitat (Table 4-2). Thus two neotropical bird species are excluded from using the project area for breeding due to the fragmenting informal routes. If current management were continued, then a local, long-term, indirect, moderate adverse impact would be expected on neotropical migratory birds in the Craig Branch area.

**Figure 4-1. Craig Branch Area (No Action Alternative): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

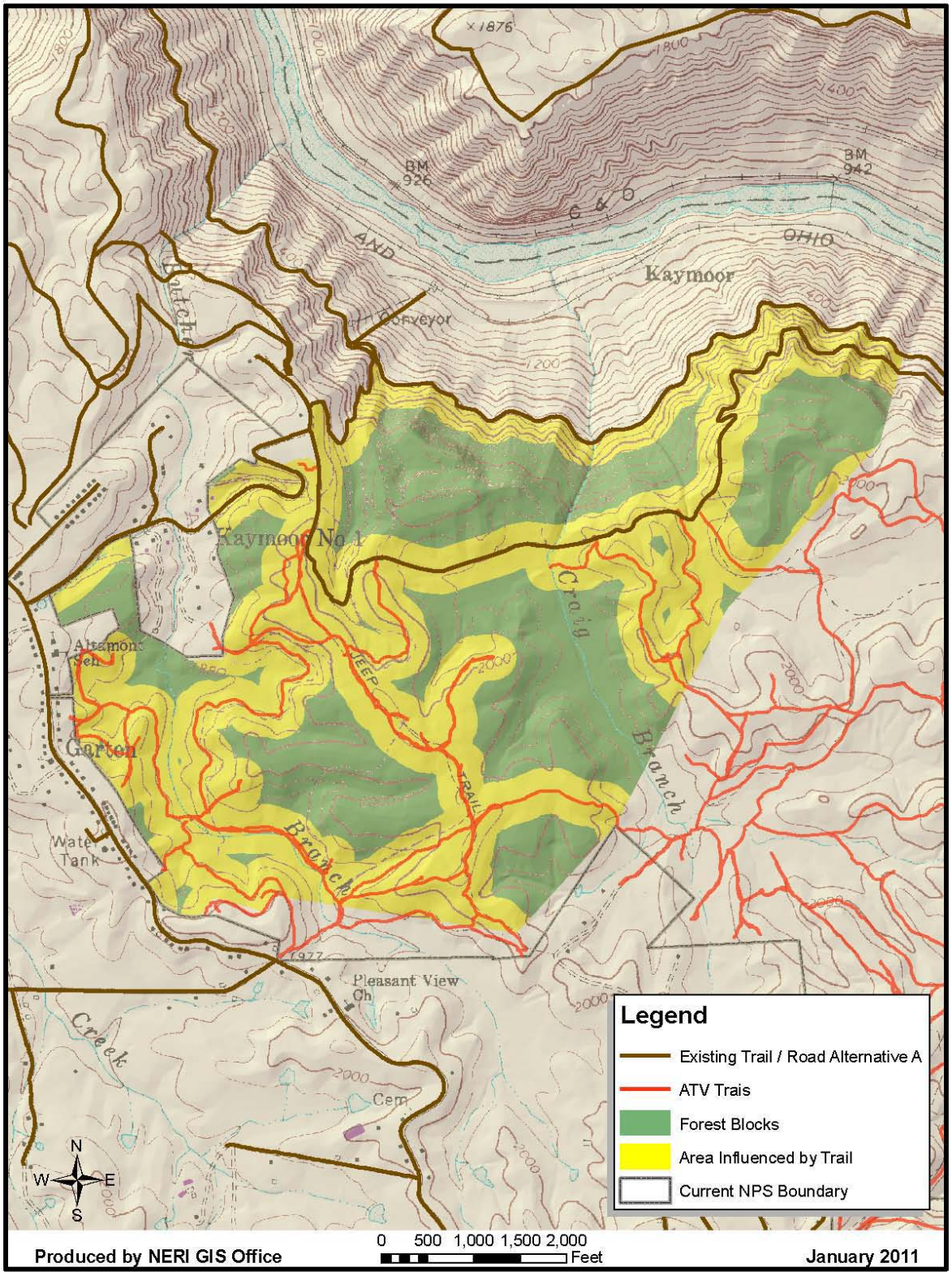
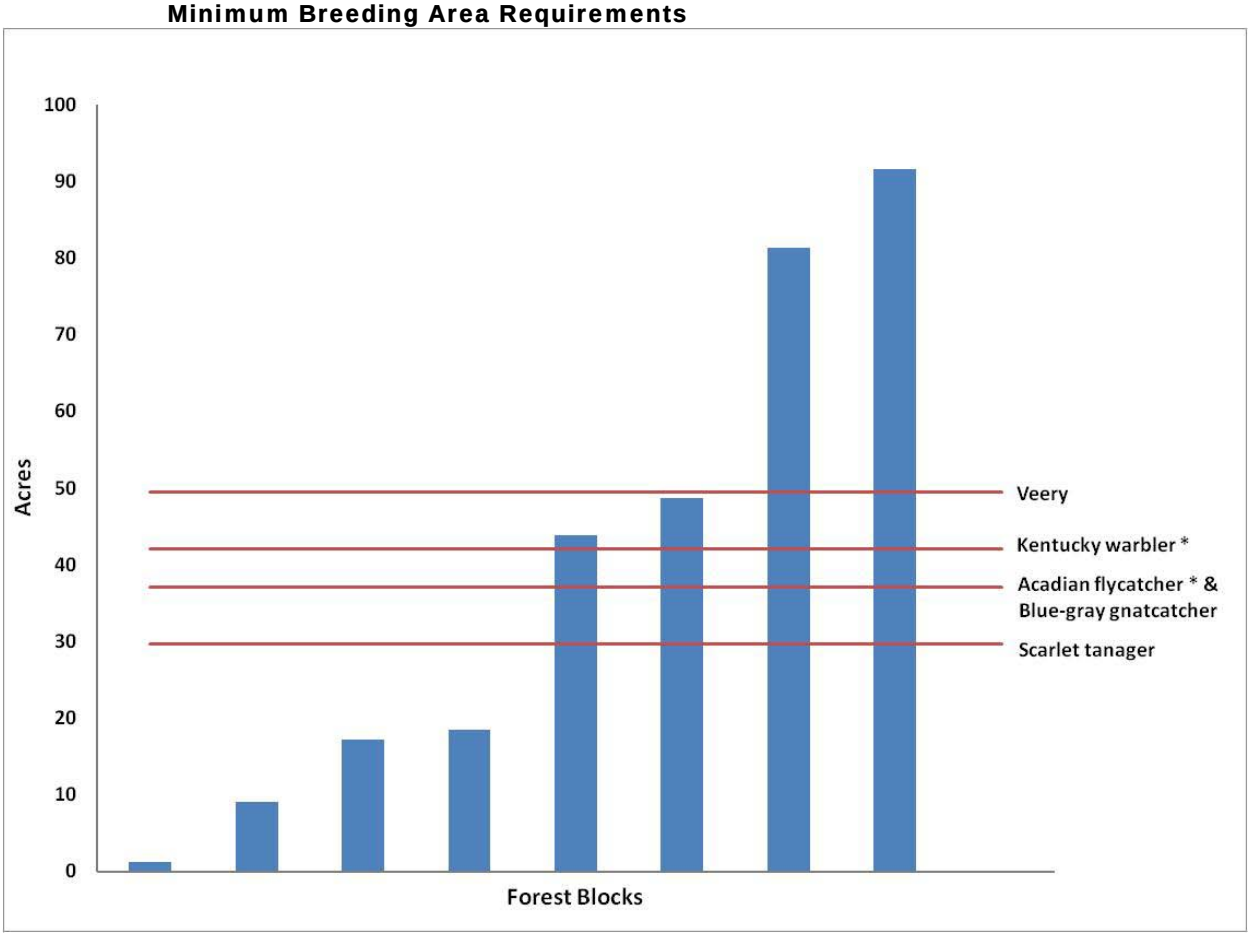


**Figure 4-2. Craig Branch Area (No Action Alternative): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (eight shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Garden Ground Area.**

**Allegheny Woodrats.** In the Garden Ground area, trails are limited and informal routes are not known to traverse woodrat habitat. Therefore, a local, long-term, indirect, negligible impact would be expected on Allegheny woodrats in the Garden Ground area.

**Amphibians.** Because some OHV use could continue in the Garden Ground area, and breeding pools and wetlands in the area would continue to see disturbance, thereby reducing amphibian productivity in those localized sections. OHVs traveling through breeding pools disrupt breeding adults and result in direct mortality of adults, eggs, and young. If current management were continued, then a local, long-term, indirect, minor adverse impact would be expected on amphibians in the Garden Ground area.

**Neotropical Migratory Birds.** Because some OHV use could continue in some parts of the Garden Ground area, there could be localized fragmentation by use to area-sensitive bird species. An analysis of the existing roads, trails, and informal routes in the Garden Ground area shows the forest being divided into four forest blocks (Figures 4-3 and 4-4). All analyzed neotropical migratory bird species (Table 4-2) could potentially utilize the forest block that measures over 2,500 acres. Of the 3,500 acres in the Garden Ground area, 551 acres, representing 16 percent of the project area, are within 75 meters of trails or roads and therefore subject to disturbance,

edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). If current management were continued, then a local, long-term, indirect, minor adverse impact would be expected on neotropical migratory birds in the Garden Ground area.

**Figure 4-3. Garden Ground Area (No Action Alternative): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

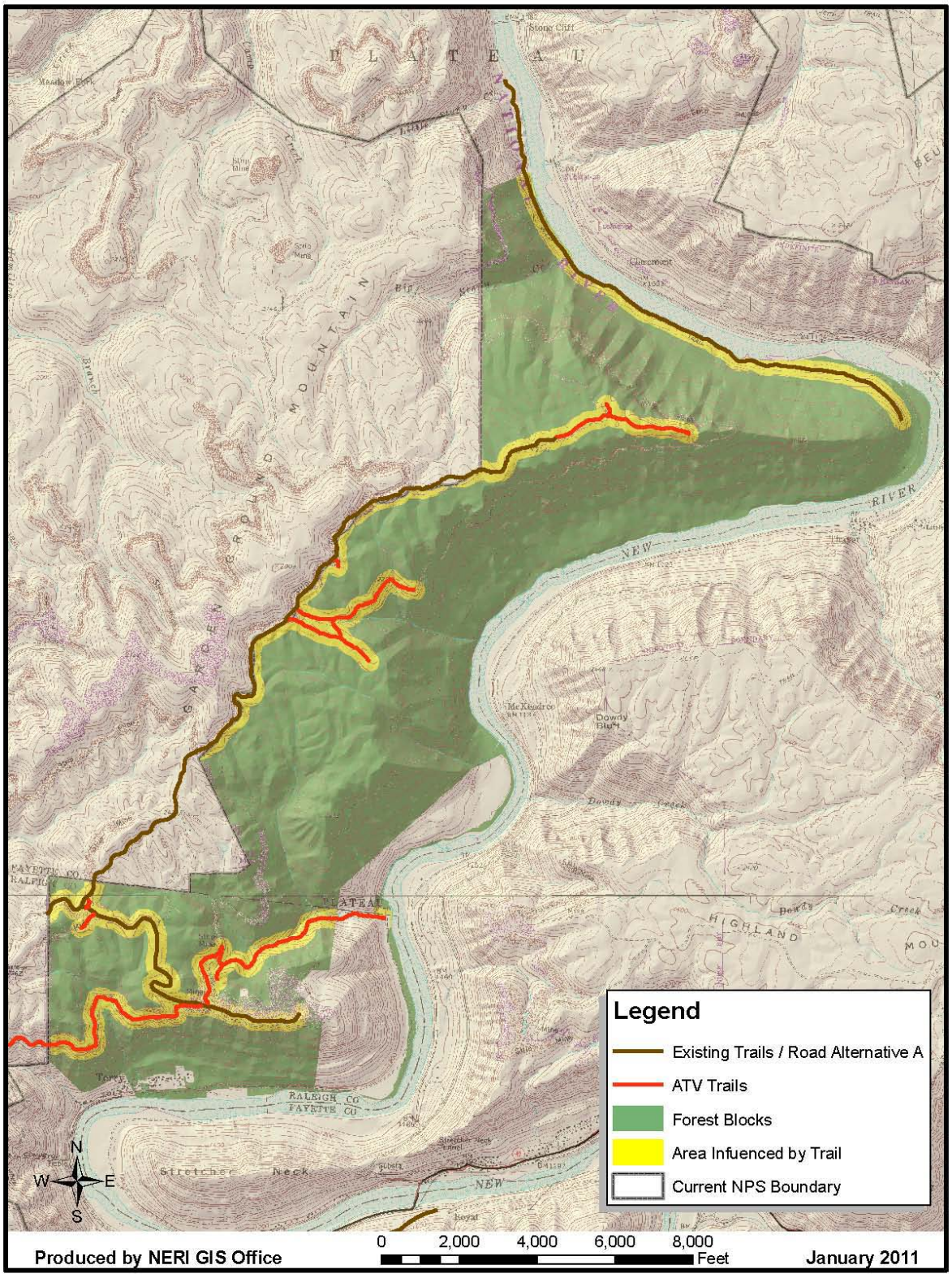
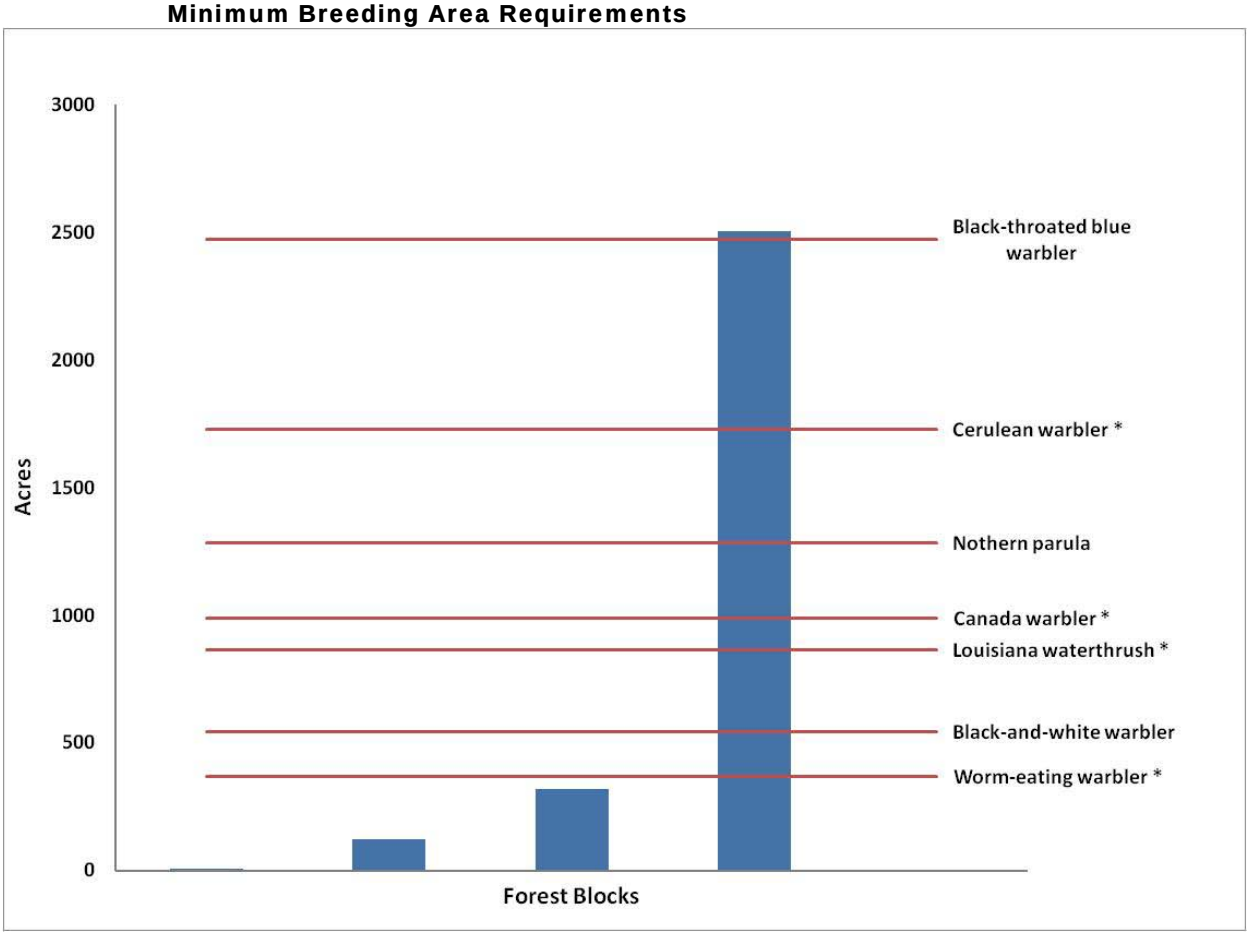


**Figure 4-4. Garden Ground Area (No Action Alternative): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (four shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Cumulative Impacts.** In the Craig Branch area, a history of logging and OHV use on the property before it was acquired by NPS left the property fragmented. Stopping the traditional OHV use of the area has been challenging. The Garden Ground area also has a history of being logged, and some OHV use. With the BSA purchasing land and constructing a facility adjacent to the Garden Ground area, access of OHVs to the NPS Garden Ground projects area should be substantially reduced in the future. Reduction of OHVs in the Garden Ground area should reduce disturbances to Allegheny woodrats, amphibians and neotropical migratory birds in the area. Existing trails in the Garden Ground area are limited, so although the BSA facility being adjacent would prompt predictions of increased use at Garden Ground, if trails are not constructed under this alternative, then there may not be substantial increased use of the area. Numerous trails and administrative roads in the park are situated on mine benches. These trails and roads act as corridors for predators of Allegheny woodrats, passing along the high walls and boulder fields associated with the benches and which serve as woodrat habitat. In addition to increasing direct predation risk, it increases the potential for the woodrats to be exposed to raccoon roundworm, which is fatal to woodrats. Impacts of Alternative A, the No Action Alternative, in conjunction with the impacts of past, present and reasonably foreseeable future actions would result in a cumulative long-term minor adverse impact on amphibians in Craig Branch area, a cumulative long-term moderate adverse impact on birds in Craig Branch area, a cumulative long-term moderate adverse impact on Allegheny woodrats on mine benches with existing trails or roads, and a cumulative long-term negligible impact on other wildlife in all project areas.

Alternative A, the No Action Alternative, would contribute a noticeable adverse impact in Craig Branch (birds) to the total cumulative impact and an imperceptible impact otherwise to the total cumulative impact.

**Conclusion.** If current management were continued, then negligible, minor and moderate impacts would be expected. Local, long-term, indirect, negligible impacts would be expected on federally-listed threatened and endangered species, including non-listed bats, for all project areas. For the Allegheny woodrat a local, long-term, indirect, negligible impact is expected for all project areas. Because trails would not be constructed for the proposed Mud Turn and Panther Branch Connector Trails and existing trails and administrative roads would not be converted to bike use, local, long-term, indirect negligible impacts would also be expected for amphibians and neotropical migratory birds in these project areas. Due to prohibited OHV use, local, long-term, indirect, minor adverse impacts could be expected on amphibians in the Craig Branch and Garden Ground areas. The OHV use in these areas would also cause an expected local, long-term, indirect, moderate adverse impact to neotropical migratory birds in the Craig Branch area, and a local, long-term, indirect, minor adverse impact to neotropical migratory birds in the Garden Ground area. With the construction of BSA facilities adjacent to the Garden Ground area, but no additional trails to be constructed under this alternative, the OHV access to Garden Ground should decrease, thus lessening the anticipated impact to woodrats, amphibians and neotropical migratory birds in this area. The anticipated impacts in the Craig Branch area would remain: a cumulative long-term, minor adverse impact on amphibians and a cumulative, long-term, moderate adverse impact on neotropical migratory birds. For existing trails and administrative roads that occur on mine benches, a cumulative, long-term, moderate adverse impact on Allegheny woodrats would be expected. For the other project areas and wildlife, a cumulative, long-term, negligible impact would be expected. Alternative A, the No Action Alternative, would contribute a noticeable adverse impact in Craig Branch (birds) to the total cumulative impact and an imperceptible impact otherwise to the total cumulative impact.

### 4.4.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Wildlife and Habitat

**Federally-listed Threatened and Endangered Species, Including Non-listed Bats.** The Indiana bat and Virginia big-eared bat are federally-listed endangered species which occur in the park. This analysis includes non-listed bat species as well, because of the similarity in habitat needs.

Based on mitigation measures for the protection of wildlife species during new trail design and construction, as well as for visitor safety described in Sections 2.5 and 2.6, actions would be taken regarding the protection of bat species, including tree cutting restrictions, proposed trail reroutes and installation of gates over mine portals that allow for movement of wildlife but not humans in and out of the openings. It is estimated that up to ten trees greater than or equal to five inches DBH per mile of newly constructed trail would need to be removed to accommodate a sustainable alignment of the trails. Under Alternative B, "New Route Single Track Trail Construction," it is estimated that approximately 415 trees would be removed (eight miles of trail in the Craig Branch area not constructed on existing roads, about 33 miles of trail in the Garden Ground area and 0.5 miles for the proposed Mud Turn Trail).

Although no Indiana bat nursery colony trees have been identified within the park, it is possible that the trail may be unknowingly constructed in the vicinity of one. In the wildlife habitat review, any tree identified as having a high potential to be an Indiana bat nursery colony tree would prompt a trail re-route.

The effects of constructing trails in areas likely used in some capacity by Indiana bats and other bat species, and having a trail be constructed in the vicinity of a mine portal are likely to have local, long-term, indirect, negligible impacts on federally-listed threatened and endangered species, including non-listed bats. Effects would be indirect, because it is the use of the trail, not its presence that could potentially affect bats. With any area mine portal gated, there would be minimal interaction between visitors and bats using the mine.

If the wildlife habitat survey misses the presence of an Indiana bat nursery colony tree and a trail is placed close enough to disrupt the future use of the tree by Indiana bats (or other bat species), then

the action could have local, short-term, indirect, minor adverse impacts on federally-listed threatened and endangered species, including non-listed bat species. Even daytime use of a trail placed too close to an Indiana bat maternity colony can disrupt the mothers and young, causing abandonment of the roost. It is anticipated that abandonment of a maternity roost tree would be a temporary effect, as the bats would likely switch to an alternate site in the future.

**Bicycle Use on Existing Trails and Administrative Roads.** The wildlife issue to be considered in converting the allowed uses of existing trails and administrative roads from hiking only to hiking and biking is whether biking would adversely affect wildlife in the area more than hiking use already does.

**Amphibians.** Where bikers might travel through standing water and hikers might walk around the pools to avoid walking through them on existing trails and roads, amphibians making use of these ephemeral pools for breeding would experience more disturbance and increases in pre-adult mortality from the addition of biking use to the trails. The addition of biking to the selected existing trails could have a local, long-term, indirect, minor adverse impact on amphibian populations.

**Allegheny Woodrats.** Hiking use itself on the existing trails and roads is not known to have any adverse affects on the woodrats or their habitat, although discarding food along trails can. Where existing trails and administrative roads are situated on mine benches, they act as corridors for predators of Allegheny woodrats, passing along the high walls and boulder fields associated with the benches and which serve as woodrat habitat. In addition to increasing direct predation risk, it increases the potential for the woodrats to be exposed to raccoon roundworm, which is fatal to woodrats. These impacts are associated with the existence and use of the trails, not necessarily and differences in the type of use, when comparing hiking to biking. The primary difference between those uses is that bikers can cover more distance per unit time than hikers.

The addition of biking to the selected existing trails is expected to have a local, long-term, indirect, negligible impact on neotropical migratory bird populations, federally-listed threatened and endangered species, including non-listed bats and Allegheny woodrats.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.**

**Allegheny Woodrats.** If trails are placed to avoid habitat types that Allegheny woodrats typically inhabit, then the project is expected to have a local, long-term, indirect, negligible impact on Allegheny woodrat populations in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails.

**Amphibians.** It is important to protect habitat and breeding habitat for amphibians (frogs, toads and salamanders). Any seeps, wetlands or existing water holes that act as breeding pools for amphibians in old roads, mine benches, user-created OHV routes or other features need to be maintained without placing new trails through them. If streams or wetlands must be crossed by trails, the use of bridges (preferred over culverts) would maintain the wetland integrity and flow characteristics. The construction of the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails would have a local, long-term, indirect, negligible impact on amphibian populations.

**Neotropical Migratory Birds.** The proposed Mud Turn Trail, being a single, short trail, would have some effect as a fragmenting force to forest-interior bird species on the large block of forest in which it would occur. Of its two-mile length, about 1.5 miles of the proposed trail would cut through interior forest and create an 89-acre zone of negative influence on forest interior bird species.

Because the Panther Branch Connector Trail would follow the river along the edge of the forest, its use would not act as a fragmenting force on forest interior bird species. Based on the proximity of the trail to the edge transition from forest to river, the trail would not be expected to cause an appreciable increase in the number of edge bird species using the area. However, installation of

the trail would create an increase in human use, and potentially cause an increase in predator access of the area.

The proposed Brooklyn Miner's Connector Trail, being a single, short trail (0.8 miles) would have some effect as a fragmenting force on the large block of forest in which it would occur and create a 47-acre zone of negative influence on forest interior bird species.

The construction of the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails could be expected to have a local, long-term, indirect, minor adverse impact on neotropical migratory bird populations.

**Bicycle Use.** Allowing bicycle use on the proposed new trails, in comparison to hiking use, would have similar impacts to wildlife and habitat as those discussed for allowing bicycle use on existing park trails and administrative roads. The only species that would seem to be impacted more by bicycle use than hiking use are amphibians, which could be long-term, minor and adverse where bikers travel through standing water and hikers walk around pools. All other impacts to wildlife species analyzed in this EA are associated with the existence and use of trails, not necessarily the type of use when comparing impacts of biking to hiking.

**Craig Branch Stacked Loop Trail System with Bicycle Use.**

**Amphibians.** Under this alternative, existing informal routes, particularly user-created OHV routes, would be barricaded at control points and rehabilitated to de-compact the soil, remove exotic plant species and promote native plant growth. Water hole features, both naturally-occurring and those in existing roads and informal routes, would be retained for amphibian use, which should protect habitat and breeding habitat for amphibians (frogs, toads and salamanders). If streams or wetlands must be crossed by trails, the use of bridges (preferred over culverts) would maintain the wetland integrity and flow characteristics. If the rehabilitation and OHV control are effective, then the project would be expected to have a local, long-term, indirect, beneficial impact for amphibian populations in the Craig Branch area.

**Neotropical Migratory Birds.** The Craig Branch project area is about 789 acres of predominantly deciduous forest habitat. The existing forest fragmentation in the Craig Branch area is already high from prohibited OHV use and the existence of informal routes, including old logging roads and user-created OHV routes. Under this alternative, these informal routes would be rehabilitated. Proposed new trails would be of narrower width than existing trails and roads, offering the potential that some of the physical fragmentation of the forest would decrease over time. Until the rehabilitated areas recover, however, the physical fragmentation from the past combined with the use of the new trails would increase the amount of functional fragmentation in the area, since trails would be constructed in addition to the existing informal routes. Even after the rehabilitated areas recover, with about 11 miles of new trails proposed for this alternative, the area would still be broken into numerous sections by the trails, and the use of the trails by humans, predators and edge bird species would still act as a fragmenting force to any area-sensitive bird species that could potentially use the area.

An analysis of the 789-acre Craig Branch project area was conducted for the effects that the proposed trails and existing informal routes would have on neotropical migratory birds (Figures 4-5 and 4-6). Informal routes were considered rehabilitated and were not included in the analysis. The forest was divided into 12 blocks greater than one acre. The Veery could be accommodated by one forest block, the Kentucky warbler by two blocks, and the Acadian flycatcher, Blue-gray gnatcatcher and Scarlet tanager by three blocks. Although these species can utilize the smaller blocks, the forest area that is available without disturbance by trails or roads is limited. Of the 789 acres, 586 acres, representing 74 percent of the project area, would be within 75 meters of trails or roads and therefore subject to disturbance, edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). Thus fragmentation and forest area subject to trail disturbance would be slightly more than the existing condition, as analyzed in Alternative A, the No Action Alternative. Neotropical migratory birds that are area-sensitive would continue to have decreased opportunity in this area to establish successful breeding territories. The designation by the park of the Craig Branch area as frontcountry is consistent with heavier use than would be deemed

appropriate in a designated backcountry area. Pursuing this alternative would be expected to continue a local, long-term, indirect, moderate adverse impact on neotropical migratory birds in the Craig Branch area, which represents a negligible increase in adverse impact from the existing condition.

**Figure 4-5. Craig Branch Area (Alternative B, Preferred): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

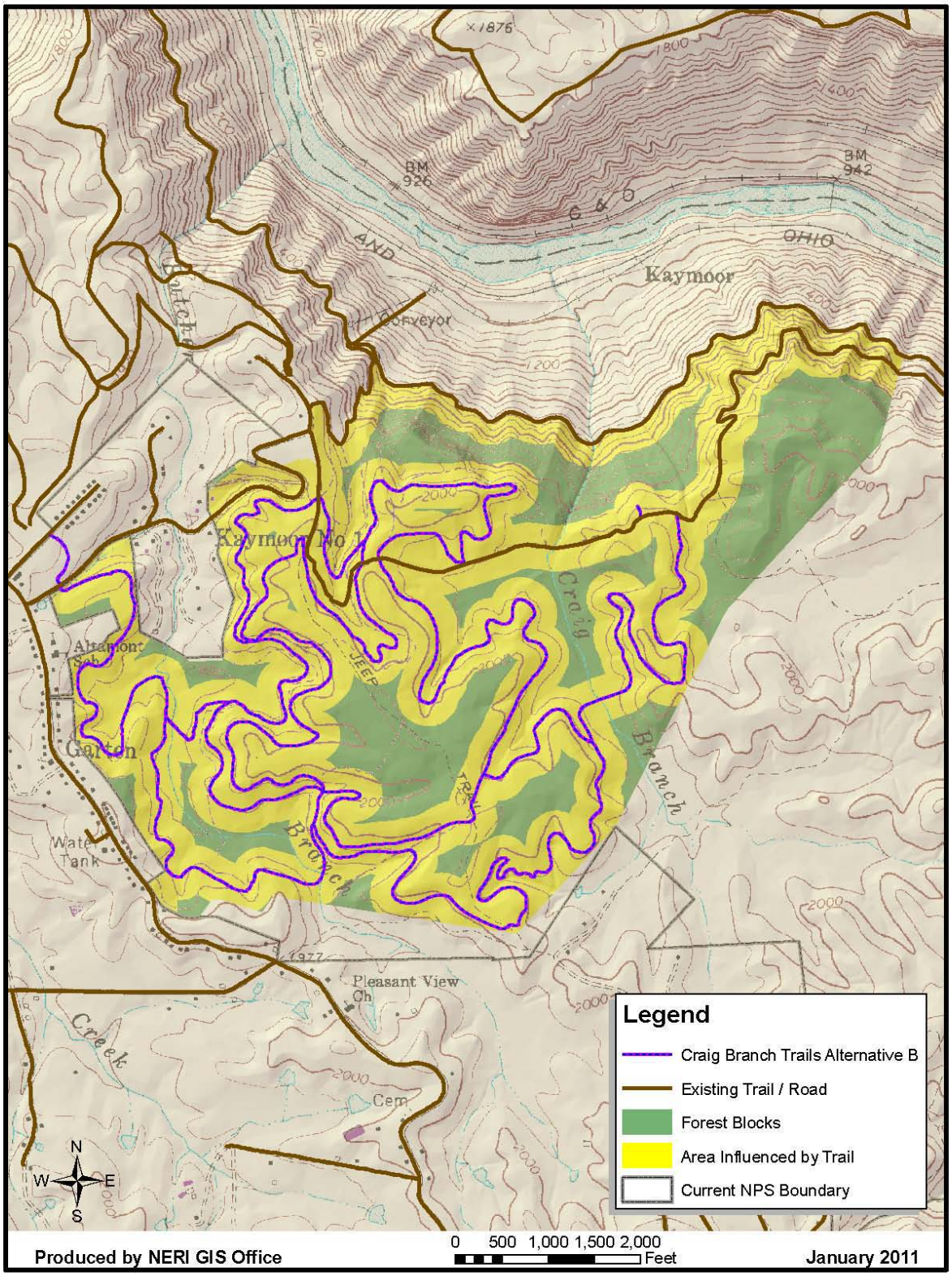
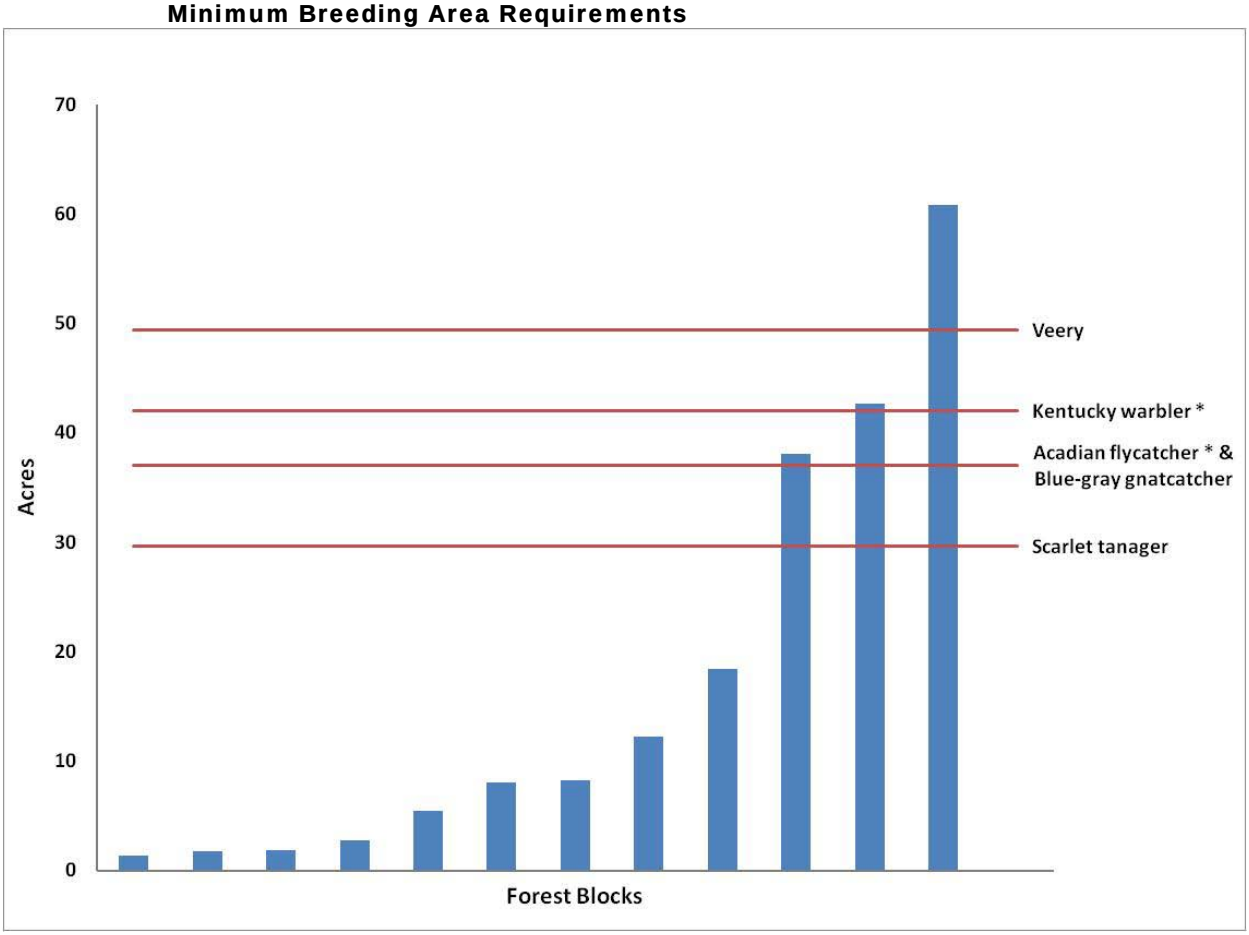


**Figure 4-6. Craig Branch Area (Alternative B, Preferred): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (12 shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Bicycle Use.** Allowing bicycle use on the proposed new trail system, in comparison to hiking use, would have similar impacts to wildlife and habitat as those discussed for allowing bicycle use on existing park trails and administrative roads. The only species that would seem to be impacted more by bicycle use than hiking use are amphibians, which could be long-term, minor and adverse where bikers travel through standing water and hikers walk around pools. All other impacts to wildlife species analyzed in this EA are associated with the existence and use of trails, not necessarily the type of use when comparing impacts of biking to hiking.

**Garden Ground Stacked Loop Trail System with Bicycle Use.**

**Allegheny Woodrats.** The proposed trail placement would not occur on mine benches, and plans are to follow the mitigation measures as outlined in Section 2.6.3. Although woodrat habitat would be avoided as much possible, creating a network of trails in the area may facilitate predator movement. Additionally, if increased use of the area occurs due to the trail network, an increase in litter and food scraps may attract raccoons. See Section 3.4 under Allegheny Woodrats for details on trail effects on woodrats. A slightly increased risk to woodrats is expected from this alternative compared to the No Action Alternative, resulting in an expected local, long-term, indirect minor adverse impact on the Allegheny woodrat in the Garden Ground area.

**Amphibians.** Area rehabilitation, invasive plant treatment, avoidance of water-hole features and stream crossing mitigations would be the same for the Garden Ground area as they would be in the Craig Branch area for this alternative. If the rehabilitation and OHV control are effective, then the project would be expected to have a local, long-term, indirect, beneficial impact for amphibian populations in the Garden Ground area.

**Neotropical Migratory Birds.** The Garden Ground project area is about 3,500 acres of predominantly deciduous forested habitat. Existing informal routes in this area have been mapped, and the trail network is not nearly as extensive as that found on the Craig Branch area (Figure 3-1). The Garden Ground area is one of the few places left in the park where contiguous unfragmented forest remains from the rim of the gorge down to the river, unbroken by road or railroad.

An analysis of the proposed trails and remaining informal routes and NPS trails and administrative roads divides the forest into 16 blocks greater than one acre (Figures 4-7 and 4-8). The largest two blocks would be large enough to accommodate breeding Black-and-white warblers and Worm-eating warblers. The five analyzed species with the largest area requirements would no longer have their breeding needs met however, as compared to the existing conditions analyzed in the No Action Alternative (Table 4-2). Even for those species that can use the smaller forest blocks, the forest area that is available without disturbance by trails or roads is limited. Of the 3,500 acres, 1,593 acres, representing 46 percent of the project area, are within 75 meters of trails or roads and therefore subject to disturbance, edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). Thus fragmentation and forest area subject to trail disturbance would be considerably more than the existing condition, as analyzed in Alternative A, the No Action Alternative. The fragmenting influence of the trails and their use may reduce the breeding utility of the area by five area-sensitive bird species, three of which are listed by the park as species of management concern. Pursuing this alternative is expected to create a local, long-term, indirect, moderate adverse impact on neotropical migratory birds in the Garden Ground area, which represents a noticeable, incremental increase in adverse impact over the existing condition.

**Figure 4-7. Garden Ground Area (Alternative B, Preferred): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

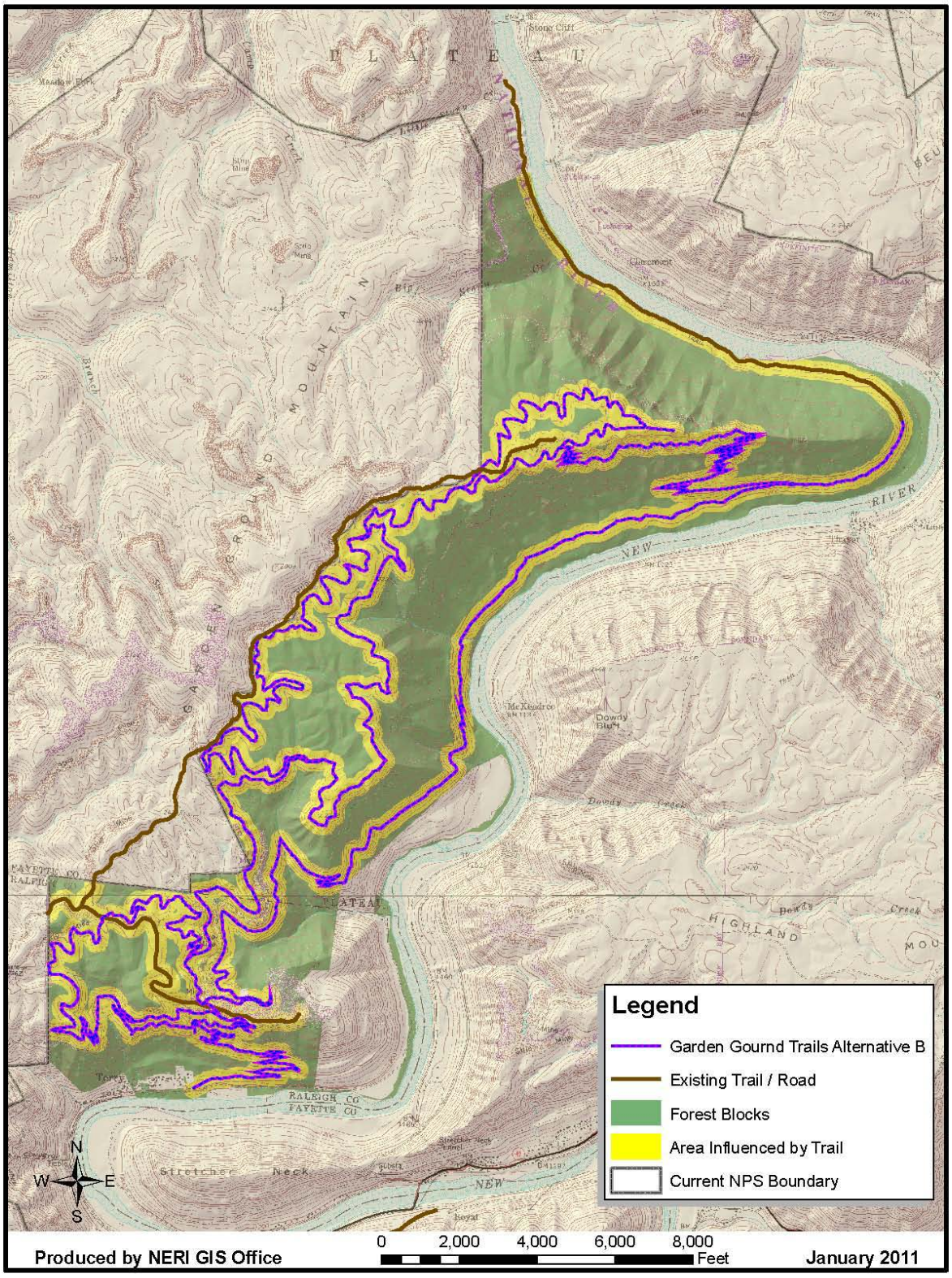
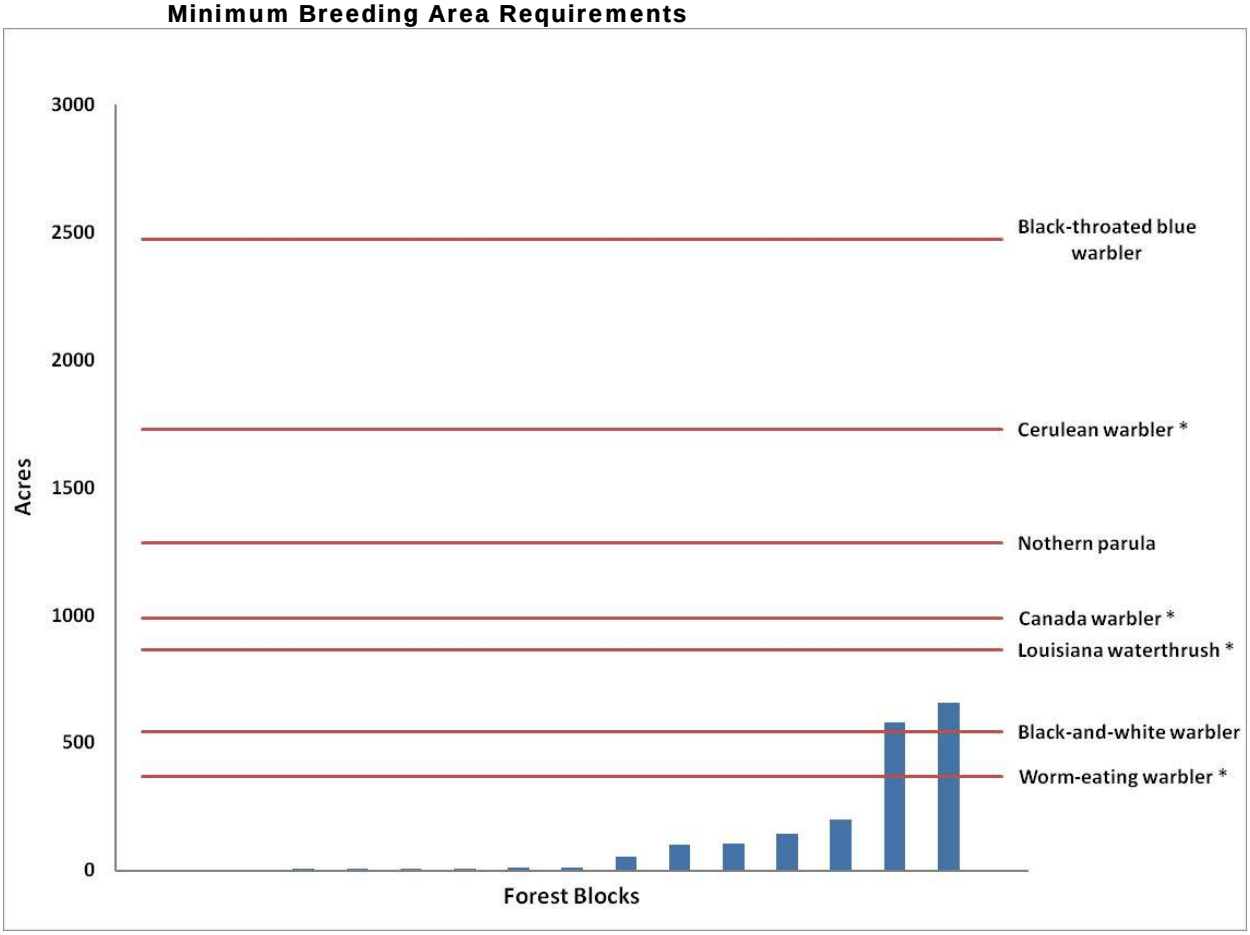


**Figure 4-8. Garden Ground Area (Alternative B, Preferred): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (16 shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Bicycle Use.** Allowing bicycle use on the proposed new trail system, in comparison to hiking use, would have similar impacts to wildlife and habitat as those discussed for allowing bicycle use on existing park trails and administrative roads. The only species that would seem to be impacted more by bicycle use than hiking use are amphibians, which could be long-term, minor and adverse where bikers travel through standing water and hikers walk around pools. All other impacts to wildlife species analyzed in this EA are associated with the existence and use of trails, not necessarily the type of use when comparing impacts of biking to hiking.

**Cumulative Impacts.** In the Craig Branch area, a history of logging and OHV use on the property before it was acquired by NPS left the property fragmented. Stopping the traditional OHV use of the area has been challenging. The Garden Ground area also has a history of being logged, and some OHV use. With the BSA purchasing land and constructing a facility adjacent to the Garden Ground area, access of OHVs to the NPS Garden Ground projects area should be substantially reduced in the future. Reduction of OHVs in the Garden Ground area should reduce disturbances to Allegheny woodrats, amphibians and neotropical migratory birds in the area. With the BSA facility being adjacent to the Garden Ground area and new trails being proposed under this alternative, use of the new trails could be heavy, which would increase disturbance along the new trails. Numerous existing trails and administrative roads are situated on mine benches, and they act as corridors for predators of Allegheny woodrats, passing along the high walls and boulder fields associated with the benches

and which serve as woodrat habitat. In addition to increasing direct predation risk, it increases the potential for the woodrats to be exposed to raccoon roundworm, which is fatal to woodrats. Impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, negligible impact on federally-listed threatened and endangered species, including non-listed bats. For Allegheny woodrats, impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, minor adverse impact in the Garden Ground area, a cumulative long-term moderate adverse impact on Allegheny woodrats on mine benches with existing trails or roads, and a cumulative local, long-term, indirect, negligible impact for the other project areas. For amphibians, impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term beneficial impact in the Craig Branch and Garden Ground areas, a cumulative local, long-term, indirect, negligible impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a cumulative local, long-term, indirect, minor adverse impact on trails and administrative roads converted to bike use. For neotropical migratory birds, impacts of Alternative B, "New Route Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, moderate adverse impact in the Craig Branch and Garden Ground areas, a cumulative local, long-term, indirect, minor adverse impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a cumulative local, long-term, indirect, negligible impact on trails and administrative roads converted to bike use. Alternative B, "New Route Single Track Trail Construction," would contribute noticeable adverse impacts in the Craig Branch and Garden Ground areas (birds) to the total cumulative impact; noticeable beneficial impacts in the Craig Branch and Garden Ground areas (amphibians) to the total cumulative impact; and imperceptible adverse impacts in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails (birds) and for converted trails and administrative roads (amphibians) to the total cumulative impact; and an imperceptible impact otherwise to the total cumulative impact.

**Conclusion.** Under this alternative, negligible, minor, and moderate impacts would be expected. Local, long-term, indirect, negligible impacts on federally-listed threatened and endangered species, including non-listed bats, would be expected for all project areas, and local, short-term, indirect, minor adverse impacts would be expected where trails are constructed. For Allegheny woodrats, a local, long-term, indirect, minor adverse impact in the Garden Ground area would be expected. A local, long-term, indirect, negligible impact could be expected for Allegheny woodrats in the other project areas. For amphibians, a local, long-term beneficial impact in the Craig Branch and Garden Ground areas, a local, long-term, indirect, negligible impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a local, long-term, indirect, minor adverse impact on trails and administrative roads converted to bike use would be expected. For neotropical migratory birds, a local, long-term, indirect, moderate adverse impact to the birds' ability to breed, representing a negligible increase in adverse impact over the existing condition in the Craig Branch area and a noticeable, incremental increase in adverse impact over the existing condition int the Garden Ground area, a local, long-term, indirect, minor adverse impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a local, long-term, indirect, negligible impact on trails and administrative roads converted to bike use would be expected. Cumulative impacts mirror the long-term impacts just summarized for this alternative, but additionally include a cumulative, long-term, moderate adverse impact on Allegheny woodrats from the occurrence of existing trails and roads on mine benches. Alternative B, "New Route Single Track Trail Construction," would contribute noticeable adverse impacts in the Craig Branch and Garden Ground areas (birds) to the total cumulative impact; noticeable beneficial impacts in the Craig Branch and Garden Ground areas (amphibians) to the total cumulative impact; and imperceptible adverse impacts in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails (birds) and for converted trails and administrative roads (amphibians) to the total cumulative impact; and an imperceptible impact otherwise to the total cumulative impact.

### 4.4.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Wildlife and Habitat

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Federally-listed Threatened and Endangered Species, Including Non-listed Bats.** The Indiana bat and Virginia big-eared bat are federally-listed endangered species which occur in the park. This analysis includes non-listed bat species as well, because of the similarity in habitat needs.

Impacts to bats related to new trail construction would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction," as they would be under Alternative B, "New Route Single Track Trail Construction," (see Section 4.4.3), with the exception that an estimated 455 trees would be removed (0 miles of trail in Craig Branch area, about 45 miles of trail in the Garden Ground area, and 0.5 miles for the proposed Mud Turn Trail at an estimated ten trees per mile of trail).

**Craig Branch Stacked Loop Trail System with Bicycle Use.**

**Amphibians.** Impacts to amphibians in the Craig Branch area would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction," as those discussed for Alternative B, "New Route Single Track Trail Construction," (see Section 4.4.3).

**Neotropical Migratory Birds.** The Craig Branch project area is about 789 acres of predominantly deciduous forest habitat. The existing forest fragmentation in the Craig Branch area is already high from prohibited OHV use and the existence of informal routes, including old logging roads and user-created OHV routes. Under this alternative, these informal routes would be rehabilitated, unless those routes are used for new trail construction. Proposed new trails placed within the confines of existing roadbeds would to be of narrower width than existing informal routes, offering the potential that some of the physical fragmentation of the forest would decrease over time. With 4.5 miles of trails proposed for this alternative, the area would still be broken into sections by the trails, and the use of the trails by humans, predators and edge bird species would still act as a fragmenting force to any area-sensitive bird species that could potentially use the area. The level of fragmentation would not be as much as under Alternative B, "New Route Single Track Trail Construction," however, which proposes more than twice the trail length. Also, since existing informal routes would be used for the proposed trails, fragmentation would not temporarily increase in the area as it would for Alternative B, "New Route Single Track Trail Construction."

An analysis of the 789-acre Craig Branch project area was conducted for the effects that the proposed trails and existing informal routes would have on neotropical migratory birds (Figures 4-9 and 4-10). Informal routes, particularly user-created OHV routes, were considered rehabilitated and were not included in the analysis. The forest was divided into six blocks greater than one acre. The Veery and four other area-sensitive species could utilize two blocks for breeding habitat (Kentucky warbler, Acadian flycatcher, Blue-gray gnatcatcher and Scarlet tanager, as well as birds with smaller area needs; Table 4-2). Although this alternative would leave a resultant forest block of 331 acres, its shape is analogous to a donut, with its center cut out, which is not as useful to area-sensitive bird species as a tract with an intact center (Figure 4-9). Although these species can utilize the smaller blocks, the forest area that is available without disturbance by trails or roads would still be somewhat limited. Of the 789 acres, 345 acres, representing 44 percent of the project area, would be within 75 meters of trails or roads and therefore subject to disturbance, edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). Thus fragmentation and forest area subject to trail disturbance would be less than the existing condition or Alternative B, "New Route Single Track Trail Construction." Neotropical migratory birds that are area-sensitive would continue to have decreased opportunity in this area to establish successful breeding territories. The designation by the park of the Craig Branch area as frontcountry is consistent with heavier use than would be deemed appropriate in a designated backcountry area. Pursuing this alternative would be expected to continue a local, long-term, indirect, moderate adverse impact on neotropical migratory birds in the Craig Branch area, representing a negligible benefit over the existing condition.

**Figure 4-9. Craig Branch Area (Alternative C): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

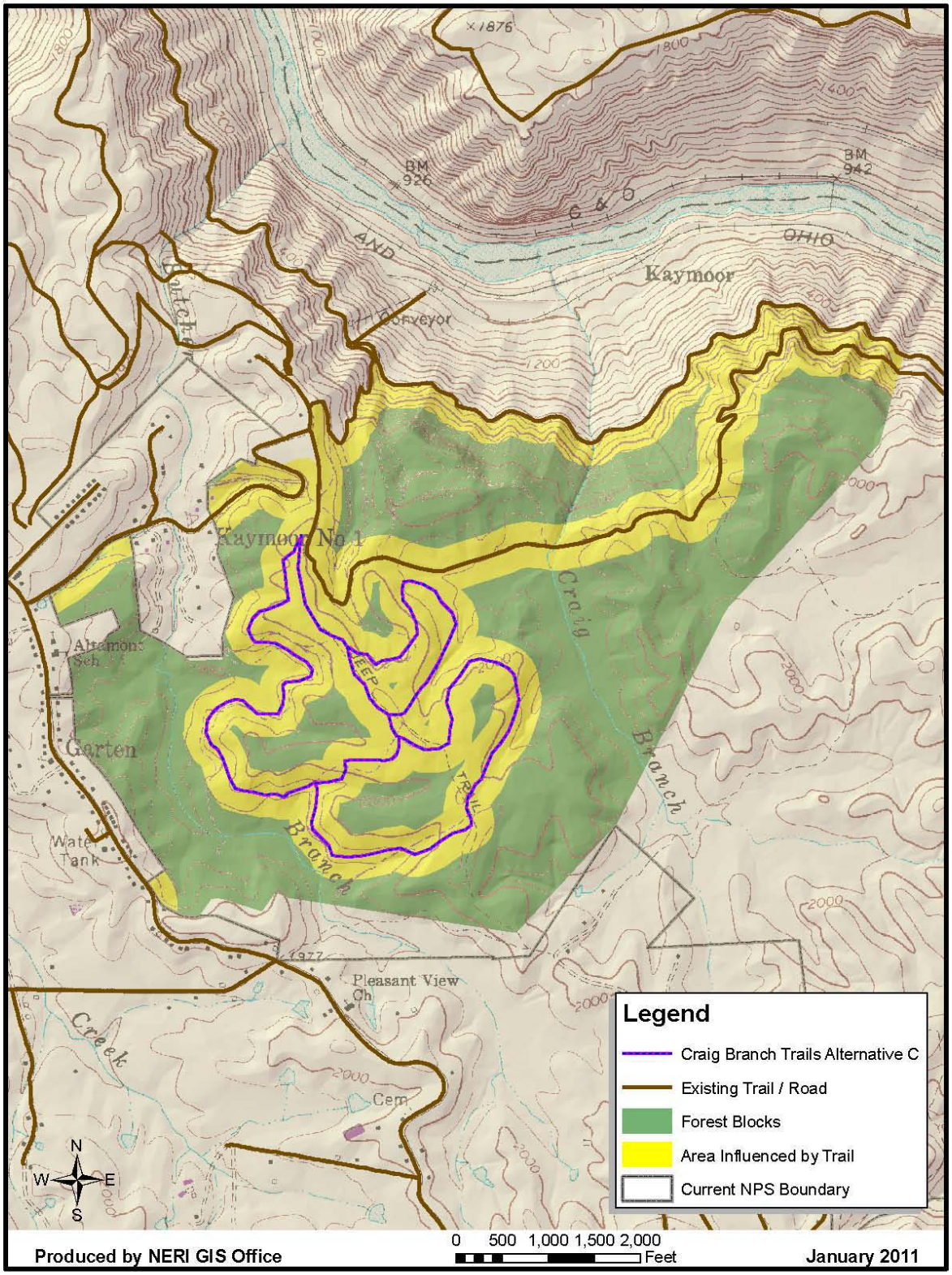
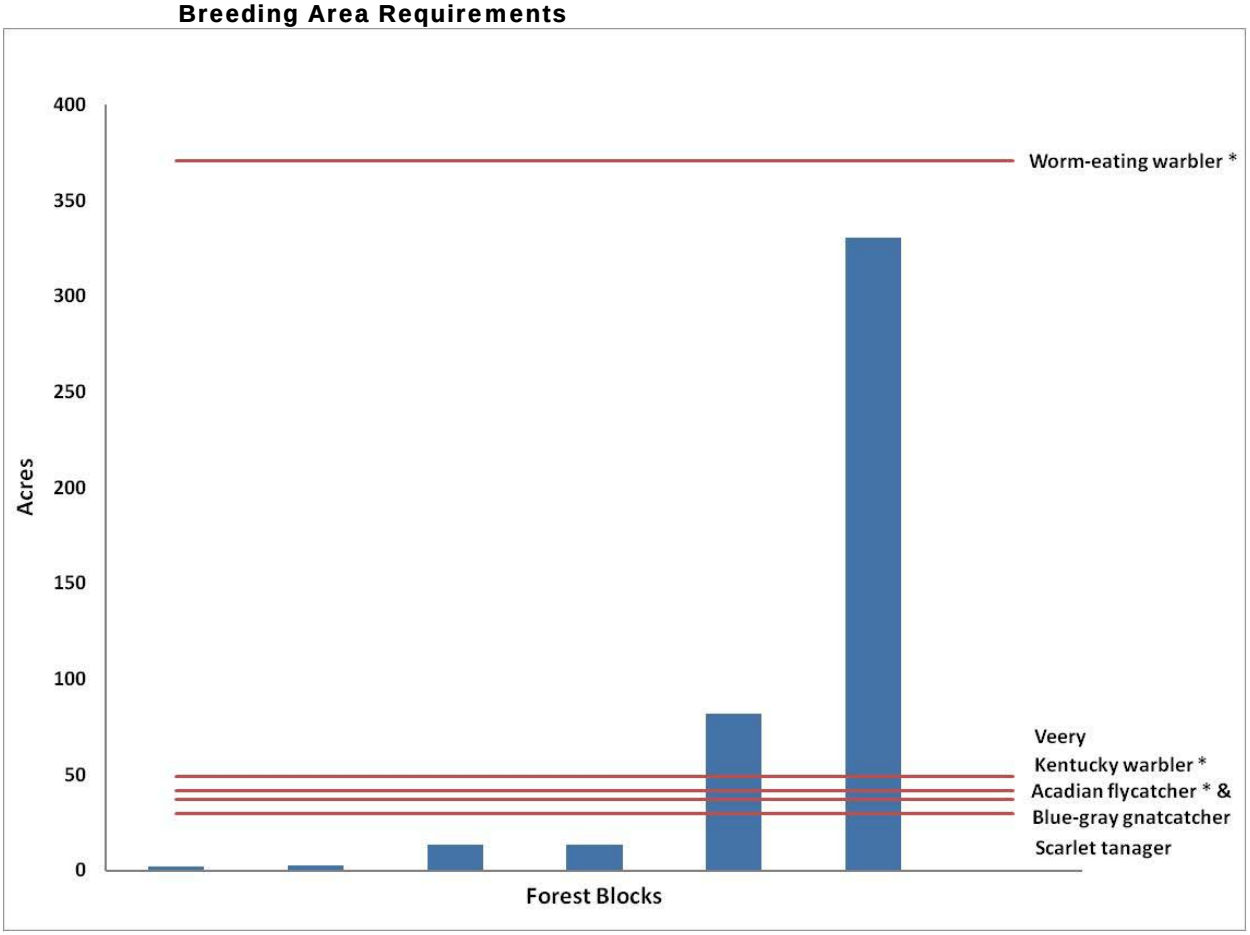


**Figure 4-10. Craig Branch Area (Alternative C): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (six shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Bicycle Use.** Allowing bicycle use on the proposed new trail system, in comparison to hiking use, would have similar impacts to wildlife and habitat as those discussed for allowing bicycle use on existing park trails and administrative roads. The only species that would seem to be impacted more by bicycle use than hiking use are amphibians, which could be long-term, minor and adverse where bikers travel through standing water and hikers walk around pools. All other impacts to wildlife species analyzed in this EA are associated with the existence and use of trails, not necessarily the type of use when comparing impacts of biking to hiking.

**Garden Ground Stacked Loop Trail System with Bicycle Use.**

**Allegheny Woodrats.** The proposed trail placement includes constructing a segment of trail on the existing mine bench. Boulder fields are typical Allegheny woodrat habitat and occur frequently along benches as the high walls undergo freeze and fracture cycles. Constructing and maintaining a trail on the mine bench keeps the bench open as a corridor for predator movement and maintains vegetative denuded areas, thus putting the woodrats at risk from direct predation and predator-carried pathogens (in particular raccoon roundworm). Thus, if constructed on the mine bench because this alternative favors the use of existing disturbance on which to build proposed new trails, the trail may connect existing woodrat habitats for predator exploitation, which could

result in a local, long-term, indirect, moderate adverse impact on the Allegheny woodrats in the Garden Ground area.

**Amphibians.** Impacts to amphibians in the Garden Ground area would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction," as those discussed for Alternative B, "New Route Single Track Trail Construction," (see Section 4.4.3).

**Neotropical Migratory Birds.** The Garden Ground project area is about 3,500 acres of predominantly deciduous forested habitat. Existing informal routes in this area have been mapped, and the trail network is not nearly as extensive as that found on the Craig Branch area (Figure 3-1). The Garden Ground area is one of the few places left in the park where contiguous unfragmented forest remains from the rim of the gorge down to the river, unbroken by road or railroad.

An analysis of the proposed trails and remaining informal routes and NPS trail and administrative roads divides the forest into 27 blocks greater than one acre (Figures 4-11 and 4-12). The largest two blocks would be large enough to accommodate breeding Worm-eating warblers and species with lesser requirements (Table 4-2). The six analyzed species with the largest area requirements would no longer have their breeding needs met, however, as compared to the existing conditions analyzed in Alternative A, the No Action Alternative (Table 4-2). Even for those species that can use the smaller forest blocks, the forest area that is available without disturbance by trails or roads is limited. Of the 3,500 acres, 1,919 acres, representing 55 percent of the project area, are within 75 meters of trails or roads and therefore subject to disturbance, edge effects and reduction in nest success (see Sections 3.4 and 4.4.1). Thus fragmentation and forest area subject to trail disturbance would be considerably more than the existing condition, as analyzed in Alternative A, the No Action Alternative. The fragmenting influence of the trails and their use may reduce the breeding utility of the area by five area-sensitive bird species, three of which are listed by the park as species of management concern. Pursuing this alternative is expected to create a local, long-term, indirect, moderate adverse impact on neotropical migratory birds in the Garden Ground area, which represents a noticeable, incremental increase in adverse impact over the existing condition.

**Figure 4-11. Garden Ground Area (Alternative C): Area of Influence on Forest Interior Birds and Resultant Forest Blocks**

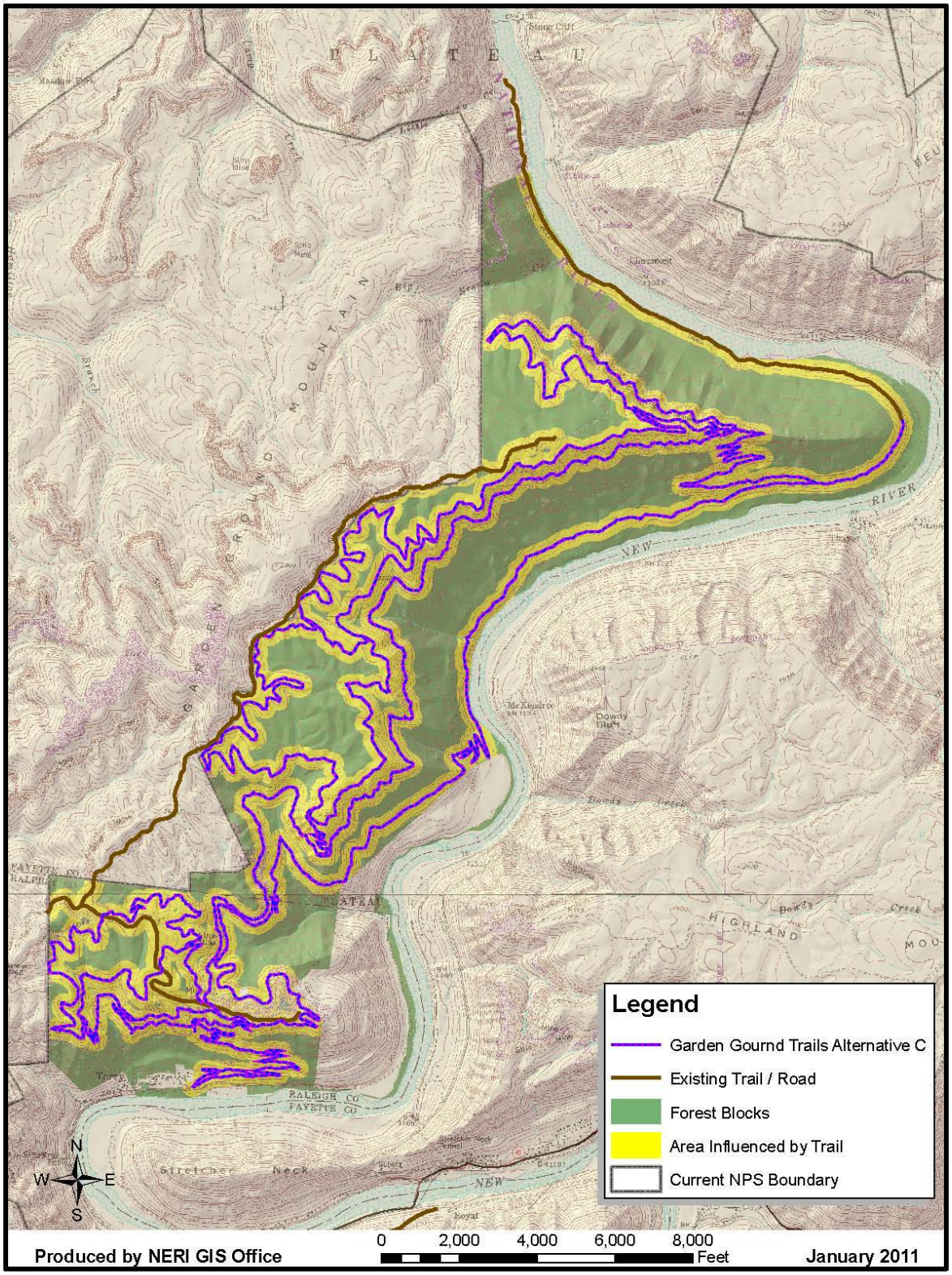
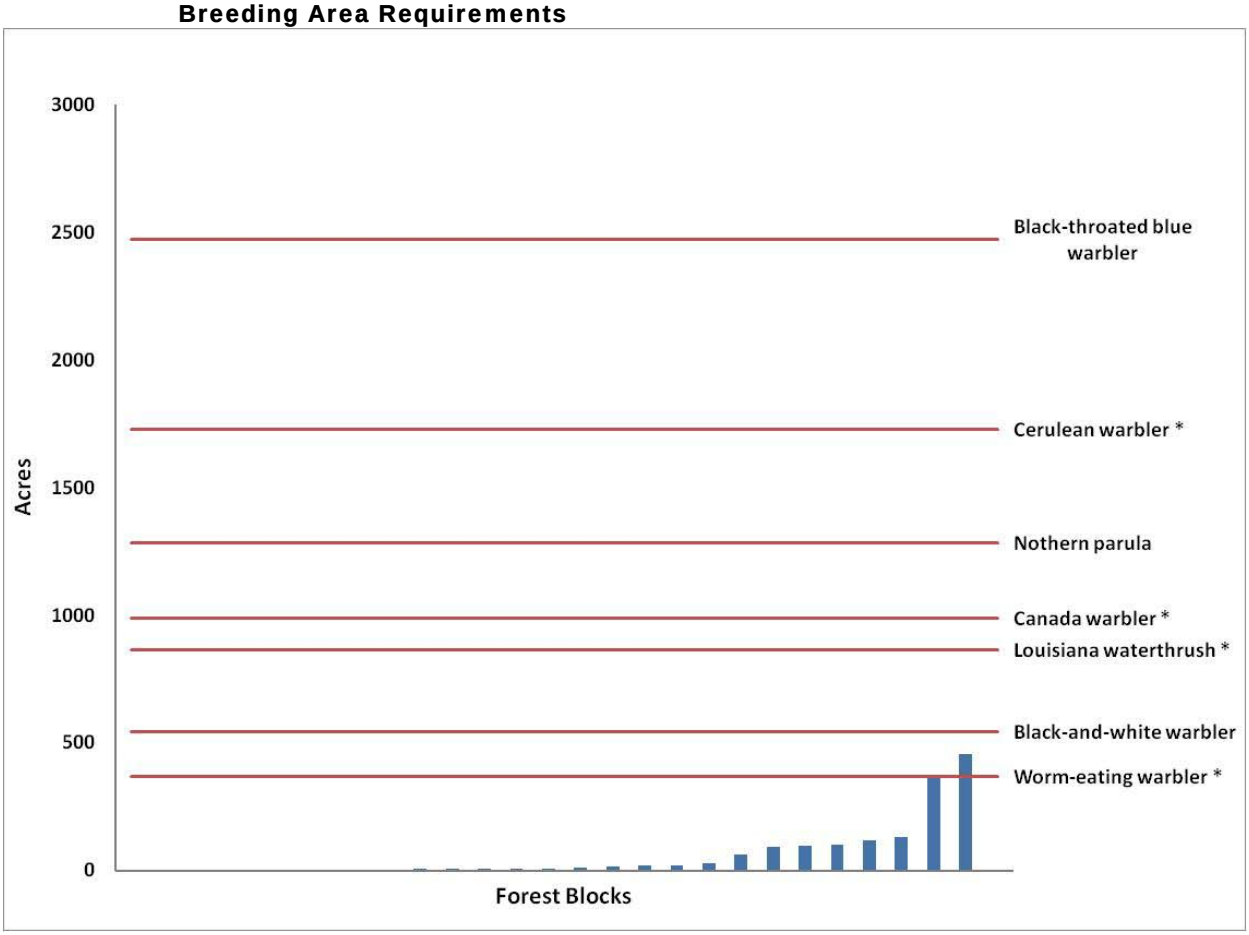


**Figure 4-12. Garden Ground Area (Alternative C): Resultant Forest Blocks and Minimum Breeding Area Requirements**




*This figure represents the resultant forest block areas (blue bars) compared to forest- interior bird species' minimum breeding area requirements (red lines). Each bar represents one forest block; blocks less than one acre in size are not shown (27 shown). Bird species areas are taken from Robbins et al. (1989). Asterisks (*) indicate bird species that are on the park's Species of Management Concern List.*

**Bicycle Use.** Allowing bicycle use on the proposed new trail system, in comparison to hiking use, would have similar impacts to wildlife and habitat as those discussed for allowing bicycle use on existing park trails and administrative roads. The only species that would seem to be impacted more by bicycle use than hiking use are amphibians, which could be long-term, minor and adverse where bikers travel through standing water and hikers walk around pools. All other impacts to wildlife species analyzed in this EA are associated with the existence and use of trails, not necessarily the type of use when comparing impacts of biking to hiking.

**Cumulative Impacts.** The cumulative impact discussion for Alternative C, "Existing Disturbance Single Track Trail Construction," is the same as for Alternative B, "New Route Single Track Trail Construction," (see Section 4.4.3). Impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, negligible impact on federally-listed threatened and endangered species, including non-listed bats. For Allegheny woodrats, impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, moderate adverse impact in the Garden Ground area, a cumulative long-term moderate adverse impact on Allegheny woodrats on mine benches with existing trails or roads, and a cumulative local, long-term, indirect, negligible impact for the other project areas. For amphibians, impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term beneficial impact in the

Craig Branch and Garden Ground areas, a cumulative local, long-term, indirect, negligible impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a cumulative local, long-term, indirect, minor adverse impact on trails and administrative roads converted to bike use. For neotropical migratory birds, impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," in conjunction with the impacts of these actions would result in a cumulative local, long-term, indirect, moderate adverse impact in the Garden Ground and Craig Branch areas and in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a cumulative local, long-term, indirect, negligible impact on trails and administrative roads converted to bike use. Alternative C, "Existing Disturbance Single Track Trail Construction," would contribute noticeable adverse impacts in the Craig Branch area (birds) and the Garden Ground area (woodrats, birds) to the total cumulative impact; noticeable beneficial impacts in the Craig Branch area (amphibians) and the Garden Ground area (amphibians) to the total cumulative impact; and imperceptible adverse impacts in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails (birds) and for converted trails and administrative roads (amphibians) to the total cumulative impact; and an imperceptible impact otherwise to the total cumulative impact.

**Conclusion.** Under this alternative, negligible, minor, and moderate impacts would be expected. Local, long-term, indirect, negligible impacts on federally-listed threatened and endangered species, including non-listed bats, would be expected for all project areas, and local, short-term, indirect, minor adverse impacts would be expected where trails are constructed. For Allegheny woodrats, a local, long-term, indirect, moderate adverse impact in the Garden Ground area would be expected due to a particular trail segment is located on a mine bench. A local, long-term, indirect, negligible impact could be expected for Allegheny woodrats in the other project areas. For amphibians, a local, long-term beneficial impact in the Craig Branch and Garden Ground areas, a local, long-term, indirect, negligible impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a local, long-term, indirect, minor adverse impact on trails and administrative roads converted to bike use would be expected. For neotropical migratory birds, a local, long-term, indirect, moderate adverse impact in the Garden Ground and Craig Branch areas would be expected, representing a negligible benefit from the existing condition in the Craig Branch area and a noticeable, incremental increase in adverse impact from the existing condition in the Garden Ground area; a local, long-term, indirect, minor adverse impact in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, and a local, long-term, indirect, negligible impact on trails and administrative roads converted to bike use would be expected. Cumulative impacts mirror the long-term impacts just summarized for this alternative, but additionally include a cumulative long-term moderate adverse impact on Allegheny woodrats from the occurrence of existing trails and roads on mine benches. Alternative C, "Existing Disturbance Single Track Trail Construction," would contribute noticeable adverse impacts in the Craig Branch area (birds) and the Garden Ground area (woodrats, birds) to the total cumulative impact; noticeable beneficial impacts in the Craig Branch area (amphibians) and the Garden Ground area (amphibians) to the total cumulative impact; and imperceptible adverse impacts in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails (birds) and for converted trails and administrative roads (amphibians) to the total cumulative impact; and an imperceptible impact otherwise to the total cumulative impact.

### 4.4.5 Comparison of the Alternatives – Impacts to Wildlife and Habitat

Some differences between alternative impacts are highlighted here. More detail can be found by referring to the analysis sections.

Short-term minor adverse impacts are predicted for federally-listed threatened and endangered species, including non-listed bats, under both action alternatives, for the Craig Branch, Garden Ground, Mud Turn and Panther Branch areas based on the chance that the wildlife habitat survey misses the presence of an Indiana bat nursery colony tree and a trail is placed close enough to disrupt the future use of the tree by Indiana bats (or other bat species). Under both action alternatives in these project areas, long-term impacts to federally-listed and non-listed bat species would be indirect, negligible and adverse.

The minor adverse impacts to amphibians under Alternative A, the No Action Alternative, for the Craig Branch and Garden Ground areas, are due to current prohibited OHV use of the areas. Under both action alternatives for these areas, beneficial impacts are predicted based on the proposed rehabilitation of the affected areas, which would preserve the pools and wetlands in the trails and roads.

The moderate adverse impact predicted for neotropical migratory birds under Alternative A, the No Action Alternative, in the Craig Branch area is due to the existing informal routes and current prohibited OHV use of the area and resultant fragmentation. The moderate adverse impact predicted under both action alternatives for the birds' breeding capacity is actually a negligible change in impacts from the existing condition for the area; these conclusions are based on the fragmentation caused by the construction and use of the proposed trails. Fragmentation under Alternative C, "Existing Disturbance Single Track Trail Construction," would be less than under Alternative B, "New Route Single Track Trail Construction."

In the Garden Ground area, under Alternative B, "New Route Single Track Trail Construction," for Allegheny woodrats, a minor adverse impact is predicted based on an increase in the trail network which attracts predators such as raccoons to human activity. Under Alternative C, "Existing Disturbance Single Track Trail Construction," a moderate adverse impact would be expected due to a particular trail segment proposed to be located on a mine bench.

In the Garden Ground area, under Alternative A, the No Action Alternative, for neotropical migratory birds, a minor adverse impact is predicted due to the existing informal routes and current prohibited OHV use in the area creating fragmenting trails. The moderate adverse impact predicted under both action alternatives for the birds' breeding capacity is actually a negligible change in impacts from the existing condition for the area; these conclusions are based on the fragmentation caused by the construction and use of the proposed trails. Fragmentation under Alternative C, "Existing Disturbance Single Track Trail Construction," would be more than under Alternative B, "New Route Single Track Trail Construction."

In the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails, minor adverse impacts would be expected for neotropical migratory birds under both action alternatives based on the fragmenting nature of the Mud Turn and Brooklyn Miner's Connector Trails and both proposed trails' influence on predator access.

The minor adverse impacts predicted under both action alternatives for amphibians in converting existing trails and administrative roads to bicycle use are based on the possible tendency of bikers being more likely than hikers to travel through standing water in the paths, as hikers might be more likely to walk around the pools.

**Table 4-3. Comparison of Areas in Which Trails and Roads Would Adversely Affect Forest Interior Birds**

| | Craig Branch | | Garden Ground | |
|---|---|---|---|---|
| Total Acres Analyzed | 789 ac | | 3,500 ac | |
| Area of Adverse Influences | Acres | Percent of total area | Acres | Percent of total area |
| -- Alternative A (no action) | 473 | 60% | 551 | 16% |
| -- Alternative B (preferred) | 586 | 74% | 1,593 | 46% |
| -- Alternative C | 345 | 44% | 1,919 | 55% |

Areas calculated based on 75-meter buffers on each side of existing/proposed trails and roads.

## 4.5 Cultural Resources

### 4.5.1 About the Analysis

**Applicable Regulations and Guidelines.** Federal laws, regulations and NPS policies related to cultural resources include the following:

- 36 CFR 79 – Curation of Federally Owned and Administered Archeological Collections
- Advisory Council on Historic Preservation implementing regulations regarding the "Protection of Historic Properties" (36 CFR Part 800)
- Archeological Resources Protection Act of 1979, as amended
- National Historic Preservation Act of 1966, as amended
- Native American Graves Protection Act of 1990
- Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (1966)
- Directors Order 28 – Cultural Resources Management Guidelines
- NPS 28 – Cultural Resources Management Guideline Release No. 5
- NPS 2006 Management Policies

**Methodology and Assumptions.** Known sites have been identified for all of the project areas, and where new trails are proposed to be constructed these sites are to be avoided. Some sections of the proposed trail routes were surveyed during the summer of 2010. Any potential sites identified by these surveys were evaluated by the park's archeologist. Effects to all newly identified sites would be mitigated by rerouting the section of trail proposed for that area to completely avoid any known cultural resources.

**Impact Intensity.** Cultural resource impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Management actions would result in impacts at the lowest levels of detection, barely measurable, with no perceptible consequences. The Section 106 determination would be no adverse effect.

**Minor.** Management actions would result in a measurable or perceptible effect, but would be slight and affect a limited cultural landscape area, limited area of an archeological site or group of sites. For purposes of Section 106, the determination of effect would be adverse effect.

**Moderate.** Management actions would result in a measurable or perceptible effect on a cultural landscape area, on an archeological site or group of sites. For purposes of Section 106, the determination of effect would be adverse effect.

**Major.** Management actions would have a substantial, noticeable and permanent effect on a cultural landscape, or archeological site or group of sites. For purposes of Section 106, the determination of effect would be adverse effect.

**Duration.** Any impact to cultural resources would be permanent.

### 4.5.2 Alternative A – No Action Alternative: Impacts to Cultural Resources

**Bicycle Use on Existing Trails and Administrative Roads.** Nearly all the designated trails and administrative roads have already impacted or affected higher probability archeological site locations or other cultural resources within their alignments. Most of the impact and effect has occurred within the right-of-way of these routes. Continuing the current use of the existing trails and administrative roads would therefore not impact or adversely affect (Section 106) any intact archeological resources.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** Nearly all the park's existing roadways follow coal and rail industry routes that would have destroyed or heavily damaged potential archeological sites within the alignments of the roads. Therefore, any existing use of these roads would generally not adversely affect archeological resources. Historic structures may occur in

association with some segments of these roadways, such as bridges, culverts and retaining walls. These features may be under some pressure from use, resulting in possible negligible, adverse impacts, and no adverse effects (Section 106).

**Craig Branch Area.** Allowing the current network of informal routes in the Craig Branch area to persist would result in long-term minor adverse impacts to pre-historic Native American archeological resources. Many routes cross upland landforms that have known archeological sites or are locations with a higher probability for potential sites than the new trail routes proposed in the preferred alternative. Other portions of the existing informal routes, which pre-date NPS ownership, pass close to two archeological sites that have been heavily damaged by recent looting. Under the No Action Alternative, these routes might continue to be utilized by unauthorized OHVs, would continue to erode and would generally result in minor adverse impacts to the area's archeological resources, constituting possible adverse effects under Section 106.

Additionally, the historic Kaymoor Access Road that passes through the Craig Branch area would continue to be degraded by unauthorized OHV activity, resulting in a negligible, adverse impact to historic resources.

**Garden Ground Area.** Three known archeological sites are located in the Garden Ground area. Although existing logging and mining roads that are in the project area are heavily disturbed and causing active erosion, they are not currently affecting these known sites. Additionally, none of these existing roads are in proximity to the limited cultural resources in the area, such as historic fence lines or remnants of farm roads. If OHV activity where to continue or increase in the area, it could cause adverse effects to the cultural resources. Generally, the No Action Alternative could have a negligible adverse impact, or no adverse effect (Section 106), on archeological and cultural resources.

**Cumulative Impacts.** Historic land management within and surrounding the project areas has heavily disturbed cultural resources through the extensive construction of mining and logging roads. Looting of archeological sites throughout the region has occurred over the years and continues to this day. The disturbance of soils from these activities in association with erosion forces of rain, wind and the freeze-thaw cycle all contribute to the impacts to the region's cultural resources.

The project areas lie within a broader region of heavy industrial use during the build-up of the coal and timber industries. Many areas have seen their forests re-grow, which has led to some stabilization of the soils from previous impacts. Archeological sites that would have been in the direct footprint of these activities would have been heavily impacted.

**Conclusion.** The No Action Alternative would not result in any new ground-disturbing action, nor would it prevent the continued erosion from unauthorized use of OHVs, which could lead to further degradation of sites along their routes. Therefore, it would result in cumulative, local, negligible to minor impacts on the cultural resources in the different project areas.

### 4.5.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Cultural Resources

**Bicycle Use on Existing Trails and Administrative Roads.** Any cultural resources that may be located in association with existing trails and administrative roads would have already been affected when they were constructed. The potential continued effects that may result from the use of bikes on these hardened surfaces would be no more than the existing allowed uses. Allowing for the use of bicycles on existing administrative roads that already permit hiking or allow the use of vehicles would have no impact and no adverse effects (Section 106) on cultural resources.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** Original construction of these roads would have severely impacted or destroyed any prehistoric archeological sites located along their routes. Some sections of these roads, which generally evidence physical disturbance of the soil, cross over higher probability landforms that include ridge noses and stream-side settings. Converting the roads to trails would have no anticipated additional effects to any of these resources since they would have already been affected. Because design and pre-construction mitigations incorporate archeological surveys and re-routes of proposed trails where they

could encounter archeological resources, Alternative B, "New Route Single Track Trail Construction," would have negligible, adverse impacts to archeological resources, resulting in a Section 106 determination of no adverse effect.

Implementing this alternative could ensure the protection and interpretation of three historic roads. Converting these linear features could be moderately beneficial because it would help to protect and interpret these historic resources.

Allowing bicycle use on these proposed trails would create no additional impacts over trail construction and hiking use upon them.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Many of the existing informal routes cross upland landforms that have dozens of documented and potential ridge-top and stream-juncture archeological sites. Alternative B, "New Route Single Track Trail Construction," would eliminate any further degradation of this area by rehabilitating the existing routes, thereby discouraging continued OHV use. With the proposed rehabilitation of the user-created OHV routes, erosion of the soils and possible destruction of archeological resources should diminish or stop. The proposed new trails would not disrupt any known sites or sites discovered during surveys occurring prior to trail construction. Field visits conducted as part of planning for the proposed trail system has already led to the discovery of heavy looting and vandalism to two rockshelters that are located in the project area. Improving access to the area for increased patrol by park rangers would improve their future protection and reduce the likelihood of continued looting and vandalism. Developing the proposed network of trails in the Craig Branch area would result in moderate beneficial impacts to pre-historic Native American archeological resources.

Implementing this alternative could ensure the protection and interpretation of the former truck road that connects Kaymoor Top and the Kaymoor Mine portals and is part of the Kaymoor Historic District, and the historic Kaymoor to Brown Road. The former route is classified as an administrative road, and has a gravel tread that is graded from time to time. Developing the trails in this area would be moderately beneficial because it would help to protect and interpret the area's two historic resources and by discouraging the prohibited OHV use that has led to increased erosion.

Because impacts would generally be beneficial for cultural resources, the Section 106 determination would be for no adverse effect.

Allowing bicycle use on this proposed trail system would create no additional impacts over trail construction and hiking use upon them.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** All proposed trail segments under this alternative would be surveyed for archeological resources prior to construction. Through this process, any known or discovered archeological sites would be avoided. Construction crews would stop construction and alert the park's archeologist to any inadvertent discoveries of cultural resources. The existing and proposed trail sections cross upland landforms and do have the potential to cross unknown ridge-top and stream-juncture sites. Developing the proposed network of trails in the Garden Ground area could result in negligible, adverse impacts to its pre-historic Native American and historic archeological resources, which constitutes a determination of no adverse effect under Section 106.

Allowing bicycle use on this proposed trail system would create no additional impacts over trail construction and hiking use upon them.

**Cumulative Impacts.** Historic land management within and surrounding the project areas has heavily disturbed cultural resources through the extensive construction of mining and logging roads. Looting of archeological sites throughout the region has occurred over the years and continues to this day. The disturbance of soils from these activities in association with erosion forces of rain, wind and the freeze-thaw cycle all contribute to the impacts to the region's cultural resources.

The project areas lie within a broader region of heavy industrial use during the build-up of the coal and timber industries. Many areas have seen their forests re-grow, which has led to some

stabilization of the soils from previous impacts. Archeological sites that would have been in the direct footprint of these activities would have been heavily impacted. Current regional impacts include new housing developments, construction of roads and retail centers, and large scale logging operations. All of these activities have the potential to adversely impact cultural resources. Any potential impacts from Alternative B, "New Route Single Track Trail Construction,"would be negligible in comparison.

**Conclusion.** Alternative B, "New Route Single Track Trail Construction," would result either in beneficial or negligible, adverse impacts to archeological or historic sites in the proposed project areas. Developing the existing trail networks and the other routes should not adversely affect intact pre-historic Native American archeological sites, historic structures and buildings or other cultural resources due to the fact that all areas would be surveyed prior to construction. However, there is always the potential for inadvertent discoveries by the trail construction crews. Localized benefits would also occur where OHV routes are stabilized, which would reduce erosion to known or potential sites. This conclusion is based on having an up-to-date inventory of potential cultural resources in the affected areas or Areas of Potential Affect (APE), and more importantly, the avoidance of known and higher probability archeological site locations. It also depends upon the park's continued review of actions proposed to ensure that cemeteries and associated features like bridges and culverts are not destroyed or damaged.

The Section 106 determination for Alternative B is that the project would result in no adverse effect to archeological or historic sites in the proposed project areas because any adverse impacts were determined to be negligible.

### 4.5.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Cultural Resources

Unless noted below, analysis for effects to cultural resources for Alternative C, "Existing Disturbance Single Track Trail Construction," are the same as for Alternative B, "New Route Single Track Trail Construction." Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Craig Branch Area.** Trail construction under this alternative would be limited to converting sections of existing informal routes (old logging roads) to trail with no new ground disturbance. Other informal routes (abandoned road and user-created OHV routes) would be reclaimed as described and help remediate indirect impacts to archeological sites. The benefits to the rockshelters and historic road would be similar to the benefits described for Alternative B, "New Route Single Track Trail Construction." Therefore this alternative would be beneficial overall to cultural resources within the Craig Branch area, resulting in a Section 106 determination of no adverse effect.

Allowing bicycle use on this proposed trail system would create no additional impacts over trail construction and hiking use upon them.

**Garden Ground Area.** Analysis of impacts in this project area produces the same results as discussed under Alternative B, "New Route Single Track Trail Construction." Impacts could be imperceptibly more adverse under Alternative C, "Existing Disturbance Single Track Trail Construction," than Alternative B, "New Route Single Track Trail Construction," as a result of more proposed miles of trail construction, but adverse impacts to cultural resources would still be negligible, continuing to result in a Section 106 determination of no adverse effect.

Allowing bicycle use on this proposed trail system would create no additional impacts over trail construction and hiking use upon them.

**Cumulative Impacts.** Cumulative impacts under Alternative C, "Existing Disturbance Single Track Trail Construction," are the same as those under Alternative B, "New Route Single Track Trail Construction."

**Conclusion.** Impacts resulting from Alternative C, "Existing Disturbance Single Track Trail Construction," are very similar to those resulting from Alternative B, "New Route Single Track Trail Construction," except that there would be a lower probability of adverse impacts to cultural resources

in the Craig Branch area and a slightly higher probability of adverse impacts in the Garden Ground area. When considered as a whole, there would be no change in overall impact determinations (negligible adverse), which means that the Section 106 determination would be "no adverse effect."

### 4.5.5 Comparison of the Alternatives – Impacts to Cultural Resources

The continued existence of informal routes and impacts associated with continued erosion in the Craig Branch Area under Alternative A, the No Action Alternative, has a higher potential to lead to adverse impacts to cultural resources, particularly archeological resources, than either of the two action alternatives.

When considering the potential impacts to cultural resources from the two action alternatives, they are quite similar, and vary only in the amount of new trail being proposed for construction at the Craig Branch and Garden Ground project areas. Mitigation measures applicable to both alternatives would greatly reduce the potential to adversely impact any historic or archeological resources; all adverse impacts would be negligible, therefore the Section 106 determination under both action alternatives would be that of no adverse effect.

## 4.6 Park Facilities and Operations

### 4.6.1 About the Analysis

**Applicable Regulations and Guidelines.**

- The NPS Organic Act of 1916, which directs the U.S. Department of the Interior and the NPS to manage units "to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC § 1).
- NPS Management Policies 2006

**Methodology and Assumptions.** Evaluation of impacts is based on existing data on park facilities and operations, where available, public input and best professional judgment of park facilities and operations, as well as how those elements affect a visitor's experience in the park.

**Impact Intensity.** Park facilities and operations impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** Impacts on park facilities and operations would be barely detectable by visitors and park staff.

**Minor.** Impacts on park facilities and operations would be small – noticeable to park staff, but probably not to visitors.

**Moderate.** Impacts on park facilities and operations would be apparent to both staff and visitors.

**Major.** Impacts on park facilities and operations would be readily apparent to both staff and visitors and would result in substantial, widespread changes.

**Duration, Short-Term.** These impacts would be temporary, lasting one year or less, such as impacts associated with construction.

**Duration, Long-Term.** These impacts would last more than one year and could be permanent in nature.

### 4.6.2 Alternative A – No Action Alternative: Impacts to Park Facilities and Operations

**Bicycle Use on Existing Trails and Administrative Roads.** Because no change in management would occur to park facilities under the No Action Alternative, there would be no measurable impact to park facilities, or to visitor experiences as a result of available facilities.

Despite the prohibition on the activity, mountain biking on some park single track trails has occurred without heavy enforcement for about 30 years, thus it has become a conventional use. Alternative A, the No Action Alternative would induce the NPS to take more stringent efforts to enforce the prohibition, subject to reasonable constraints of funding, staff and operations resources. This would cause moderate, long-term adverse impacts on park operations, as enforcement capacity is already stretched thin for this relatively low-priority issue (when compared to other visitor and resource protection responsibilities and priorities, such as emergency response, river rescue and protection of archeological sites).

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** Because no new facilities would be developed and no change in management would occur in these areas, park facilities and operations would not be impacted in these areas under Alternative A, the No Action Alternative.

**Craig Branch Area.** There would be no change to facilities provided in the Craig Branch area, although the NPS may be induced to increase its current efforts to curtail the prohibited OHV use that continues to occur in this area. This would cause moderate, long-term adverse impacts on park operations, as enforcement capacity is already stretched thin, and with numerous private entrances that facilitate OHV access to the area, it is challenging to patrol. Also, NPS law enforcement staff may not want to exacerbate the OHV impacts in the area by using OHVs themselves to catch offenders, but they would have no other reliable way of keeping up with those offenders, adding additional challenges to patrolling the area.

**Garden Ground Area.** There would be no change to facilities provided in the Craig Branch area, although the NPS may be induced to increase its current efforts to curtail the prohibited OHV use that continues to occur in this area. This would cause moderate, long-term adverse impacts on park operations, as enforcement capacity is already stretched thin, and with several private entrances that facilitate OHV access to the area, it is challenging to patrol. Also, NPS law enforcement staff may not want to exacerbate the OHV impacts in the area by using OHVs themselves to catch offenders, but they would have no other reliable way of keeping up with those offenders, adding additional challenges to patrolling the area.

**Cumulative Impacts.** Alternative A, the No Action Alternative, would contribute noticeably to demands on park facilities and operations, as park visitation would be expected to increase from a growth in resident and tourist populations.

**Conclusion.** Alternative A, the No Action Alternative, would result in long-term, moderate, adverse impacts to park operations as a result of the continuation of current management, due to enforcement of prohibited bicycle use on existing trails and due to enforcement of prohibited OHV use in the Craig Branch and Garden Ground areas.

### 4.6.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Park Facilities and Operations

**Bicycle Use on Existing Trails and Administrative Roads.** Allowing bicycle use on selected park trails and administrative roads would substantially reduce the need to enforce bicycle use prohibitions, which would still be active on some park trails that rarely, if ever, receive any bicycle use currently. Maintenance of existing trails is already accounted for in park budgets, and maintenance needs would not be expected to increase very much by allowing for bicycle use, although a few isolated locations along existing trails where they are routed through wet areas may need slightly more frequent maintenance or to be rerouted to more sustainable alignments, resulting in negligible, adverse impacts to park facilities and operations.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** The development of new park trails, considered assets under the NPS facilities management system, would result in short-term, minor, adverse impacts to fulfill the budget and staffing needs of trail development. In the long term, the addition of these facilities to the park system would create negligible, adverse impacts, as the trails would need to be patrolled and maintained, costing money and staff time.

Because these trails would be developed using sustainable design principles for bicycle use, no additional maintenance needs would result from biking and hiking use over pedestrian use only.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** The development of a new park trail system, considered an asset under the NPS facilities management system, would result in short-term, moderate, adverse impacts to fulfill the budget and staffing needs of trail development. In the long term, the addition of these facilities to the park system would create negligible, adverse impacts, as the trails would need to be patrolled and maintained, costing money and staff time.

However, the rehabilitation of existing informal routes and incorporation of constricting features that would deter OHV use of the proposed new trails, in conjunction with the regular use of the trails by visitors whose uses have been determined appropriate by the NPS would likely discourage continued OHV use of the Craig Branch area. Additionally, the ability of NPS law enforcement staff to use bicycles to patrol the proposed trail system would facilitate protection of the area from OHV use and from looting of archeological sites, ultimately creating benefits for the area's fundamental resources and values.

Because these trails would be developed using sustainable design principles for bicycle use, no additional maintenance needs would result from biking and hiking use over pedestrian use only.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** The development of a new park trail system, considered an asset under the NPS facilities management system, would result in short-term, moderate, adverse impacts to fulfill the budget and staffing needs of trail development. In the long term, the addition of these facilities to the park system would create negligible, adverse impacts, as the trails would need to be patrolled and maintained, costing money and staff time.

However, the rehabilitation of existing informal routes and incorporation of constricting features that would deter OHV use of the proposed new trails, in conjunction with the regular use of the trails by visitors whose uses have been determined appropriate by the NPS would likely discourage continued OHV use of the Garden Ground area. Additionally, the ability of NPS law enforcement staff to use bicycles to patrol the proposed trail system would facilitate protection of the area from OHV use and other resource damage, ultimately creating benefits for the area's fundamental resources and values.

Because these trails would be developed using sustainable design principles for bicycle use, no additional maintenance needs would result from biking and hiking use over pedestrian use only.

**Cumulative Impacts.** Alternative B, "New Route Single Track Trail Construction," would provide needed facilities and opportunities to accommodate the increase in park visitation expected from the growth in resident and tourist populations. This alternative would noticeably accommodate the growth and allow the park to better fulfill its mission than Alternative A, the No Action Alternative, but this alternative would also result in noticeable impacts to park facilities and operations because more facilities results in greater maintenance, patrol and education needs, therefore greater strain on park budgets.

**Conclusion.** Alternative B, "New Route Single Track Trail Construction," would result in short-term minor to moderate, adverse impacts on park operations because of the staffing and funding needs associated with new trail development. In the long term, park facilities and operations would benefit from allowing bicycle use on existing trails and administrative roads and from development of the Craig Branch and Garden Ground Stacked Loop Trail Systems, and could be negligibly, adversely impacted from the facility maintenance needs associated with the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails.

### 4.6.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Park Facilities and Operations

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Because the proposed trail system would be constructed entirely on existing informal routes, mainly old logging roads, and the NPS proposes to utilize sustainable design and construction techniques, considerably more construction time, materials, labor and cost would be associated with making the segments of these existing routes that are unsustainable into sustainable trails. In some locations, it may not even be possible to develop truly sustainable trails on these existing features, which would result in greater, more frequent maintenance needs. Because less trail would be constructed in the Craig Branch area under Alternative C, "Existing Disturbance Single Track Trail Construction," than under Alternative B, "New Route Single Track Trail Construction," the short-term, adverse impacts to park facilities and operations could be roughly the same moderate intensity. However, the long-term, adverse impacts would likely be minor, because of the increased maintenance needs.

Because the proposed trail system under Alternative C, "Existing Disturbance Single Track Trail Construction," would be less extensive than that proposed under Alternative B, "New Route Single Track Trail Construction," NPS law enforcement staff would have less access to the periphery of the project area by bicycle or on trails. OHV users may re-develop their user-created routes around the periphery of the project area without much opportunity among NPS staff to prevent the action, therefore the challenges of enforcement of this activity could remain nearly the same as they are under current management.

Because these trails would be developed using sustainable design principles for bicycle use, no additional maintenance needs would result from biking and hiking use over pedestrian use only.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Because the proposed trail system would be constructed mostly on existing informal routes, mainly old logging roads, user-created OHV routes and mine benches, and the NPS proposes to utilize sustainable design and construction techniques, considerably more construction time, materials, labor and cost would be associated with making the segments of these existing routes that are unsustainable into sustainable trails. In some locations, it may not even be possible to develop truly sustainable trails on these existing features, which would result in greater, more frequent maintenance needs. The increased mileage proposed by Alternative C, "Existing Disturbance Single Track Trail Construction," over Alternative B, "New Route Single Track Trail Construction," would not be enough to substantially change the other impacts to park facilities and operations discussed for Alternative B. Therefore, both short-term and long-term, adverse impacts would increase as a result of construction and maintenance needs, though the intensity of the short-term impacts would remain moderate and the intensity of the long-term impacts may increase to minor.

Because these trails would be developed using sustainable design principles for bicycle use, no additional maintenance needs would result from biking and hiking use over pedestrian use only.

**Cumulative Impacts.** The difference in trail construction requirements and proposed trail distance under Alternative C, "Existing Disturbance Single Track Trail Construction," are not substantial enough to create any difference in cumulative impacts to park facilities and operations between Alternative C and Alternative B, "New Route Single Track Trail Construction." See the cumulative impact analysis in Section 4.6.3.

**Conclusion.** Alternative C, "New Route Single Track Trail Construction," would result in short-term moderate, adverse impacts on park operations because of the staffing and funding needs associated with new trail development. In the long term, park facilities and operations would be adversely impacted at a minor intensity as a result of higher maintenance needs and greater enforcement challenges under Alternative C than under Alternative B, "New Route Single Track Trail Construction."

### 4.6.5 Comparison of the Alternatives – Impacts to Park Facilities and Operations

Alternative A, the No Action Alternative, would result in greater challenges for NPS law enforcement, requiring more time, staff and funding to meet NPS goals for the project areas; long-term, moderate, adverse impacts to park facilities and operations would be the result. Alternative B, "New Route Single Track Trail Construction," would result in beneficial overall impacts to park facilities and operations by allowing bicycle use on some existing trails and administrative road and from proposed trail development and area rehabilitation in the Craig Branch and Garden Ground areas. Alternative C, "New Route Single Track Trail Construction," would result in greater short-term impacts on park facilities and operations for proposed trail construction in the Craig Branch and Garden Ground areas because of the greater costs, materials, time and labor required to develop sustainable trails on existing unsustainable routes; long-term maintenance needs would also increase, resulting in a greater long-term impact on park facilities and operations, as well, all as opposed to impacts associated with Alternative B, "New Route Single Track Trail Construction."

## 4.7 Visitor Use, Experience and Access

### 4.7.1 About the Analysis

- The NPS Organic Act of 1916, which directs the U.S. Department of the Interior and the NPS to manage units "to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations" (16 USC § 1).
- NPS Management Policies 2006

**Methodology and Assumptions.** Evaluation of impacts is based on existing data on visitor use and experience, where available, public input and best professional judgment of visitor use, experience and access in the park and surrounding region and how those elements of visitor's experience in the park may be impacted by changes in the park's physical conditions and its management.

**Impact Intensity.** Visitor use, experience and access impact intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** The action would result in impacts that would be barely detectable, or would occasionally affect the experience of a few visitors in the applicable setting.

**Minor.** The action would result in impacts that would be slight but detectable; could be perceived as negative by visitors or could inhibit visitor experience or the achievement thereof as a result of access issues. Impacts would negatively affect the experience of some visitors in the applicable setting.

**Moderate.** The action would result in impacts that would be readily apparent and perceived as somewhat negative or would inhibit visitor experience or the achievement thereof as a result of access issues. Impacts would negatively affect the experience of many visitors in the applicable setting.

**Major.** The action would result in impacts that would be highly negative or would seriously inhibit visitor experience or the achievement thereof as a result of access issues. Impacts would negatively affect the experience of a majority of visitors in the applicable setting.

**Duration, Short-Term.** These impacts would be temporary, lasting one year or less, such as impacts associated with construction.

**Duration, Long-Term.** These impacts would last more than one year and could be permanent in nature.

### 4.7.2 Alternative A – No Action Alternative: Impacts to Visitor Use, Experience and Access

Because the No Action Alternative continues current management, existing visitor use, experience, facilities and access would remain largely the same as the current condition.

**Bicycle Use on Existing Trails and Administrative Roads.** Because no change in management would occur to park facilities or access under the No Action Alternative, there would be no measurable impact to park access, or to visitor experiences as a result of available facilities or ease of access. Also, because no management actions would change the use patterns of non-bicycle riding trail users, those visitors would not be impacted by the No Action Alternative.

Despite the prohibition on the activity, mountain biking on some park single track trails has occurred without heavy enforcement for about 30 years, thus it has become a conventional use. Alternative A, the No Action Alternative, would induce the NPS to take more stringent efforts to enforce the prohibition, subject to reasonable constraints of funding, staff and operations resources. This would cause major adverse impacts to the mountain biking user group, and minor adverse impacts to overall visitor experiences on park trails, as many of the park's trail users are mountain bikers. This more stringent enforcement of bike use would not result in any beneficial impacts to other trail users, as there is no record of conflict resulting from bicycle use on park trails.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** Because no change in management of the area would occur, visitor use and experience in areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails would remain the same as that which is described in Section 3.6.2. This would result in minor adverse impacts on visitor use and experience in this area of the park. Visitors seeking to have a primitive experience could still enjoy the natural and cultural resources along these old road traces. While these areas are fairly easily accessible, and visitors could still explore these old road traces on foot, the terrain would be challenging and heavily vegetated, and the park would not be providing any opportunities to visitors to facilitate their experiences.

**Craig Branch Area.** Because no change in management of the area would occur, visitor use and experience in the Craig Branch project area would remain the same as that which is described in Section 3.6.3. This would result in moderate adverse impacts on visitor use and experience in this area of the park. Visitors seeking to have a frontcountry park experience within this area of the park would instead encounter land used for resource extraction that has not been reclaimed in any way and is in a degraded environmental condition. They would also encounter prohibited and inappropriate park uses, such as OHV activity. Further, the available informal routes by which to experience this area are predominantly old logging roads and user-created OHV routes that are muddy and unstable hiking surfaces, and they are present in such a web-like network that it can be difficult to navigate the area.

Appropriate park uses do occur along the existing Craig Branch Trail/Administrative Road, but the experience of visitors using this route is moderately adversely impacted by the degraded condition of the surrounding forest.

Bicycle use occurs on the Craig Branch Trail/Administrative Road, and often that use comes from novice riders either on their own or with guided commercial tours. Because this surface is gravel that often behaves somewhat like marbles underneath bike tires, moderate adverse impacts to experiences for this user group would occur as a result of Alternative A, the No Action Alternative, under which no new novice-level trails would be constructed. These users would remain on the trail/administrative road where they could still ride bicycles, but may have to get off their bikes and walk through substantial sections of trail in order to feel safe and within their skill levels.

**Garden Ground Area.** Because no change in management of the area would occur, visitor use and experience in the Garden Ground project area would remain the same as that which is described in Section 3.6.4. This would result in minor adverse impacts on visitor use and experience in this area of the park. Visitors seeking to have a primitive experience could enjoy some of the imporatant cultural and natural resources in this area, including the unfragmented mixed mesophytic forest, remnants of historic farm houses and cemeteries (none of which are interpreted to facilitate an understanding of their context and importance), as well as some spectacular scenic views of the gorge. However, these

opportunities can only be accessed by cross country travel on foot through thick vegetation, or they can be accessed on overgrown, decommissioned logging and mining roads or user-created OHV routes, some of which are still in use, despite park prohibitions on that activity. Visitor experience is additionally inhibited by the project area's relative inaccessibility on narrow, unsigned roads that are challenging to discover.

**Cumulative Impacts.** Past, present and reasonably foreseeable future projects summarized in Table 4-1 would result in overall cumulative beneficial impacts to visitor use, experience and access by providing new park facilities, better access to the park and more recreational opportunities for park visitors, including more opportunities for visitors to have engaged, developed or interpreted park experiences. Alternative A, the No Action Alternative, would result in long-term minor adverse impacts to park visitor use and experience, which would contribute a small but noticeable adverse impact to the overall cumulative benefits. Because more stringent enforcement of the prohibited but conventional mountain bike use on park trails would be required by Alternative A, the No Action Alternative, this activity in the New River Gorge region would be substantially negatively impacted, as mountain bike use in the region is fairly dependent upon the availability of opportunities in the park.

In particular, the BSA and participants in the programs available at the Summit Bechtel Family National Scouting Reserve would be appreciably impacted by Alternative A, the No Action Alternative. Many future BSA park visitors and their families would not have opportunities for long-distance hiking, rendering backpacking (a traditional scouting activity) nearly infeasible for these groups, as well as other park visitors.

Alternative A, the No Action Alternative would have imperceptible impacts upon park facilities, which around the park would continue to be developed under other NPS Actions (Table 4-1), though not in the project areas discussed in this EA. Park access would see overall cumulative benefits from the transportation projects occurring around the park – visitors could more easily locate and access their desired experiences within the park, and Alternative A, the No Action Alternative, which would not change park access from the current management, would contribute imperceptible differences to the cumulative benefits.

**Conclusion.** Alternative A, the No Action Alternative, would result in long-term minor adverse impacts to visitor use and experience in the park because visitors' preferred park experiences would not be available in sizeable areas of the park, including the Craig Branch and Garden Ground areas and the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails. Also, because the conventional but prohibited use of mountain bikes on park trails would be more stringently enforced, this alternative would result in major adverse impacts to this user group, which would result in overall minor adverse impacts to park visitor experience.

### 4.7.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Visitor Use, Experience and Access

Alternative B, "New Route Single Track Trail Construction," would result in minor short-term adverse impacts to visitor use, experience and access associated with new trail construction. Appropriate visitor use in the Craig Branch and Garden Ground areas, as well as the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails would be disturbed by the activities, noise and presence of trail crews and machinery on those sites during construction. Any construction that may occur during hunting season could scare deer and impact hunters' experience. Equipment staged at access points would impact visitors' sense of outdoor adventure or remoteness, especially in the backcountry areas of Garden Ground and the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails. The presence of construction crews may deter OHV use in the area through the time of construction, which would be a short-term beneficial indirect impact of construction activity.

Alternative B, "New Route Single Track Trail Construction," would result in substantial beneficial long-term impacts to visitor experience in the park by providing more recreational opportunities, particularly those that would facilitate visitors' preferred park experiences. More visitor facilities would be provided, and access to remote parts of the park would be improved.

Adding to these benefits, allowing bicycle use on the Craig Branch and Garden Ground Trail Systems, the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and some of the park's existing trails would substantially expand mountain biking opportunities in the New River Gorge Region, resulting in tremendous beneficial impacts for this user group in the park, including both private mountain bikers and commercial guide services. Allowing bike use on park trails would make the park more interesting and inviting to a large and growing national user group of mountain bikers, who may not otherwise appreciate the NPS mission and values; their support and appreciation of the park would contribute to the strategic goal of the NPS to become and remain relevant to new user groups and youth. By using bikes, park visitors could more easily access many of the park's interesting and important natural and cultural resources that are remote and too far along a trail for many visitors to hike during their length of stay. Visitors would have a myriad of opportunities to learn about and develop an appreciation for the park's outstanding resources and values. Alternative B (the Preferred Alternative) would be beneficial for the many park stakeholders who have participated in various processes of public input over a time period of at least seven years, requesting that bike use be allowed and that more trails and loop opportunities be developed in the park.

Further adding to the beneficial impacts, by providing nearly 50 miles of new trail (including the proposed Craig Branch and Garden Ground Trail Systems and the proposed Mud Turn and Panther Branch Connector Trails), overall, Alternative B, "New Route Single Track Trail Construction," would make the park a more attractive place for long distance hikers and backpackers to visit and enjoy an opportunity that doesn't often happen in the park for lack of trail mileage and connections. All proposed new trails could facilitate hunting access to the areas in which they are located.

**Bicycle Use on Existing Trails and Administrative Roads.** While access and facilities would not change along existing trails and administrative roads, Alternative B, "New Route Single Track Trail Construction," would result in the beneficial impacts discussed above related to allowing bicycle use on park trails. Because management on the Brooklyn Mine Trail/Administrative Road would be changed to allow bicycle use and horse and pack stock use of the trail/administrative road could be discontinued, the few horseback riding trail users who have participated in that activity could be adversely impacted, including the commercial guide service that offers horseback riding opportunities in that area. Because the guide service may have already closed its business and trail users with horses and pack stock represent such a miniscule percentage of the park's visitors, this would create an overall negligible, long-term impact on visitor use and experience. The benefits gained by allowing bicycle use on the Brooklyn Mine Trail/Administrative Road would be greater than the adverse impacts of closing the trail to horse and pack stock use.

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** Alternative B, "New Route Single Track Trail Construction," would result in minor short-term adverse impacts to visitor use in the areas of the proposed Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails during construction. Vehicular traffic, possibly including large vehicles, would briefly increase along the Glade Creek Road, as well as in the Grandview Area, possibly causing access challenges for visitors, particularly along the narrow Glade Creek Road where visitors and construction vehicles may need to seek pull-outs in order to go around one another in places. Equipment or construction crew vans may be parked in the Glade Creek Trailhead parking area or in parking areas at Grandview, temporarily causing some possible inconvenience for visitors, though they could still likely find parking nearby.

This alternative would result in long-term beneficial impacts to visitor use, experience and access by providing more trails in this area of the park and an opportunity to connect the top and the bottom of the gorge by trail in the greater Beckley area, which park stakeholders in the Beckley area have requested numerous times through a variety of public input opportunities and processes over at least the past seven years. More facilities would be provided and park visitors could access more recreation opportunities from existing park trailheads.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Alternative B, "New Route Single Track Trail Construction," would result in minor short-term adverse impacts to visitor use in the area during construction, as discussed above. Campers at the private campground on Kaymoor Top could experience more traffic and noise from construction during the day. Access to the Kaymoor Top area could be disturbed by a higher traffic volume associated with construction, and possibly also by the

occasional large vehicle, along the narrow and poorly-maintained Kaymoor No. 1 Road. Visitors seeking to use the Craig Branch Trail/Administrative Road could be disturbed for approximately the first 0.5 miles, as the gate blocking public vehicular access would be moved 0.5 miles along the trail/road to the existing log landing, also the proposed new trailhead. These visitors would encounter vehicular traffic, possibly including large vehicles, along this stretch of what would become a regular park road, rather than a park trail/administrative road.

Moving the gate would also create a negligible long-term adverse impact for trail users accessing the Craig Branch Trail/Administrative Road by foot or bike from other areas of the park besides the Kaymoor Top area or the proposed new trailhead for the Craig Branch Trail System. Approximately 0.5 miles of the trail/administrative road would be repurposed for public vehicular access to the proposed trailhead, and trail users connecting from other areas would share the narrow gravel road with two-way vehicular traffic.

Negligible long-term adverse impacts on park access could be created by Alternative B, "New Route Single Track Trail Construction," as more visitors would be using the Kaymoor No. 1 Road to get to the proposed new trailhead and trail system, in addition to accessing the existing Kaymoor Top facilities. Park neighbors would see an increase in traffic on the road to their residences, and visitors would also contend with additional traffic along this narrow road. Its condition may deteriorate somewhat over time as the additional use would not necessarily prompt any alterations to its maintenance schedule.

Development of the Craig Branch Stacked Loop Trail System would result primarily in substantial long-term beneficial impacts to visitor use and experience. New trailhead facilities would be provided for visitors, easing some of the burden on existing trailhead facilities at Kaymoor Top and providing additional parking for an area that can be crowded during periods of high visitation. The additional trails would provide more recreational opportunities for hikers and bikers in the area, dispersing some use of the existing trail system, offering new trails for park users to explore, inviting park users to discover a new area of the park and showcasing some of the spectacular natural, cultural and scenic resources that still exist in this area, despite the history of heavy industrialized resource extraction. Novice and intermediate level trail users would have dedicated Easiest and More Difficult trails on which to develop skills, and visitors seeking a short loop opportunity or non-strenuous dirt-surfaced path on which to exercise or share outdoor time together as a family would have shorter loop opportunities than are offered in most areas of the park. The presence of more visitors participating in park-appropriate activities could deter the use of the inappropriate activity of OHV riding in the area. The proposed new trail system would create engaging frountcountry park experiences in the Craig Branch area for visitors to enjoy.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Alternative B, "New Route Single Track Trail Construction," would result in minor short-term adverse impacts to visitor use in the area during construction, as discussed above.

Development of the Garden Ground Trail System would result primarily in substantial long-term beneficial impacts to visitor use, experience and access. By building trails and providing both trailhead facilities and navigational cues on local roads, visitors could more easily reach this remote and beautiful area of the park. Once in the Garden Ground area, they would have opportunities for high-quality backcountry park experiences, exploring the rugged landscape of the gorge and discovering the unique cultural, natural and scenic resources that can be found there. They would have the opportunity to learn about and develop an appreciation for park resources and values. Because bicycle use would be allowed in the Garden Ground area, park visitors may have the opportunity to explore more of the area than they would on foot, exposing them to more resources and interpretive opportunities by which they could learn about park values and the interesting history of the area. Further, the high-quality More and Most Difficult level trails in this area could attract the attention of mountain bikers around the world, as has occurred with the whitewater boating and rock climbing recreation opportunities in the park, bringing new visitors to the park and helping the NPS to become and remain relevant to a user group that is predominantly young and growing in size and support. The proposed new trail development would create engaging backcountry park experiences in the Garden Ground area for visitors to enjoy.

**Cumulative Impacts.** Past, present and reasonably foreseeable future projects summarized in Table 4-1 would result in overall cumulative beneficial impacts to visitor use, experience and access by providing new park facilities, better access to the park and more recreational opportunities for park visitors, including more opportunities for visitors to have their preferred park experiences. Alternative B, "New Route Single Track Trail Construction," would contribute appreciable beneficial impacts to the cumulative impacts of these projects, by contributing a substantial number of the engaging experiences and recreational opportunities visitors to the park are seeking.

**Conclusion.** Alternative B, "New Route Single Track Trail Construction," would result in some short-term minor adverse impacts to visitor use and experience associated with the noise, traffic and disturbance of construction, but substantial long-term beneficial impacts resulting from the provision of more trail opportunities in the park, the provision of more of visitors' park experiences and the normalization of bicycle use on park trails.

### 4.7.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Visitor Use, Experience and Access

Impacts to visitor use, experience and access resulting from Alternative C, "Existing Disturbance Single Track Trail Construction," would be the same overall impacts as those resulting from Alternative B, "New Route Single Track Trail Construction," New trail construction would still occur in the Craig Branch and Garden Ground areas, resulting in similar short-term impacts to those discussed in Section 4.7.3. Long-term impacts would also be similar, with the exceptions discussed below.

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction."

**Craig Branch Stacked Loop Trail System with Bicycle Use.** The 4.5 miles of existing logging roads that would be converted to single track trail under Alternative C, "Existing Disturbance Single Track Trail Construction," would provide new trail mileage and loop opportunities that park stakeholders have requested for over seven years through various public input opportunities and processes. Thus long-term impacts of this alternative would be beneficial, but not substantially so, giving visitors new opportunities to enjoy trail experiences and to explore more of the park's natural and cultural resources. However, the existing logging roads that would be converted to trails were developed to make timber extraction most efficient, not to provide high-quality trail experiences. The proposed new trails would not necessarily access the most interesting features in the Craig Branch area, nor would they provide visitors with trail options to suit different skill levels or trail use goals. Also, because the road-to-trail conversions would occur largely on unsustainable grades, trail surfaces would degrade more rapidly than on sustainable trails, requiring more maintenance and likewise degrading user experiences as visitors would be faced with increasing incidences of mud puddles, erosion, exposed rocks and roots, trail widening to avoid such unwanted features, as well as other challenges. While Alternative C, "Existing Disturbance Single Track Trail Construction," would result in more trails and loop opportunities, it would not result in visitors' preferred frontcountry park experiences in the Craig Branch area.

Because visitor access and proposed new facilities would be the same under Alternative C, "Existing Disturbance Single Track Trail Construction," as they would be under Alternative B, "New Route Single Track Trail Construction," long-term impacts to visitor use and experience related to access and facilities would be the same as those discussed in Section 4.7.3.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Alternative C, "Existing Disturbance Single Track Trail Construction," would result in long-term beneficial impacts to visitor experience that could provide roughly the same level of benefit as Alternative B, "New Route Single Track Trail Construction." Alternative C, "Existing Disturbance Single Track Trail Construction," proposes more miles of new trail construction in the Garden Ground area than does Alternative B, "New Route Single Track Trail Construction," which could provide a greater benefit to visitor experience for those visitors seeking more miles of trail to ride, hike or run, but could provide less of a benefit to visitors seeking a sense of remoteness from their trail explorations.

**Cumulative Impacts.** Cumulative impacts for Alternative C, "Existing Disturbance Single Track Trail Construction," would be the same as those for Alternative B, "New Route Single Track Trail Construction." The difference of mileage and trail experience quality in the Craig Branch area and trail mileage in the Garden Ground area between the two action alternatives is not a noticeable difference in the overall cumulative impacts of the actions proposed and the past, present and reasonably foreseeable future actions listed in Table 4-1.

**Conclusion.** Alternative C, "Existing Disturbance Single Track Trail Construction," would result in some short-term minor adverse impacts to visitor use and experience associated with the noise, traffic and disturbance of construction, but long-term beneficial impacts resulting from the provision of more trail opportunities in the park, the provision of more "classic" park experiences and the normalization of bicycle use on park trails.

### 4.7.5 Comparison of the Alternatives – Impacts to Visitor Use, Experience and Access

Alternative A, the No Action Alternative, would result in no short-term impacts, but it would result in long-term minor adverse impacts to park visitor use and experience by failing to provide visitors' preferred park experiences in sizeable areas of the park, the project areas. The two action alternatives, on the other hand, would result in short-term minor adverse impact to park visitors related to noise, traffic and disturbance from construction activities, but both would provide substantial long-term beneficial impacts to overall visitor use and experience within the park, with Alternative B, "New Route Single Track Trail Construction," offering greater benefits than Alternative C, "Existing Disturbance Single Track Trail Construction."

## 4.8 Socioeconomics

### 4.8.1 About the Analysis

**Applicable Regulations and Guidelines.** The CEQ's Regulations for Implementing NEPA require that the impacts on the human environment be analyzed for all alternatives of the project.

> "Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment. (40 CFR 1508.14)

Effects are defined by the CEQ to include

> ecological (such as the effects on natural resources and on the components, structures and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social or health, whether direct, indirect or cumulative. (40 CFR 1508.8)

Socioeconomic impacts of the actions proposed must be analyzed as part of a comprehensive disclosure of anticipated effect on the human environment.

**Methodology and Assumptions.** Evaluation of impacts is based on existing socioeconomic data, where available, public input and best professional judgment of economic conditions, tourism and public health in the region around the park and how those socioeconomic elements could respond to changes in local recreational opportunities.

**Impact Intensity.** Socioeconomics intensities are defined for adverse impacts. Beneficial impacts are described qualitatively without levels of intensity.

**Negligible.** The action would produce no measurable impacts on the area's economy employment base, labor force or housing market.

**Minor.** The action would result in small, but detectable, changes to economic conditions. Only a small number of businesses and/or a small portion of the population would be affected. The impact would be slight and not detectable outside of one or more gateway communities.

**Moderate.** The action would result in readily apparent changes to economic conditions. Any impacts would be localized within the three-county area of Fayette, Raleigh and Summers Counties.

**Major.** The action would result in readily apparent changes to economic conditions. Measurable changes in social or economic conditions at the regional level would occur. The impact would be severely adverse within the region.

**Duration, Short-Term.** These impacts would be temporary, lasting one year or less, such as impacts associated with construction.

**Duration, Long-Term.** These impacts would last more than one year and could be permanent in nature.

### 4.8.2 Alternative A – No Action Alternative: Impacts to Socioeconomics

Because Alternative A, the No Action Alternative continues current management, and no abrupt changes to the park, particularly construction, would occur, no short-term socioeconomic impacts would result from this alternative. All impacts discussed in this section (Section 4.8.2) would be considered long-term socioeconomic impacts.

**Bicycle Use on Existing Trails and Administrative Roads.** Continuation of current management would result in the continued public recreational and commercially guided bicycle use of designated park administrative roads, so commercial guide service businesses would not be adversely impacted. However, the park has not heavily enforced the prohibition of bicycle use on single track trails, so the local community as well as visitors from out of town have grown accustomed to participating in that activity – so much so that major national publications Outside Magazine and Budget Travel Magazine have advertised and celebrated mountain biking opportunities in the New River Gorge (Kuntz 2006, Siber 2006, Sweeny 2010). Under Alternative A, the No Action Alternative, the park would be required to more stringently enforce that prohibition, as park staff, funding and operations resources are available. Making efforts to remove that existing use from park single track trails would substantially reduce the availability of mountain biking opportunities, be they official or unofficial, around the New River Gorge Region. Further, the park may no longer provide special use permits for events that incorporate sections of single track trail within the park into mountain bike races.

This would cause minor adverse impacts to tourism and marketing efforts for the area, and could result in the closure of one or more area retailers who sell bicycle equipment, which in small towns like Fayetteville would have a noticeable (moderate adverse) impact on the local economy. Alternative A, the No Action Alternative may also result in a small reduction in visitation to the area, which would have negligible adverse impacts on the local tourism-dependent economy.

**Mud Turn, Panther Branch and Brooklyn Mine Areas.** Continuation of current management in the Mud Turn and Panther Branch Connector Trails project areas would cause no change to local or regional socioeconomic conditions. Tourism, business, employment and health would continue on the same trends present at the current time, because no new recreational opportunities would be offered.

**Craig Branch Area.** Continuation of current management in the Craig Branch project area would cause no change to local or regional socioeconomic conditions. Tourism, business, employment and health would continue on the same trends present at the current time, because no new recreational opportunities would be offered.

**Garden Ground Area.** Continuation of current management in the Garden Ground project area would cause no change to local or regional socioeconomic conditions. Tourism, business, employment and health would continue on the same trends present at the current time, because no new recreational opportunities would be offered.

**Cumulative Impacts.** Nearly all of the past, present and reasonably foreseeable future actions summarized in Table 4-1 would contribute to socioeconomic impacts for the three-county region. While a few of those actions would represent or cause adverse impacts on the regional economy or public health, overall most would contribute to an increase in tourism by easing access to the area or drawing more visitation, as well as an increase in business interest and opportunity in the area, and potentially improvements to the regional conditions of poverty and public health. While implementing Alternative A, the No Action Alternative, or continuing current management of the project areas, would not contribute to this overall economic growth, neither would it deter the trends already at play in the regional economy. The adverse socioeconomic impacts that would be caused for the town of Fayetteville by the prohibition of bicycle use on park trails, and more stringent enforcement thereof, would be noticeable but potentially negligible in a cumulative sense.

**Conclusion.** Alternative A, the No Action Alternative could result in moderate adverse, long-term socioeconomic impacts to the town of Fayetteville and negligible adverse, long-term socioeconomic impacts to the city of Beckley. This alternative would not result in socioeconomic impacts to the overall three-county region in which the park is situated.

### 4.8.3 Alternative B – New Route Single Track Construction (NPS Preferred Alternative): Impacts to Socioeconomics

Short-term beneficial socioeconomic impacts of Alternative B, "New Route Single Track Trail Construction," would be associated with new trail construction and grand opening of the new trail systems, resulting from the purchase of materials and purchase rental of equipment from local and regional sources, as well as the spike in non-resident visitation to the area associated with volunteers constructing trail and visitors excited to explore the new trails and new areas of the park, and the attendant economic contribution to local businesses that serve the tourism industry.

All socioeconomic impacts discussed in the remainder of this section (Section 4.8.3) would be long-term impacts.

Development of new trails in the park, including the Craig Branch and Garden Ground Trail Systems and Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails would substantially expand and improve the recreational opportunities in the park, which would have beneficial impacts on the regional economy, drawing more tourists to the area and encouraging longer stays for visitors by providing them with more things to see and do. Area visitors who stay longer spend more money on lodging, food and entertainment. Additional recreational opportunities may also encourage repeat visits to the park, as well as provide visitors with reasons to visit more areas of the park, and therefore more of the park's surrounding communities, than they would under Alternative A, the No Action Alternative. The availability of new long-distance hiking and biking opportunities may also attract new visitors to the park and surrounding area. This growth in visitation and infusion of more money into the area's economy may result in greater profits for local businesses and a small amount of job growth in the area to support the increased demand for goods and services.

Allowing bicycle use on the Craig Branch and Garden Ground Trail Systems, the Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails and some of the park's existing trails would substantially expand mountain biking opportunities in the New River Gorge Region. Mountain biking is already recognized as a popular activity in the area (Kuntz 2006, Siber 2006, Sweeny 2010), but the whitewater boating and rock climbing opportunities are touted as being world-class. Alternative B, "New Route Single Track Trail Construction," could raise mountain biking around the New River Gorge to the same world-class status, which would attract many new visitors, encourage visitors who came for other recreational opportunities to stay longer to participate in additional activities and therefore provide substantial beneficial impacts for the local economy.

While new trails would have a negligible effect on the poverty level in the area, they could have a beneficial impact on health conditions by providing more opportunities in different areas for people to participate in active, healthy recreational activities.

**Bicycle Use on Existing Trails and Administrative Roads.** See the general analysis of socioeconomic impacts of Alternative B, "New Route Single Track Trail Construction," at the beginning of this section (Section 4.8.3).

**Mud Turn, Panther Branch Connector and Brooklyn Miner's Connector Trails with Bicycle Use.** The development of these trails would produce negligible beneficial socioeconomic impacts for the city of Beckley. While the trails would provide more opportunities for visitors and residents to participate in healthy, active recreation, and they would add to the trail mileage available in the Beckley area, possibly attracting slightly more tourism to the area, the impacts on the overall health and economy of the area would not be noticeable.

**Craig Branch Stacked Loop Trail System with Bicycle Use.** The Craig Branch Stacked Loop Trail System would provide more trail opportunities near the town of Fayetteville, which would expand visitors' ability to experience the park from town, encouraging them to stay longer and spend more time contributing to the Fayetteville economy. More trail opportunities in this area may also increase tourism to Fayetteville, particularly by allowing bicycle use on the trails and making the area much more appealing to a large population of active outdoor enthusiasts.

Providing Easiest level trails in this area would invite new visitors into the park and to the Fayetteville area. Very few trails in the park are well suited for beginners, particularly for novice mountain bikers. These trails would be very inviting for families to explore together by foot or bike, and would offer a good space for novice riders to build their skills. The design for Alternative B, "New Route Single Track Trail Construction," includes an Easiest loop of approximately one mile. This loop would be a low bar for entrance and encourage more resident park visitors to start walking, biking and spending time together outdoors because they wouldn't be intimidated by the need to make a loop commitment of several miles. The Park Loop Trail is approximately one mile in length, and it is one of the most heavily used trails in the park, where local people walk alone for exercise or with each other, all the while improving their health and fitness.

These opportunities would benefit resident and non-resident visitors alike by providing them with trails where they could spend time together and participate in active, healthy recreational activities, all of which can be inexpensive to get into and substantially improve health and fitness. Especially by allowing mountain biking on these Easiest trails, local youth would likely be more interested to start exercising by participating in an adventure sport than something like hiking that they may feel is not "cool" enough to be involved. Engaging youth in active, healthy outdoor recreation could have a major beneficial impact on the future of public health in the Fayetteville area.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** Because the Garden Ground Trail System would consist of More and Most Difficult trails, it is in a fairly remote location and most of the loop opportunities offered there would be at least several miles in length, it would not be an attractive area for families and novice trail users to casually visit on a regular basis, so it would not necessarily contribute to improvements in public health.

However, the trails in this area would be extremely attractive to trail runners and mountain bikers seeking opportunities for challenge and adventure. Many visitors who are familiar with the New River Gorge would come to the Garden Ground area for the first time, and many new visitors would come to the region for these opportunities. Nearly all of these visitors would travel through the town of Mount Hope on their way to the proposed Terry Top Trailhead. Mount Hope is an economically depressed and impoverished community with many empty store fronts. The influx of tourists to the area would provide a viable opportunity for new business in this small community. Because the population of Mount Hope is only about 1,300 people, a handful of new businesses could have a substantial beneficial impact on the local economy and even a noticeable beneficial impact on poverty in the community. Additionally, as visitors see the town, its nearby recreation opportunities, its appealing historic character, its low real estate prices and the prospects for starting a business of their own, they may choose to establish residency in the town, just as numerous outdoor enthusiasts have done in Fayetteville. This would benefit the local economy and grow the community.

**Cumulative Impacts.** Nearly all of the past, present and reasonably foreseeable future actions summarized in Table 4-1 would contribute to socioeconomic impacts for the three-county region.

While a few of those actions would represent or cause adverse impacts on the regional economy or public health, overall most would contribute to an increase in tourism by easing access to the area or drawing more visitation, as well as an increase in business interest and opportunity in the area, and potentially improvements to the regional conditions of poverty and public health. Implementation of Alternative B, "New Route Single Track Trail Construction," could noticeably contribute to cumulative socioeconomic beneficial impacts of the actions in Table 4-1. Alternative B, "New Route Single Track Trail Construction," could draw substantial numbers of new mountain bikers to the area, which would cause a notable increase in tourism even considering the other regional actions that would draw new visitors to the area. Development of the Garden Ground Trail System in conjunction with development of the Summit Bechtel Family National Scouting Reserve would produce substantial socioeconomic benefits for the city of Mount Hope. Further, the visitation that the BSA Summit would bring to the area among scouts and their families, in conjunction with development of multiple new trail systems in the park and allowing bike use on all proposed new and some existing park trails, would provide those visitors with more reasons to stay longer, explore more of the region and possibly even relocate to the area, bringing new business and employment opportunities with them.

**Conclusion.** Alternative B, "New Route Single Track Trail Construction," would result in some noticeable short-term and substantial long-term beneficial socioeconomic impacts for the three-county region around the park.

### 4.8.4 Alternative C – Existing Disturbance Single Track Trail Construction: Impacts to Socioeconomics

The socioeconomic impacts of Alternative C, "Existing Disturbance Single Track Trail Construction," would be the same overall impacts as those discussed for Alternative B, "New Route Single Track Trail Construction," because new trails and mountain biking opportunities would attract new visitors – resident and non-resident – and offer further opportunities to extend visitors' lengths of stay in the area.

Proposals common to both alternatives (see Section 2.2) are analyzed under Alternative B, "New Route Single Track Trail Construction".

**Craig Branch Stacked Loop Trail System with Bicycle Use.** Alternative C, "Existing Disturbance Single Track Trail Construction," would convert about 4.5 miles of existing logging roads into single track trails, which would offer only a moderately attractive user experience (see Section 4.8.3). Because of this, these trails may not attract a substantial number of new mountain bikers, families seeking easy hiking or biking opportunities in which to participate together, local residents seeking a short trail loop for exercise or youth seeking opportunities to learn a "cool" new outdoor activity like mountain biking. While these trails would add some mileage to the Fayetteville area trail system, they would not add particularly high quality trails, insofar as user experience is concerned. Therefore, the benefits that this trail system would bring to the local economy and public health would be negligible to minor.

**Garden Ground Stacked Loop Trail System with Bicycle Use.** The socioeconomic impacts of the Garden Ground Stacked Loop Trail System proposed in Alternative C, "Existing Disturbance Single Track Trail Construction," would be the same overall impacts as the Garden Ground Stacked Loop Trail System proposed in Alternative B, "New Route Single Track Trail Construction." While more miles of trail proposed in the Garden Ground area by Alternative C than by Alternative B would produce different environmental impacts related to the possibility of forest fragmentation, the additional miles would not create any noticeable increase in visitation from that which could be expected from Alternative B, "New Route Single Track Trail Construction." Therefore, under scenarios for both of the action alternatives, essentially the same amount of new visitation to the town of Mount Hope would likely result.

**Cumulative Impacts.** Cumulative impacts for Alternative C, "Existing Disturbance Single Track Trail Construction," would be the same as those for Alternative B, "New Route Single Track Trail Construction." The difference of mileage and trail experience quality in the Craig Branch area and trail mileage in the Garden Ground area between Alternatives B and C is not a noticeable difference in the

overall cumulative impacts of the actions proposed and the past, present and reasonably foreseeable future actions listed in Table 4-1.

**Conclusion.** Alternative C, "Existing Disturbance Single Track Trail Construction," would result in some noticeable short-term and considerable long-term beneficial socioeconomic impacts for the three-county region around the park.

### 4.8.5 Comparison of the Alternatives – Impacts on Socioeconomics

Alternative A, the No Action Alternative would result in no noticeable short- or long-term socioeconomic impacts to the overall regional economy, though it could result in moderate adverse, long-term socioeconomic impacts to the town of Fayetteville and negligible adverse, long-term socioeconomic impacts to the city of Beckley. Both of the action alternatives, however, would result in substantial beneficial socioeconomic impacts to the region, as well as individually to the town of Fayetteville, city of Beckley and especially the city of Mount Hope, with Alternative B, "New Route Single Track Trail Construction," offering slightly more beneficial impacts than Alternative C, "Existing Disturbance Single Track Trail Construction." Cumulatively, taking into consideration past, present and reasonably foreseeable future actions, socioeconomic impacts of Alternative A, the No Action Alternative, would be imperceptible, while the impacts of both of the action alternatives would be noticeably beneficial.

# 5 CONSULTATION AND COORDINATION

## 5.1 Public Involvement

**Public Involvement for the General Management Plan.** Throughout the public involvement process for the development of the General Management Plan, many members of the public and park user groups requested that the NPS consider designation of additional routes for biking in the park. The NPS consulted with the general public and park user groups interested in biking during the development of GMP action alternatives.

In October 2007, a newsletter was sent to 797 people and groups on the park mailing list outlining the biking options under consideration and inviting the public to meetings for discussion of the GMP alternatives as well as the biking options.

On November 6, 7 and 8, 2007, public meetings on the proposed GMP alternatives included a presentation of the biking options under consideration and a question-and-answer session. Most comments related to biking supported the addition of expanded biking in the park, particularly expansion of single track and stacked loop trails.

The NPS prepared a *Draft General Management Plan/Environmental Impact Statement (Draft GMP/EIS)*, which was available for public review from January 13, 2010 through April 16, 2010. The Draft GMP/EIS describes five alternatives and identified Alternative 5 as the agency Preferred Alternative and the environmentally preferred alternative. Alternative 5 would preserve areas for primitive recreational experiences from end to end of the park, would intersperse cultural and interpretive resource focal areas, establish a north-south through park connector of scenic roads and trails, develop partnerships with gateway communities, improve rim to river experiences, include potential joint hiking and biking use of existing and new trails in the park.

On October 26, 2010, the public and agency comments received concerning the Draft GMP/EIS were addressed in an Abbreviated Final EIS and submitted to the NPS Regional Office for approval to print and distribute to the public.

**Stakeholder Focus Group Scoping Meeting for this Environmental Assessment.** Early in the planning process, the Planning Team identified several individuals and groups with specific interest and/or expertise in bicycle use in the park, the areas for the proposed new stacked loop systems, visitor use and management, as well as trail design, construction and management. These representatives were invited to attend a stakeholder focus group meeting on November 10, 2009.

Representatives of the following groups, businesses and interests attended:

- West Virginia Mountain Bike Association
- River Valley Mountain Bike Association
- Earth, Wind and Tire Raleigh County Cycle Club
- West Virginia State Trails Program
- New River Bike
- Marathon Bicycle Company
- Ace Adventure Resort Trails Program
- West Virginia Wildlife Federation

Representatives of the following groups, businesses and interests were invited, but did not attend:

- West Virginia Scenic Trails Association
- National Parks Conservation Association
- West Virginia State University Extension, Fayette County

**Public Scoping Meeting.** The NPS hosted a public meeting on December 8, 2009 at the Canyon Rim Visitor Center, just north of the town of Fayetteville. The purpose of this meeting was to describe the overall concept of the project to the public and to obtain public input during the initial phase of the planning process. After a presentation explaining the planning process and the scope of the project,

there was a brief open question and answer session, then attendees broke out to conversation stations covering the following topics:

- bicycle use on existing park trails,
- a proposed stacked loop trail system in the Craig Branch area, and
- a proposed stacked loop trail system in the Garden Ground area.

Approximately 40 people attended the meeting.

**Press Releases and Public Meeting Announcements.** Press releases in three local newspapers and the parks' nps.gov homepage announced the public open house dates and times. Advertisements also appeared in two local newspapers, the Fayette Tribune and the Beckley Register-Herald, on November 26 and December 7, 2009 announcing the purpose of the public meeting, the date, time and location of the public meeting, and describing opportunities for the pubic to request additional information on-line, by phone or by writing. Press releases will be sent to the same media notifying the public of the availability of this EA for public comment and the public meeting during the comment period.

**Newsletters and Mailings.** Notifications announcing the availability of this EA for public comment and announcing future public meetings will given to the public and to all stakeholders who participated in the public scoping for this project.

**NPS Planning, Environment and Public Comment (PEPC) Website.** Information for the public concerning this project was initially posted on the park homepage and PEPC website on November 10, 2009, and will remain available through the completion of this project. The information posted included a description of the planning process, the supporting documents and maps, an opportunity to provide initial scoping comments, and copy of the Public Scoping Meeting Presentation, and date/time/location of the public scoping meeting. This EA will be posted on the PEPC website when it is available for public comment.

**Public Involvement For Special Rulemaking.** In order to allow bicycle use on park trails, pursuant to the Code of Federal Regulations, the park must both determine that bicycle use is appropriate on routes proposed for designation based upon a formal impact analysis and promulgate a special regulation for those designated routes. The promulgation process is occurring in conjunction with the process of developing this EA, and includes a separate opportunity for public review and comment.

## 5.2 Public Agencies Consulted During the Planning Process

**Agencies in Attendance at Public Meetings.** The WV State Trails Coordinator for the West Virginia Department of Transportation attended the stakeholder scoping meeting on November 10, 2009 and the public scoping meeting on December 8, 2009.

**Section 106 Consultation.** The NPS initiated consultation with the Commissioner of the Department of Culture and History for the State of West Virginia on January 8, 2010. The Deputy State Historic Preservation Officer responded on October 14, 2010 (see Appendix C). This EA will be sent to the State Historic Preservation Officer with the park's findings for impacts on cultural resources.

**Section 7 Consultation.** The NPS initiated informal consultation for Section 7 of the Endangered Species Act of 1973, as amended, with the U.S. Fish and Wildlife Service on January 8, 2010 (see Appendix C). This EA will be sent to the USFWS with the park's findings for impacts on wildlife and habitat.

**Consultation with the West Virginia Division of Natural Resources.** The NPS initiated informal consultation with the West Virginia Division of Natural Resources on January 8, 2010 (see Appendix C). This EA will be sent to the WV DNR with the park's findings for impacts on wildlife and habitat.

**Notification for Native American Tribes.** During the development of the 2010 Draft GMP, the NPS contacted 14 Native American tribes who may have some interest in the New River Gorge National River. Two tribes responded that they would be interested in receiving information about

management actions in the park. There are no federally-recognized tribal affiliations with the park. The NPS will send this EA to all 14 tribes identified as potentially-interested.

## 5.3 Internal Coordination

**Internal Scoping Meetings and Field Visits.** An interdisciplinary team meeting was held on October 21, 2009; NPS preparers and contributors were in attendance, as was the project manager from Trail Solutions, International Mountain Biking Association, contracted to design the action alternatives for the Craig Branch and Garden Ground Stacked Loop Trail Systems. Numerous individual meetings took place, in the office, on the phone and in the field, between planners, designers and resource specialists over the span of planning for the project, development of the action alternatives and analysis of environmental impacts.

**Contracted Conceptual Design.** The NPS announced a solicitation for bids on contract work to design the Craig Branch and Garden Ground Stacked Loop Trail Systems (Solicitation #Q478009008) in August 2009. A contract was awarded to Trail Solutions, International Mountain Biking Association (P4780090051). The contractor worked closely with NPS staff throughout the design and analysis of the project.

# REFERENCES

## Citations

Ambuel, B. and S. A. Temple. 1983. Area-Dependent Changes in the Bird Communities and Vegetation of Southern Wisconsin Forests. *Ecology* 64: 1057-1068.

Balcom, B.J. and R.H. Yahner. 1996. Microhabitat and Landscape Characteristics Associated with the Threatened Allegheny Woodrat. *Conservation Biology*, 10.

Bodor, Thomas and Lyle C. Torp. 2008. *Archeological Investigation of the Dowdy Creek Watershed, New River Gorge National River, Fayette County, West Virginia.* Report prepared for the National Park Service New River Gorge National River by The Ottery Group, Olney Maryland. On file at New River Gorge National River, Glen Jean, West Virginia (CR NERI-07-009).

Bryan, H.D., J.R. MacGregor and J.D. Kiser. 1999. *A Survey for Federally Endangered Bat Species in Abandoned mine Portals in the New River Gorge National River, West Virginia*. Final report. Frankfurt, NY: Eco-Tech, Inc.

Buhlmann, K.A and M.R. Vaughan. 1987. *A Biological Survey of the New River Gorge National River*. Volumes 1-3. National Park Service, Mid-Atlantic Region.

Canterbury, R.A., J. Meyer, S. Pugh and D.M. Stover. 2002. *Monitoring Avian Productivity and Survivorship in New River Gorge National River West Virginia*. Progress report. Glen Jean, WV: National Park Service.

Castleberry, S.B., W.M. Ford, M.A. Menzel, J.M. Menzel and K.V. Miller. 2002. Surveys of Bat Community Composition, Relative Abundance and Distribution at the New, Gauley and Bluestone River National Park Areas. Research proposal. Glen Jean, WV: National Park Service.

Cessford, Gordon. 1995. Off-Road Impacts of Mountain Bikes: A Review and Discussion. *New Zealand Department of Conservation Science & Research Series*, 92: 42-70.

Cox, George W. 1999. *Alien species in North America and Hawaii: Impacts on Natural Ecosystems*. Washington, DC: Island Press.

Fuerst, David N. 1981. *A Cultural Resource Project: New River Gorge National River, West Virginia (Volumes 1 and 3)*. Report submitted to the National Park Service (Contract No. CX4000-0-0034). Charleston, WV: Paul D. Marshall & Associates.

Gander, Hans and P. Ingold. 1997. Reactions of Male Alpine Chamois *Rupicapra r. rupicapra* to Hikers, Joggers and Mountainbikers. *Biological Conservation*, 79: 107-109.

Goeft, Ute and J. Alder. 2001. Sustainable Mountain Biking: A Case Study from the Southwest of Western Australia. *Journal of Sustainable Tourism*, 9(3): 193-211.

Hassinger, J. D., C. M. Butchkoski, and D. R. Diefenbach. 2008. Managing Surface Rock Communities for *Neotoma magister*. Pp. 133-152 in J. D. Peles and J. Wright, eds. *The Allegheny Woodrat: Ecology, Conservation and Management of a Declining Species*. New York, NY: Springer.

Hickman, S. 1990. Evidence of Edge Species Attraction to Nature Trails within Deciduous Forest. *Natural Areas Journal*, 10: 3-5.

Horsely, S.B., S.L. Stout and D.S. DeCalesta. 2003. White-tailed Deer Impact on the Vegetation Dynamics of a Northern Hardwood Forest. *Ecological Applications*, 13.

Hufford, M., T. Carroll and R. Moonsammy. 2006. *Ethnographic Overview and Assessment of the New River Gorge National River and the Gauley River National Recreation Area*. Report prepared by the

Center for Folklore and Ethnography, University of Pennsylvania). Glen Jean, WV: National Park Service.

Johnson, J. 2003. *Survey of Abandoned Mine Portals for Bats at the New River Gorge National River and Gauley River National Recreation Area, West Virginia*. Research report. Glen Jean, WV: National Park Service, New River Gorge National River.

Keller, K. J. D. 1990. *Mountain Bikes on Public Lands: A Manager's Guide to the State of Practice*. Washington, DC: Bicycle Federation of America.

Kuntz, Laurie. 2006. The Coolest Small Towns in the U.S.A. *Budget Travel*, April. Retrieved on November 3, 2010, from http://www.budgettravel.com/bt-dyn/content/article/2006/03/09/AR2006030901203.html.

Lathrop, Jason. 2003. *Ecological Impacts of Mountain Biking: A Critical Literature Review*. Wildlands CPR through the University of Montana's Environmental Studies Scientific Approaches to Environmental Problems.

LoGiudice, K. 2001. Latrine Foraging Strategies of Two Small Mammals: Implications for the Transmission of *Baylisascaris procyonis*. *The American Midland Naturalist*, 146: 369-378.

LoGiudice, K. 2003. Trophically Transmitted Parasites and the Conservation of Small Populations: Raccoon Roundworm and the Imperiled Allegheny Woodrat. *Conservation Biology*, 17: 258-266.

McDonald, B.R. and P.J. Harmon. 1989. Rare Species of the Cunard, Stonecliff and Southside Junction Areas, New River Gorge National River. Report to New River Gorge National River. Elkins, WV: West Virginia Natural Heritage Program.

Mahan, C.G. 2004. *A Natural Resource Assessment for new River Gorge National River.* Technical Report NPS/NER/NRTR-2004/002. Philadelphia, PA: National Park Service.

Manni, M. F., Y. Le, M. A. Littlejohn and S. J. Hollenhorst. 2005. *New River Gorge National River Visitor Study, Summer 2004 (Park Unit Studies Report 153; University of Idaho Park Studies Unit)*. Moscow, ID: National Park Service.

Marion, Jeffrey L and Olive, Nate. 2006. *Assessing and Understanding Trail Degradation: Results from Big South Fork National River and Recreation Area*. Blacksburg, VA: USDI, National Park Service.

Marshall, P. D. 1981. *A Cultural Resource Project: New River Gorge National River, West Virginia (Volume 2)*. Report submitted to the National Park Service (Contract No. CX4000-0-0034). Charleston, WV: Paul D. Marshall & Associates.

Messinger, T. 2004. *Polycyclic Aromatic Hydrocarbons in Bottom Sediment and Bioavailability in Streams in the New River Gorge National River and Gauley River National Recreation Area, West Virginia, 2002*. Scientific Investigations Report 2004-5045, 24 pp.

Miller, S. G., R. L. Knight and C. K. Miller. 1998. Influence of Recreational Trails on Breeding Bird Communities. *Ecological Applications*, 8: 162-169.

Naylor, L. M., M. J. Wisdom and R. G. Anthony. 2009. Behavioral Responses of North American Elk to Recreational Activity. *Journal of Wildlife Management* 73: 328-338.

O'Connell, T., R. Brooks, M. Lanzone and J. Bishop. 2003. A bird Community Index for the Mid-Atlantic Piedmont and Coastal Plain. Final Report to the U.S. Environmental Protection Agency. Report No. 2003-02. University Park, PA: Penn State Cooperative Wetlands Center, The Pennsylvania State University.

Papouchis, Christopher M., F.J. Singer and W.B. Sloan. 2001. Responses of Desert Bighorn Sheep to Increased Human Recreation. *Journal of Wildlife Management*, 65(3): 573-582.

Pauley, T.K. 1993. *Report of Upland Vertebrates in the New River Gorge National River* (3 volumes). Report submitted to New River Gorge National River. Glen Jean, WV.

Pauley, T.K., G. Kees, L. Ordiway and M. Turner. 1997. *Report of Vertebrates in Developmental Areas of the New River Gorge National River*. Final Report. Glen Jean, WV: National Park Service.

Pease, M. L., R. K. Rose and M. J. Butler. 2005. Effects of Human Disturbance on the Behavior of Wintering Ducks. *Wildlife Society Bulletin*, 33: 103-112.

Perez, J. H. and J. Akerson. 2010. *Implementation Plan for Managing Invasive Exotic Vegetation of New River Gorge National River and Bluestone National Scenic River*. Glen Jean, WV: National Park Service.

Pollack, D. and G. Crothers. 2005. *Archeological Overview and Assessment of New River Gorge National River, West Virginia*. Lexington, KY: Kentucky Archaeological Survey.

Pugh, S. 2003. Personal communication with NPS.

Purvis, J. M. 2010. *Water Quality Monitoring During 2009 for New River Gorge National River*. Glen Jean, WV: National Park Service. Available at www.nps.gov/neri.

Purvis, J. M., M Mathes, T. Messinger, J. Wiley and K. Paybins. 2002. *Water Resources Management Plan: New River Gorge National River, Gauley River National Recreation Area, Bluestone National Scenic River, West Virginia*. Glen Jean, WV: National Park Service.

Purvis, J. M. and L. Wilson. 2007. *Water Quality Monitoring Program 2004-2006, New River Gorge National River, Bluestone National Scenic River, Gauley River National Recreation Area*. Glen Jean, WV: National Park Service. Available at www.nps.gov/neri.

Robbins, C. S., D. K. Dawson and B. A. Dowell. 1989. Habitat Area Requirements of Breeding Forest Birds of the Middle Atlantic States. *Wildlife Monographs*, 103: 34 pp.

Rosenberg, K.V., S.E. Barker and R.W. Rohrbaugh. 2000. *An Atlas of Cerulean Warbler Populations*. Ithaca, NY: Cornell Lab of Ornithology.

Siber, Kate. 2006. Wet and Wild Appalachia. *Outside Magazine*, April. Retrieved on November 3, 2010, from http://outsideonline.com/outside/destinations/200604/adventure-hot-spots-3.htm.

Sneddon, L.A. 2010. *Global Conservation Status Ranks of State-Rare Vegetation Associations in the Eastern Rivers and Mountains Network*. Technical Report NPS/NER/NRTR—Draft/XXX. Philadelphia, PA: National Park Service.

Southern Appalachian Biodiversity Institute. 2003. http://www.sabionline.org.

Stahlgren, L., M. Jones, R. Burdin and B. Mabelitini. 2007. *Historical Archeological Survey: New River Gorge National River and Gauley River National Recreation Area (Kentucky Archeological Survey Report 143)*. Report submitted to the National Park Service. Lexington, KY: Kentucky Archaeological Survey.

Streets, Brian P. 2010. *Draft Floristic Survey of the New River Gorge Proposed Stacked Loop Mountain Bike Trails at Craig Branch and Garden Ground*. Fayette and Raleigh Counties, WV: Report to New River Gorge National River.

Sullivan, R.J. 2005. *Peregrine Falcon Survey Report*. Final Report. Glen Jean, WV: National Park Service, New River Gorge National River.

Sweeny, Shauna. Best Towns, 2010. *Outside Magazine*, August. Retrieved on November 3, 2010, from http://outsideonline.com/travel/travel-ta-west-virginia-fayetteville-canoeing-rafting-whitewater-kayaking-sidwcmdev_150727.html.

Taylor, Audrey R. and R.L. Knight. 2003. Wildlife Responses to Recreation and Associated Visitor Perceptions. *Ecological Applications*, 13(4): 951-963.

Thurston, Eden and R.J. Reader. 2001. Impacts of Experimentally Applied Mountain Biking and Hiking on Vegetation and Soil of a Deciduous Forest. *Environmental Management*, 27(3): 397-409.

Trust for America's Public Health. 2010. *State Data for West Virginia*. Retrieved on July 21, 2010, from http://healthyamericans.org/states/?stateid=WV.

U.S. Census Bureau.

2000. *United States Census 2000*. Retrieved on July 22, 2010, from http://www.census.gov/main/www/cen2000.html.

2009. *Population Finder*. Retrieved on November 9. 2010 from http://factfinder.census.gov/servlet/SAFFPopulation?_event=Search.

U.S. Department of the Interior, Fish and Wildlife Service. 1999. *Partners in Flight Watchlist*. Laurel, MD: USGS Patuxent Wildlife Research Center.

U.S. Department of the Interior, Fish and Wildlife Service, Interstate Mining Compact Commission and U.S. Office of Surface Mining, Reclamation and Enforcement. 2009. *Range-wide Indiana Bat Protection and Enhancement Plan*. 37 pp.

U.S. Department of the Interior, National Park Service.

2010. *Draft General Management Plan and Environmental Impact Statement for New River Gorge National River*. Glen Jean, WV: National Park Service.

2009. *Draft Foundation Plan for New River Gorge National River*. Glen Jean, WV: National Park Service.

2006a. *National Park Service Management Policies*. Washington, DC: National Park Service.

2006b. *New River Gorge National River: List of Classified Structures*. Glen Jean, WV: National Park Service.

2006c. *Strategic Plan for New River Gorge National River, Gauley River National Recreation Area, Bluestone National Scenic River (Fiscal Year 2007-2011)*. Glen Jean, WV: National Park Service.

2005. *New River Gorge National River Cultural Landscapes Inventory*. Report prepared by the NPS Northeast Regional Office. Boston, MA: National Park Service.

2004a. *Collections Management Plan: New River Gorge National River*. (NPS Northeast Museum Services Center). Glen Jean, WV: National Park Service.

2004b. Park Species List: Non-Native Plants. *NPSpecies Database*. Fort Collins, CO: National Park Service. Report generated November 18, 2004.

2003. Park Species List: Birds. *NPSpecies Database*. Fort Collins, CO: National Park Service. Report generated November 18, 2004.

2001a. *DO-12: Conservation Planning, Environmental Impact Analysis and Decision Making*. Retrieved on 25 June 2010 from http://www.nature.nps.gov/protectingrestoring/DO12site/.

2001b. *New River Gorge Floods – 2001, Emergency Rehabilitation Plan*. Glen Jean, WV: National Park Service.

1993. *A Trail Development Plan for the New River Gorge National River*. Glen Jean, WV: National Park Service.

1998. *NPS-28 Cultural Resource Management Guideline*. Retrieved on November 10, 2010 from http://www.nps.gov/history/history/online_books/nps28/28contents.htm.

1982. *General Management Plan: New River Gorge National River*. Oak Hill, WV: National Park Service.

U.S. Environmental Protection Agency. 1997. *Revised Draft Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*. Washington, DC: Environmental Protection Agency.

Unrau, H. D. 1996. *Special History Study/Historic Context Study*. Glen Jean, WV: National Park Service.

Vanderhorst, J. P., J. Jeuck and S. C. Gawler. 2007. *Vegetation Classification and Mapping of New River Gorge National River, West Virginia (Technical Report NPS/NER/NRTR-2007/092)*. Philadelphia, PA: National Park Service.

Van der Zande, A.N., et al. 1984. Impact of Outdoor Recreation on the Density of a Number of Breeding Bird Species in Woods Adjacent to Urban Residential Areas. *Biological Conservation*, 30: 1-39.

Webber, Pete (Ed.). 2007. *Managing Mountain Biking: IMBA's Guide to Providing Great Riding*. Boulder, CO: International Mountain Bicycling Association.

West Virginia Department of Environmental Protection. 2008. *West Virginia Integrated Water Quality Monitoring and Assessment Report*. Charleston, WV: WV DEP.

West Virginia Division of Natural Resources. 2003. Wildlife Populations. Retrieved in February 2004 from http://www.wvdnr.gov/.

West Virginia Gap Analysis Program (WVGAP). 2003. Retrieved on 1 November, 2010 from http://nrac.wvu.edu/projects/gap/index.html.

West Virginia Natural Heritage Program. 2007. *Rare, Threatened and Endangered Animals*. 14pp. Retrieved from http://www.wvdnr.gov/wildlife/RareSpecList.shtm.

Westbrooks, Randy G. 1998. *Invasive Plants, Changing the Landscape of America: Fact Book*. Washington, DC: Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW).

White, Dave D., et al. 2006. A Comparative Study of Impacts to Mountain Bike Trails in Five Common Ecological Regions of the Southwestern U.S. *Journal of Park and Recreation Administration*, 24(2): 21-41.

Wilcove, D. S. 1985. Nest Predation in Forest Tracts and the Decline of Migratory Songbirds. *Ecology*, 66: 1211-1214.

Wilson, John P. and J.P. Seney. 1994. Erosional Impact of Hikers, Horses, Motorcycles, and Off-Road Bicycles on Mountain Trails in Montana. *Mountain Research and Development*, 14(1): 77-88.

Wilson, L., K. Vandersall and J. M. Purvis. 2007. *Water Quality Monitoring Program 2001-2003, New River Gorge National River, Bluestone National Scenic River, Gauley River National Recreation Area*. Glen Jean, WV: National Park Service. Available at www.nps.gov/neri.

Wood, P.B. 2000. *Point Count Surveys for Birds in Hemlock Stands at New River Gorge National River*. Progress report to Resource Management, New River Gorge National River. Glen Jean, WV: National Park Service.

Workman, M. E., L.R. Maddex and D. J. Bonenberger. 2005. *Historic Resources Study, New River Gorge National River (NERI-02-038 HRS)*. Glen Jean, WV: National Park Service.

**Additional Research**

Carothers, Pam, J.J. Vaske and M.P. Donnelly. 2001. Social Values Versus Interpersonal Conflict Among Hikers and Mountain Bikers. *Leisure Sciences*, 23: 47-61.

Cessford, Gordon. 2002. Perception and Reality of Conflict: Walkers and Mountain Bikes on the Queen Charlotte Track in New Zealand. *Conference Proceedings: Monitoring and Management of Visitor Flows in Recreational and Protected Areas*, Vienna, Austria.

Chavez, Deborah J., P.L. Winter and J.M. Baas. 1993. Recreational Mountain Biking: A Management Perspective. *Journal of Park and Recreation Administration*, 11(3): 29-36.

Chiu, Luke and L. Kriwoken. 2003. Managing Recreational Mountain Biking in Wellington Park, Tasmania, Australia. *Annals of Leisure Research*, 6(4): 339-361.

Cushman, J. Hall and R.K. Meentemeyer. 2008. Multi-scale Patterns of Human Activity and the Incidence of an Exotic Forest Pathogen. *Journal of Ecology*, 96: 766-776.

Fritz, S.C., J.C. Kingston and D.R. Engstrom. 1993. Quantitative Trophic Reconstruction from Sedimentary Diatom Assemblages: A Cautionary Tale. *Freshwater Biology*, 30(1): 1-23.

Fuller, Sylvia. 2003. Creating and Contesting Boundaries: Exploring the Dynamics of Conflict and Classification. *Sociological Forum*, 18(1): 3-30.

Grutz, Jeff and D. Hollingshead. "Managing the Biophysical Impacts of Off-Road Bicycling" or "Shred Lightly". *Conference Proceedings: Environmental Ethics and Practices in Backcountry Recreation*, Calgary, Alberta.

Heer, Claudia, H. Rusterholz and B. Baur. 2003. Forest Perception and Knowledge of Hikers and Mountain Bikers in Two Different Areas in Northwestern Switzerland. *Environmental Management*, 31(6): 709-723.

Hellmund, Paul Cawood. 1998. *Planning Trails with Wildlife in Mind: A Handbook for Trail Planners*. Denver, CO: Colorado State Parks.

Herrero, Jake and S. Herrero. 2000. *Management Options for the Moraine Lake Highline Trail: Grizzly Bears and Cyclists*. Unpublished report. Calgary, Alberta: Parks Canada.

Hoger, Jennifer L. and D.J. Chavez. 1998. Conflict and Management Tactics on the Trail. *Parks & Recreation*, 33(9):41-49.

Leung, Yu-Fai and J.L. Marion. 1996. Trail Degradation as Influenced by Environmental Factors: A State-of-the-Knowledge Review. *Journal of Soil and Water Conservation*, 51(2): 130-136.

Moore, Roger L. 1994. *Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice*. Washington, DC: Federal Highway Administration and National Recreational Trails Advisory Committee.

Moore, Roger L., D. Scott and A.R. Graefe. 1998. The Effects of Activity Differences on Recreation Experiences Along a Suburban Greenway Trail. *Journal of Park and Recreation Administration*, 16(2): 35-53.

Nelson, Charles M., R. Jennings and J. Henschell. 2004. State Park Trail Conflicts and Resolution Strategies. *Proceedings of the 2004 Northeastern Recreation Research Symposium*, p. 120-125.

Pickering, Catherine M, W. Hill, D. Newsome and Y. Leung. 2009. Comparing Hiking, Mountain Biking and Horse Riding Impacts on Vegetation and Soils in Australia and the United States of America. *Journal of Environmental Management*, doi:10.1016/j.jenvman.2009.09.025.

Pickering, Catherine M. 2010. Ten Factors that Affect the Severity of Visitor Impacts in Protected Areas. *Ambio*, 38.doi: 10.1007/13280-009-0007-6.

Roggenbuck, J.W., D.R. Williams and A.E. Watson. 1993. Defining Acceptable Conditions in Wilderness. *Environmental Management*, 17(2): 187-197.

Schneider, Ingrid E. 2000. Revisiting and Revising Recreation Conflict Research. *Journal of Leisure Research*, 32(1): 129-132.

Schneider, Ingrid E. 2004. Less Stress: How You Can Respond to and Manage Visitor Conflicts. *Parks & Recreation*, 39(2): 68-73.

Spahr, Robin. 1990. *Factors Affecting the Distribution of Bald Eagles and Effects of Human Activity on Bald Eagles Wintering Along the Boise River*. Thesis. Boise, ID: Boise State University.

Symmonds, Mathew C., W.E. Hammit and V.L. Quisenberry. 2000. Managing Recreational Trail Environments for Mountain Bike User Preferences. *Environmental Management*, 25(5): 549-564.

Taylor, Audrey R. and R.L. Knight. 2003. Behavioral Responses of Wildlife to Human Activity: Terminology and Methods. *Wildlife Society Bulletin*, 31(4): 1263-1271.

Taylor, David N., et al. 1983. Campylobacter Enteritis from Untreated Water in the Rocky Mountains. *Annals of Internal Medicine*, 99: 38-40.

Thapa, Brijesh and A.R. Graefe. 2004. Recreation Conflict and Tolerance Among Skiers and Snowboarders. *Journal of Park and Recreation Administration*, 22(1): 37-52.

Tyser, Robin W. and C.A. Worley. 1992. Alien Flora in Grasslands Adjacent to Road and Trail Corridors in Glacier National Park, Montana (U.S.A.). *Conservation Biology*, 6(2): 253-262.

Vaske, Jerry, R. Dyar and N. Timmons. 2004. Skill Level and Recreation Conflict Among Skiers and Snowboarders. *Leisure Sciences*, 26: 215-225.

Vittersø, Joar, R. Chipeniuk, M. Skår and O.I. Vistad. 2004. Recreational Conflict is Affective: The Case of Cross-Country Skiers and Snowmobiles. *Leisure Sciences*, 26: 227-243.

Webber, Pete (Ed.). 2004. *IMBA's Guide to Building Sweet Singletrack*. Boulder, CO: International Mountain Bicycling Association.

Winter, Patricia L., et al. 1998. An Analysis of Normative Messages in Signs at Recreation Settings. *Journal of Interpretation Research*, 3(1): 39-47.

Winter, Patricia L., et al. 2000. Choosing to Encourage or Discourage: Perceived Effectiveness of Prescriptive Versus Proscriptive Messages. *Environmental Management*, 26(6): 589-594.

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## ACRONYMS

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| ACHP | Advisory Council on Historic Preservation |
| ADA | Americans with Disabilities Act of 1990 |
| APE | Area of Potential Effect |
| ASMIS | Archeological Sites Management Information System |
| BSA | Boy Scouts of America |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| DBH | Diameter Breast Height |
| DO-12 | Director's Order 12 |
| EA | Environmental Assessment |
| FEMA | Federal Emergency Management Agency |
| GMP | General Management Plan |
| IMBA | International Mountain Biking Association |
| MOU | Memorandum of Understanding |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NPS | National Park Service |
| OHV | Off Highway Vehicle |
| PA | Programmatic Agreement |
| PIF | Partners in Flight |
| SHPO | State Historic Preservation Officer |
| TMDL | Total Maximum Daily Load |
| USFWS | United States Fish and Wildlife Service |
| WNS | White Nose Syndrome |