



National Park Service
U.S. Department of the Interior
Glen Canyon National Recreation Area
Page, Arizona

Glen Canyon Rim Trail

Environmental Assessment

June 2009

Glen Canyon National Recreation Area Glen Canyon Rim Trail

Environmental Assessment

Summary

The National Park Service at Glen Canyon National Recreation Area (AZ/UT) proposes to construct an 8.7 mile recreational use trail. The proposed trail would be a non-motorized trail for pedestrian and bicycling use. The project is needed to enhance and provide additional opportunities for trail-based non-motorized recreation to the residents of Page and the approximately 1.3 million annual tourists who visit the Page area.

The project area is located along the common boundary of Glen Canyon National Recreation Area and the City of Page. The project area encompasses approximately 2,500 acres and lies between Highway 89 and the southeast rim of Glen Canyon along the Colorado River. The area reaches from the Horseshoe Bend overlook upstream (north) to the Glen Canyon Dam, with a small area to the east extending to the rim of Manson Mesa.

This Environmental Assessment evaluates two alternatives: a no action alternative, and an action alternative. The no action alternative describes the current condition of the project area and represents the baseline condition against which the impacts of the action alternative will be measured. The action alternative proposes to construct the Rim Trail.

Public comments were received on alternatives during a public meeting and initial project scoping in late March and April 2008. The action alternative was developed using an earlier 1995 *Recreational Use Management Plan/Environmental Assessment* (NPS 1995a) and was updated to reflect public comments and current resource and social conditions in the project area.

This Environmental Assessment has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet project objectives, 2) evaluates potential issues and impacts to **Glen Canyon's** resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics that have been addressed in this document include soils and geology, vegetation, visitor use and experience, park operations, wildlife, and cultural resources. Other resource topics have been dismissed because the project would result in negligible or minor effects to those resources. No major effects are anticipated as a result of this project.

Public Comment

If you wish to comment on the Environmental Assessment, you may enter your comments online at the National Park Service website Planning, Environment, and Public Comment (<http://parkplanning.nps.gov/glca>) or you may mail comments to the address below. This Environmental Assessment will be on public review for a minimum of 30 days ending July 10, 2009. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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U.S. Department of the Interior

Glen Canyon National Recreation Area
Arizona/Utah



**Glen Canyon Rim Trail
Glen Canyon National Recreation Area**

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List of Acronyms

ADOT	Arizona Department of Transportation
APE	Area of Potential Effect
AZ	Arizona
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DM	Department Manual
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
GMP	General Management Plan
IDT	Interdisciplinary Planning Team
IMBA	International Mountain Bicycling Association
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRA	National Recreation Area
RTCA	Rivers, Trails and Conservation Assistance
U.S.	United States

Chapter 1: Purpose and Need for Action

1.1 Introduction

The National Park Service (NPS) at Glen Canyon National Recreation Area is considering the construction of a non-motorized recreational trail near Page, Arizona, to enhance the availability of outdoor recreational opportunities in the area. This Environmental Assessment (EA) presents the purpose and need for the project, outlines alternatives, describes existing conditions in the project area, identifies mitigation measures, and analyzes the effects of each alternative on the environment and the potential for resource impairment. This EA analyzes two alternatives: a no action alternative (Alternative A); and one action alternative to construct the Glen Canyon Rim Trail (Alternative B).

This EA is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality regulations implementing NEPA (40 *Code of Federal Regulations* (CFR) §1500-1508), and the National Park Service's **Director's Order** (DO) 12: *Conservation Planning, Environmental Impact Analysis, and Decision-Making* (NPS 2001).

Should the National Park Service select the preferred alternative to construct the recreation trail and the use of bicycles is included, the NPS would be required to undertake a special rule-making to authorize bicycling on a trail in a national park unit, pursuant to Chapter 36, section 4.30(b) of the CFR, which states “Except for routes designated in developed areas or in special use zones, routes designated for bicycle use shall be promulgated as special regulations.”

1.2 Project Background

Glen Canyon encompasses approximately 1.25 million acres of lands and waters across a five county area in northern Arizona and southeastern Utah. Page, Arizona, a city of approximately 6,800 residents, serves as the primary gateway to Glen Canyon National Recreation Area. Located at the junction of Arizona State Highways 89 and 98, Page is the largest municipality in the greater Glen Canyon vicinity (Figure 1).

Visitors to Glen Canyon frequently request information for and express an interest in developing more outdoor recreation opportunities in the Page area. Presently, developed trails in the area are limited. Four short hiking trails lead to scenic viewpoints. A 10-mile recreation trail managed by the city encircles the city. Increasing trail based opportunities for hikers and bicyclists is a priority for the city and the National Park Service.

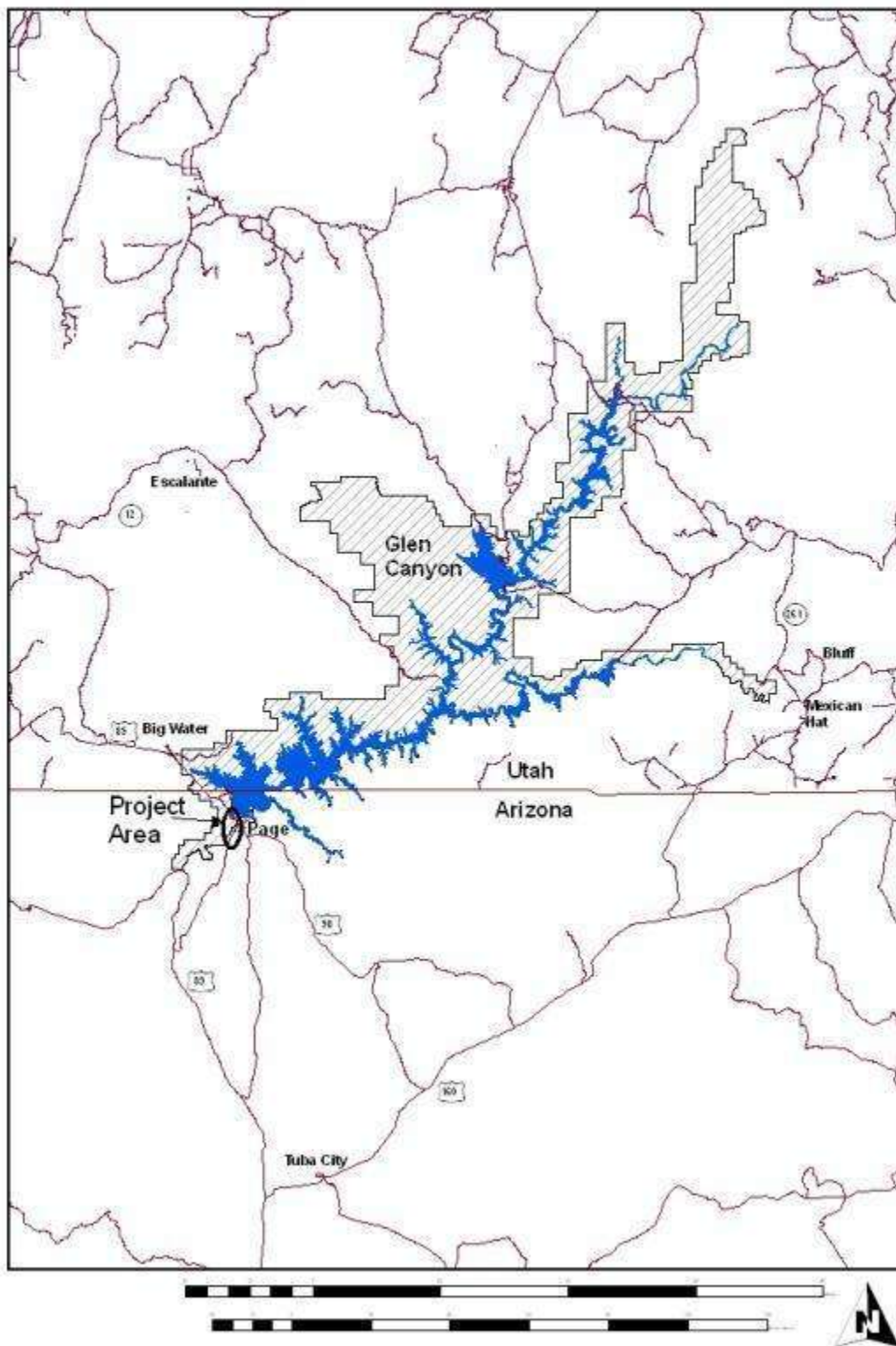
In November 2007, representatives from the National Park Service, Glen Canyon National Recreation Area, and the City of Page agreed to pursue the development of a

recreational trail that would serve park visitors and city residents. A similar recreational trail had been proposed in a 1995 environmental assessment (NPS 1995a), but that trail was not constructed.

To revitalize the trail plan, a stakeholders group was formed consisting of Glen Canyon staff, city officials, representatives from other government agencies, and interested members of the community. The stakeholders group convened under the auspices of the **National Park Service's Rivers, Trails and Conservation Assistance Program** (RTCA). The RTCA helps to facilitate cooperative ventures between private and public partners.

The stakeholders group met every three months to discuss trail planning and design, identify trail uses, review development issues such as fundraising and grant applications, and consider administrative issues such as project zoning, long-term maintenance, and similar issues. The result of this work is the proposed Glen Canyon Rim Trail, an 8.7 mile non-motorized recreational trail to be constructed on both city and federally-owned lands along the eastern rim of Glen Canyon.

Figure 1 – Glen Canyon Region



1.3 Project Area

The project area is located along the common boundary of Glen Canyon National Recreation Area and the City of Page (Figure 2). The project area encompasses approximately 2,500 acres and lies between Highway 89 and the southeast rim of Glen Canyon along the Colorado River. The area under review reaches from the Horseshoe Bend overlook upstream to the Glen Canyon Dam and proceeds easterly and upslope to the rim of Manson Mesa.

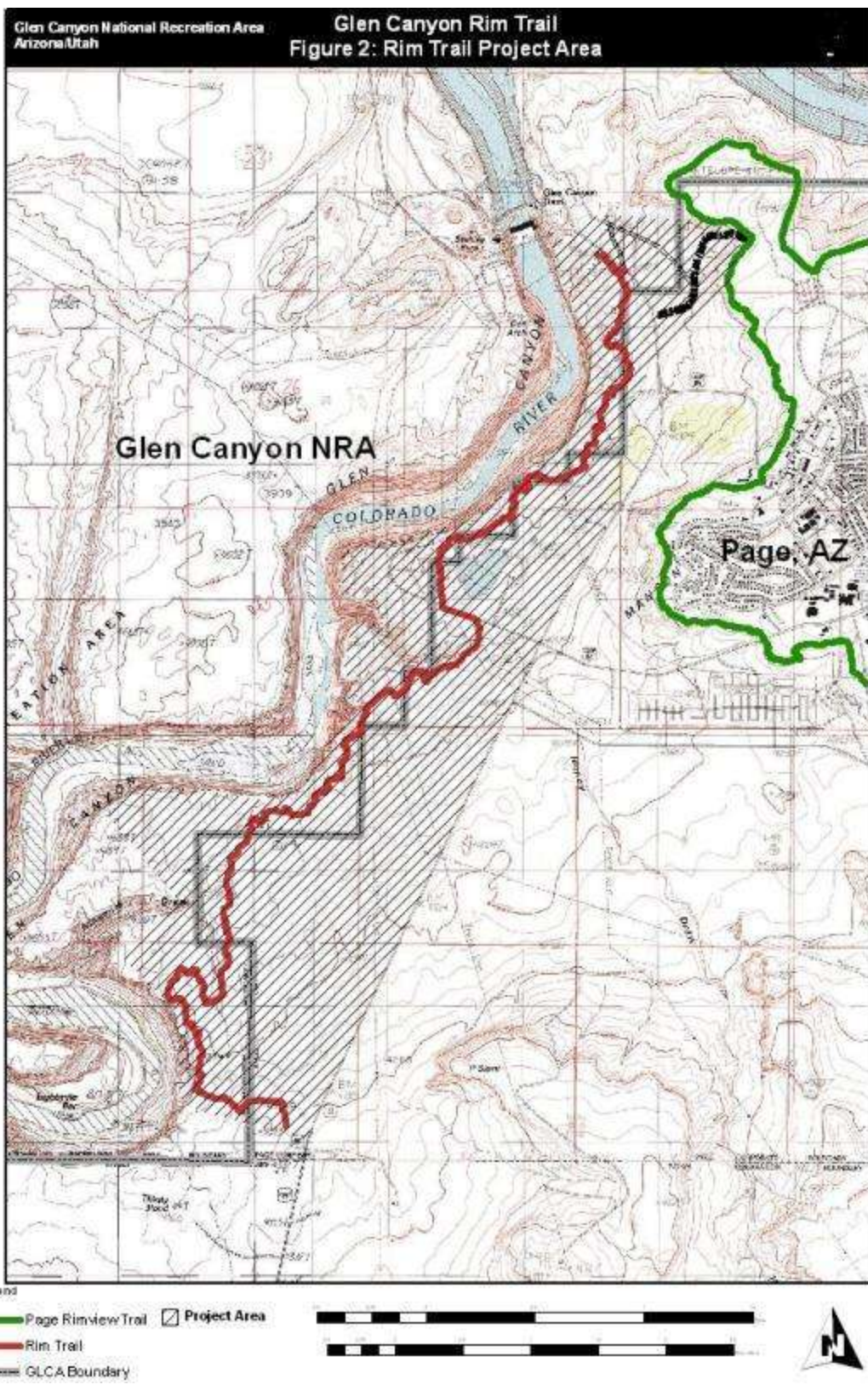
1.4 Purpose and Need

The purpose of this project is to construct a non-motorized recreational trail to enhance opportunities for developed trail use. Currently, only limited developed trail and related recreational facilities exist in this heavily visited portion of the recreation area. Residents and visitors alike have requested additional facilities and more recreational opportunities. The proposed Glen Canyon Rim Trail is needed to enhance and provide additional recreational opportunities for visitors and residents to Glen Canyon and the Page area.

1.5 Project Objectives

The National Park Service developed the following objectives based on NPS policy directives and the goals and objectives outlined in the recreation area's General Management Plan. Objectives 1 and 3 are derived from guidance in NPS *Management Policies* (NPS 2006), which requires that allowable park uses do not result in impairment or unacceptable impacts to park resources, and recommends that park uses are developed to be inspirational, healthful, and educational. Objective 2 is based on Glen Canyon planning documents that call for developing appropriate recreation opportunities, including opportunities for hiking and bicycling. Objective 4 is The NPS proposed to fulfill the following project objectives:

1. Prevent impairment and unacceptable impacts to natural and cultural resources
2. Provide additional trail-based recreational opportunities for residents and visitors in the Page area
3. Develop recreational opportunities that are aesthetically pleasing, enhance the visitor experience, and provide opportunities for healthful activities
4. Foster through outdoor recreation opportunities with strong interpretive/educational components a greater understanding and appreciation of the local natural environment and the stewardship mandate of the National Park Service



1.6 Relationship to Relevant Park Authorities and Plans

Current plans and policies that pertain to this proposal include the Glen Canyon National Recreation Area *General Management Plan* (GMP) (NPS 1979) and the 2006 NPS *Management Policies* (NPS 2006), and additional NPS authorities. The following information explains how this proposal meets the goals and objectives of these plans and policies:

- This project is consistent with the Glen Canyon GMP in that it is designed “To manage the recreation area so that it provides maximal recreational enjoyment to the American public and their guests.” The GMP identifies the proposed project area as located within the Development, and the Recreation & Resource Utilization planning zones, both of which identify bicycling as a permitted recreational activity. A portion of the project area also includes a Utilities Development Corridor identified in the GMP.
- The proposal is consistent with the goals and objectives of the 2006 NPS *Management Policies* (NPS 2006). The guidance put forth in *Management Policies* ensures that management decisions: comply with current laws, regulations, and executive orders; prevent impairment of park resources and values; ensure that conservation is predominant when there is a conflict between protection of resources and their use, and; ensure consistency across the National Park System. Relevant sections of *Management Policies* frequently will be referenced in this document.
- The National Park Service in 1995 prepared an environmental assessment and issued a Finding of No Significant Impact for the *Recreational Use Management Plan* that included a similar trail in the project area (NPS 1995b). Although the trail was not constructed, the 1995 environmental assessment provided valuable background information which informed this EA.
- Should the National Park Service select the preferred alternative to construct the recreational trail and the use of bicycles is included, then the NPS would be required to undertake a special rule-making to authorize bicycling on a trail in a national park unit, pursuant to Chapter 36, section 4.30(b) of the CFR.

1.7 NPS Appropriate Use Standards

Sections 1.4 and 1.5 of *Management Policies* (NPS 2006), *Appropriate Use of the Parks*, directs the National Park Service to ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 of *Management Policies* (NPS 2006), *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- 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

Park managers must continually monitor all park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it.

A recreational trail is a common and expected asset in many park units, particularly national recreation areas. Proper planning, location, layout and design, and construction materials and methods ensure that unacceptable impacts to park resources and values do not occur. The proposed recreation trail is consistent with **Glen Canyon's** GMP and the purposes for which the recreation area was established as a unit of the National Park System. Based upon the evaluation presented in Chapter 3 – Environmental Consequences, and on the standards outlined above, the National Park Service has determined that construction of the Glen Canyon Rim Trail is an appropriate use of park resources at Glen Canyon.

1.8 Public Scoping

The National Park Service conducts public scoping to identify resources that may be affected by the proposed project and to gather new information and ideas that may result in new alternatives to achieve the proposal while minimizing adverse impacts. For the Glen Canyon Rim Trail proposal, the National Park Service conducted internal scoping with park resource and management experts, and external scoping with the public, tribal and state agencies, and other interested groups.

Internal scoping was conducted with an interdisciplinary team (IDT) of resource, planning, and management professionals from the National Park Service. IDT members met on several occasions to discuss the proposed trail, identify potential impacts and mitigation measures, select a preferred alternative, and ensure the environmental assessment satisfied all planning and compliance requirements.

External scoping was initiated on March 26, 2008 with a news release to local media outlets, followed by the distribution of a scoping newsletter to interested members of the public and other federal and state agencies and affiliated Native American tribes.

Project information was posted on the National Park Service's project planning website (www.nps.parkplanning.gov). The National Park Service on April 23, 2008 hosted a public open house at Glen Canyon park headquarters, and invited the public to ask questions and offer comments on the proposed trail project. Public scoping was open for 36-days between March 26 and April 30, 2008.

Five public comments were received during public scoping. Four of the comments focused on the positive benefits associated with developing the Glen Canyon Rim Trail, while one comment identified a concern with nesting raptors in the project area. The concern with potential impacts to raptors is addressed in Chapter 3 under *Wildlife*. More information on scoping can be found in Chapter 4 – Consultation and Coordination.

1.9 Impact Topics Retained for Further Analysis

In this section and the following section on Impact Topics Dismissed from Further Analysis, the NPS takes a “hard look” at all potential impacts by considering the direct, indirect, and cumulative effects of the proposed action on the environment, along with connected and cumulative actions. Impacts are described in terms of context and duration. The context or extent of the impact is described as localized or widespread. The duration of impacts is described as short-term, ranging from days to three years in duration, or long-term, extending up to 20 years or longer. The intensity and type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. The NPS equates “major” effects as “significant” effects. The identification of “major” effects would trigger the need for an EIS. Where the intensity of an impact could be described quantitatively, the numerical data is presented; however, most impact analyses are qualitative and use best professional judgment in making the assessment.

The NPS defines “measurable” impacts as moderate or greater effects. It equates “no measurable effects” as minor or less effects. “No measurable effect” is used by the NPS in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an EA or EIS. The use of “no measurable effects” in this EA pertains to whether the NPS dismisses an impact topic from further detailed evaluation in the EA. The reason the NPS uses “no measurable effects” to determine whether impact topics are dismissed from further evaluation is to concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail in accordance with CEQ regulations at 1500.1(b).

In this section of the EA, NPS provides a limited evaluation and explanation as to why some impact topics are not evaluated in more detail. Impact topics are dismissed from further evaluation in this EA if:

- they do not exist in the analysis area, or

- they would not be affected by the proposal, or the likelihood of impacts are not reasonably expected, or
- through the application of mitigation measures, there would be minor or less effects (i.e. no measurable effects) from the proposal, and there is little controversy on the subject or reasons to otherwise include the topic.

Due to there being no effect or no measurable effects, there would either be no contribution toward cumulative effects or the contribution would be low. For each issue or topic presented below, if the resource is found in the analysis area or the issue is applicable to the proposal, then a limited analysis of direct and indirect, and cumulative effects is presented. There is no impairment analysis included in the limited evaluations for the dismissed topics because the NPS's threshold for considering whether there could be an impairment is based on "major" effects.

Impact topics for this project have been identified on the basis of federal laws, regulations, and orders; 2006 Management Policies; and National Park Service knowledge of resources at Florissant Fossil Beds National Monument. Impact topics that are carried forward for further analysis in this environmental assessment are listed below along with the reasons why the impact topic is further analyzed. For each of these topics, the following text also describes the existing setting or baseline conditions (i.e. affected environment) within the project area. This information will be used to analyze impacts against the current conditions of the project area in the Environmental Consequences chapter.

1.9.1 Soils and Geology

Soils and geologic features are fundamental natural resource components whose integrity is addressed in numerous laws and policies governing the management of national park units. NPS *Management Policies* directs that natural resources, including physical resources such as geologic features and soils, be protected and preserved as integral components of the natural system (NPS 2006). Trail construction and subsequent public use of the area would result in some disturbance to soils and geologic formation; therefore, soils and geology are evaluated in Chapter 3.

1.9.2 Vegetation

The NPS seeks to maintain all native plant populations within parks as part of the natural ecosystem, including the natural abundance, diversity, dynamics, distribution, and habitats of native plants (NPS 2006). The National Park Service is directed to minimize human impacts to native plants, populations, communities, and ecosystems, as well as the process that sustain them. Any recreational use has the potential to directly and indirectly impact vegetation through trampling, disturbing groundcover, compacting soils, or collection. Because vegetation has the potential to be impacted

through construction activities, subsequent trail maintenance activities, and public of the trail, vegetation is considered as an impact topic.

1.9.3 Visitor Use and Experience

The National Park Service strives to provide appropriate, quality recreational opportunities for visitors to enjoy the national parks, with an emphasis on recreational opportunities that are appropriate for the environment, are healthful and educational, foster an appreciation for park resources and values, and that can be sustained without causing unacceptable impacts to park resources or values (NPS 2006). Currently, developed trail systems in the project area are limited. Because this proposal would affect the availability of recreational opportunities, this topic is analyzed in the chapter on environmental consequences.

1.9.4 Park Operations

Park operations refer to adequacy of staffing levels and quality and effectiveness of park infrastructure in protecting and preserving vital resources and providing for effective visitor experience.

Alternatives considered in this environmental assessment could result in an impact on park operations, including law enforcement patrols, costs and maintenance associated with infrastructure and facilities, printing costs for the publication of new route maps and brochures, and costs associated with natural and cultural resource management, mitigation, and monitoring. Therefore, park operations is evaluated as an impact topic.

1.9.5 Wildlife

As with plants, NPS *Management Policies 2006* directs the Service to maintain all native animal populations within parks as part of the natural ecosystem, including the natural abundance, diversity, dynamics, distribution, habitats and behaviors of native wildlife. The National Park Service is directed to minimize human impacts to native animal populations, communities, and ecosystems, as well as the biological and evolutionary process that sustain them. Wildlife is known to be affected by recreational activities, including the presence of pedestrians and bicyclists. Because wildlife has the potential to be impacted by the adoption of alternatives under consideration, wildlife is considered as an impact topic.

1.9.6 Cultural Resources

The cultural resource management policies of the NPS derive from a suite of historic preservation, environmental, and other laws, proclamations, executive orders and regulations. Those relevant to the project are listed in section 3.6.6 and direct the NPS to preserve cultural resources unimpaired for the enjoyment of present and future

generations. Cultural resources are aspects of a cultural system that are valued by or significantly representative of culture or that contains significant information about a culture. These resources are typically tangible entities but may include cultural practices. Tangible cultural resources are categorized for NPS management purposes as archeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections. Section 106 of the *National Historic Preservation Act of 1966* (16 USC 470 *et seq.*) specifically directs each federal agency to consider the effects of their undertakings on these tangible cultural resources eligible or listed in the National Register of Historic Places.

For the purposes of this EA, cultural resources have been divided into types and assessed for their potential to be affected by the alternatives. Only one type, archeological resources, is retained for further analysis and evaluated as an impact topic. The other four types of cultural resources – Cultural Landscapes, Ethnographic Resources, Historic and Prehistoric Structures, and Museum Collections – have been dismissed from further analysis as described below.

Archeological Resources: The Archeological Resource Protection Act of 1979 (14 USC 470bb) and NPS *Management Policies* (NPS 2006) define archeological resources as any material remains or physical evidence of past human life or activities that are of archeological interest and are capable of revealing scientific or humanistic information through archeological research. The project area is known to contain archeological resources eligible for inclusion on the National Register of Historic Places. Therefore, archeological resources are evaluated as an impact topic.

Cultural Landscapes: According to NPS-28 a cultural landscape is a reflection of human adaptation and use of natural resources, and 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 (NPS 1998). The use of such landscapes reflects cultural values and traditions. During tribal consultation, no cultural landscapes were identified within the Rim Trail corridor and Area of Potential Effect. The topic is not addressed because there are no cultural landscapes identified in the project area or general vicinity.

Ethnographic Resources: NPS -28 defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it (NPS 1998). According to NPS -28 and Executive Order 13007 on sacred sites, the National Park Service should try to preserve and protect ethnographic resources.

An ethnographic resource located about one-half mile from the proposed Rim Trail corridor possesses traditional cultural significance as identified by the LeChee Chapter of the Navajo Nation. The resource consists of a feature and artifact scatter located below the cliff edge and is associated with a Navajo route to the Colorado

River. Representatives of the Chapter House recommend management of the site as a Traditional Cultural Property (TCP), which makes it eligible to the National Register. The proposed Rim Trail crosses the historic route to the cliff edge, but the route itself is not part of the TCP as identified by the LeChee Chapter House members.

Effects on this ethnographic resource are anticipated to be negligible because the impact would be barely perceptible, would not alter resource conditions, would not interfere with traditional access or site preservation, and would not alter the **affiliated group's body of beliefs or practices related to the site**. This topic is not discussed further in the EA because adverse effects to the identified ethnographic resource will not occur.

Historic and Prehistoric Structures: The National Park Service uses the term “historic structures” to refer to both prehistoric and historic buildings and structures, which are defined as constructions that shelter any form of human habitation or activity. The project area contains no historic structures, nor are any known to exist in the broader area of potential effect. Therefore, historic structures are not considered as an impact topic.

Museum Collections: As defined at *36 CFR 79: Curation of Federally Owned and Administered Archeological Collections* and *NPS Management Policies* (NPS 2006), museum collections refer to material remains that are excavated or removed during a survey, excavation, or other study of a cultural resource including associated records. The area of archeological inventory along the Rim Trail produced a small collection of artifacts and associated records. According to federal procedures, these collections should be deposited in an institution with adequate long-term curatorial capabilities. In this case, these and any subsequent artifacts collected in connection with the Rim Trail will be accessioned into the Glen Canyon museum collections. This topic is not addressed because adverse impacts to museum collections resulting from archeological inventory of the project area are avoided through compliance with relevant policies and guidance.

1.10 Impact Topics Dismissed from Further Analysis

1.10.1 Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The act establishes specific programs that provide special protection for air resources and air quality related values associated with National Park System units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. Glen Canyon National Recreation Area is designated as a Class II air quality area under the Clean Air Act. A Class II designation indicates the maximum allowable increase in concentrations of pollutants over baseline concentrations of sulfur dioxide

and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

Construction activities such as moving materials and operating equipment could result in temporary increases of vehicle exhaust, emissions, and fugitive dust in the general project area. Any exhaust, emissions, and fugitive dust generated from construction activities would be temporary, intermittent, and localized, and would likely dissipate rapidly because air stagnation at Glen Canyon National Recreation Area is rare. Dust from trail construction would specifically be mitigated through the use of water spray bars on the milling machinery. Overall, the project could result in no measurable effect to air quality. The Class II air quality designation for Glen Canyon National Recreation Area would not be affected by adopting the proposal. Therefore, air quality was dismissed as an impact topic.

1.10.2 Energy Requirements and Conservation Potential

CEQ at 40 CFR 1502.16 requires the NPS to consider the impact of proposed actions on energy requirements, energy conservation, and sustainability. Management actions evaluated in this EA would have no measurable effect on energy use or energy conservation.

1.10.3 Natural or Depletable Resources

The construction of the proposed trail would have no effects on the long-term enhancement or productivity of the land or natural and depletable resources within Glen Canyon (CEQ impact requirement at 40 CFR 1501.16). Therefore, this topic has been dismissed from analysis.

1.10.4 Floodplains or Wetlands

Executive Order 11988 *Floodplain Management* (1977) requires all federal agencies to avoid construction within the 100-year floodplain unless no practicable alternative exists. **Director's Order 77-2 *Floodplain Management*** requires a Statement of Findings should there be adverse effects to floodplains or wetlands. The proposed action in this environmental assessment does not involve any new development or construction within a floodplain and does not result in adverse effects to floodplains or wetlands. Therefore, a Statement of Findings for floodplain management is not required, and this impact topic was dismissed.

1.10.5 Environmental Justice

Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low Income Populations* (1994), requires all federal agencies to

incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low income populations and communities. The proposed action would not have disproportionate health or environmental effects on minorities or low income populations or communities as defined in the Environmental Protection Agency's *Environmental Justice Guidance* (1998). Therefore, environmental justice was dismissed as an impact topic in this document.

1.10.6 Prime and Unique Agricultural Lands

Under the *Farmland Protection Policy Act* of 1981 the NPS seeks to minimize the unnecessary or irreversible conversion of farmland to nonagricultural uses. No unique or prime farmlands exist in Glen Canyon NRA, and the proposed trail would have no effect on the conversion of farmlands.

1.10.7 Accommodation of Sacred Sites

Executive Order 13007, *Indian Sacred Sites* (1996) requires that the NPS (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites. The NPS consulted with the affected tribes and determined that no sites exist in the project area. While an ethnographic site does exist in the project area, this site is not considered sacred, and this project would neither harm the integrity of, nor prevent access to, this ethnographic resource. Because there are no sacred sites in the project area, this topic was dismissed from further analysis.

1.10.8 Indian Trust Resources

The unique legal and political responsibilities of the federal government to American Indian tribes arise from treaties, statutes, and executive orders. The term "Indian trust resources" is used to define the precise legal duties of the United States in managing property and resources of tribes.

The proposed Rim Trail transects land now managed by the NPS and the City of Page. The land originally belonged to the Navajo Nation. The Navajo Land Exchange Act of September 2, 1958 authorized the exchange of Manson Mesa to create what is now the City of Page for other lands near Blanding, Utah.

While the proposed Rim Trail land no longer is owned by the Navajo Nation, the NPS does recognize its responsibility to identify and protect the cultural resources of traditionally associated peoples such as the Navajo. Please refer to section 1.9.6 on Cultural Resources for a discussion of one ethnographic resource identified in the area of the proposed Rim Trail.

1.10.9 Soundscapes

Part of the NPS mission is to preserve, to the greatest extent possible, the natural soundscape of a park, and to protect this natural soundscape from unacceptable impacts (NPS 2006, §4.9). At Glen Canyon, the natural soundscape is considered a recreation area resource, and qualifies as an inherent component of “the scenery and the natural and historic objects and the wild life therein” that is protected by the NPS *Organic Act*.

The project area is located in areas of Glen Canyon zoned for Recreation and Resource Utilization, and Development. The area is subject to human-caused sounds, primarily due to motorized vehicle traffic on U.S. Highway 89 and municipal roads. Sources of sounds include many types of automobiles, overhead aircraft, electronic devices, and other sounds associated with a built urban environment. Human sounds are not unexpected or necessarily inappropriate within the project area.

Implementation of the preferred alternative would result in negligible impacts to the soundscape. Sounds from construction activities, including from the operation of machinery and presence of work teams, would be short term, intermittent, and occur only during work hours. Some impacts to the soundscape would continue following completion of the trail as public use of the area increases and the park performs routine management and trail maintenance functions. However, because these intrusions on the soundscape do not rise above the impact threshold of negligible, this topic was dismissed from further analysis.

1.10.10 Federally Listed Species

In accordance with Section 7(a)2 of the *Endangered Species Act* (ESA) (16 United States Code 1531 et seq.) the NPS consulted the most recent United States Fish and Wildlife Service (FWS) listing of endangered, threatened, and candidate species for Coconino County, Arizona (Appendix B) to determine what species may be present in the project area. Provisions of the ESA require consideration during any federal undertaking of both species populations and designated critical habitats for species listed or proposed for listing. Critical habitat is defined as a specific geographic area that is essential for conservation of endangered and/or threatened species.

Although the FWS has listed 22 species in Coconino County, Arizona, no critical habitat has been designated in the project area. Nor does the habitat for any of the listed or proposed species occur in the project area. After reviewing park files and conducting site visits, NPS biologists have determined that the proposed Glen Canyon Rim Trail project will have no affect on listed species, including the Mexican Spotted Owl, Brady pincushion cactus, and California condor. The following explanation is provided for the three species with the highest probability of occurring in the project area.

- California condor: The California condor (*Gymnogyps californianus*) is an endangered species under the ESA with experimental populations occurring in the project area. California condors routinely are sighted 9 river miles down the Colorado River at Lee's Ferry, but resource managers believe they may be using the river corridor upstream to the Glen Canyon Dam and along U.S. 89. Working with the U.S. Fish and Wildlife Service, the NPS has established conservation measures for construction projects to protect California condors in areas where construction projects are being undertaken (see Appendix C: California condor Conservation Measures for Construction Projects). These conservation measures would be utilized during construction and subsequent maintenance and other activities in the project area.
- Mexican spotted owl: The Mexican spotted owl (*Strix occidentalis lucida*) is a federally listed threatened species that is known to inhabit areas of Glen Canyon, and areas on the nearby Kaibab Plateau. The owl prefers isolated and remote locations with habitat consisting of dense, multi-layered foliage structure. Such habitat is not present in the project area.
- Brady pincushion cactus: The Brady pincushion cactus (*Pediocactus bradyi*), a small, semi-globose cactus, is listed as endangered by the federal government. A population is present on the benches and terraces near Marble Canyon. This project would have no impact on the cactus or suitable habitat.

Because the NPS has determined that this project will have no effect on any candidate or listed species or critical habitat, this topic is dismissed from further analysis.

1.10.11 Water Resources

The NPS protects surface and ground water resources as integral components of park aquatic and terrestrial ecosystems (NPS 2006, Sec. 4.6). The project area includes very few aquatic resources, limited to a few dry washes and water pockets (Tinajas). This project will have no adverse effects on these temporary water resources. None of these washes or tinajas remain wet long enough to develop a riparian zone. The trail will cross several dry washes, which flood during heavy rains, but the trail will not remain in the wash any longer than is necessary to cross and the final trail will not impede the hydrologic processes that transport water, sediment, and woody debris through the system. Significant water pockets are avoided by the trail. During the construction phase standard mitigations to prevent erosion and contamination will be employed to protect the washes, tinajas, and the Colorado River in the canyon below. Because this project will have no measurable impact to the water resources in the project area, water resources have been dismissed as an impact topic.

Chapter 2: Alternatives

2.1 Introduction

This chapter describes the two alternatives considered by the National Park Service: a no action alternative (Alternative A), and the action alternative (Alternative B). The action alternative was selected as the preferred alternative. The alternatives described include mitigation measures designed to minimize or avoid environmental impacts from the proposed action. This chapter also describes alternatives that were considered but rejected for further consideration.

The action alternative presented below is an updated version of the alternative selected in the 1995 environmental assessment described above in section 1.2 “Project Background.” The NPS interdisciplinary planning team and the external stakeholders group refined the original trail concept into the alternative presented here. The alternative was developed using public feedback, prior recreation area planning documents, legal authorities for park management, and the input of park planners and resource experts. The alternative was found to be feasible, and therefore reasonable for the purposes of analysis, because it satisfied the purpose and need and met project objectives (see Table 1), and was within the scope of the project analysis.

2.1.1 Alternative A – No Action

The guiding regulations of NEPA require the evaluation of a “no action” alternative in the analysis (40 CFR 1502.14). A no action alternative is developed for two reasons: first, the no action alternative represents a viable and feasible choice in the range of management alternatives. Second, because a no action alternative represents the continuation of current management actions, it provides a benchmark of existing impacts continued into the future against which to compare the impacts of the other proposed management alternatives. In this environmental assessment, the impacts of the no action alternative can be understood as the “current condition” of the project environment.

Under the no action alternative, the recreational hiking and bicycling trail would not be constructed. The project area would remain undisturbed and largely inaccessible to park visitors and residents. The decision not to construct the trail would not affect use or alter management of the Horseshoe Bend Trail or the city’s Rimview Trail. While the no action alternative fails to meet the project purpose and objectives, it will be carried forward for evaluation as a baseline for comparison of the action alternative.

2.1.2 Alternative B – Construct Glen Canyon Rim Trail

Alternative B is the National Park Service’s preferred alternative, and would result in the construction of an approximately 8.7 mile linear recreational hiking and bicycling trail

to be called the Glen Canyon Rim Trail. The following text further describes the project components of the proposed Glen Canyon Rim Trail:

Trail Corridor: The main trail corridor was identified and aligned during extensive field visits throughout 2008. Identifying the trail corridor involved an iterative process of flagging and reflagging segments of the trail until the trail satisfied the project objectives outlined in Chapter 1. The trail was then recorded with global positioning system tools.

The trail would link existing scenic areas together to form a single trail system (Figure 3). Following the proposed trail from south to north, the trail would begin at the Horseshoe Bend area and travel north across city and federally owned lands parallel to U.S. Highway 89 and the rim of Glen Canyon. The trail would connect with the parking lot at the Dam Overlook, a popular viewpoint above the Colorado River on the canyon rim. The trail would continue north to an intersection with Highway 89 approximately ¼-mile south of the Glen Canyon Dam bridge. Here the trail would fork with one branch leading northwest toward the dam to a proposed trailhead at an existing parking area, while a second branch would cross Highway 89 and connect to a parking area on Chains Road associated with the Hanging Gardens hike. From this parking area the trail would turn east and progress upslope along an old roadbed and then a new residential road to the intersection with the City of Page's existing Rimview Trail atop Manson Mesa.

The trail would include alternate paths that would depart from the main trail corridor, travel over an unimproved surface, and reconnect to the main trail. These trail spurs are intended to provide a higher degree of challenge over unimproved terrain to appeal to experienced users. The trail would also include a loop reconnecting to the Horseshoe Bend parking lot. These additional segments of the trail are considered in this document, but have only been conceptually aligned with the main trail because the main trail first needs to be constructed prior to aligning the Horseshoe Bend loop and spur/side trails (see Figure 3).

Trail Design: The philosophy behind the trail design is to combine elements of singletrack with a need to accommodate bimodal, two-way traffic. The trail is designed to blend into the natural setting by using native materials and creating a narrow-footprint. Gradual transitions and sinuous flows would be utilized to provide for a safe and enjoyable experience. Existing transportation routes and utility corridors in the project area were evaluated and when possible utilized to minimize the impact to resources in the area. Trail design considered topography, slope, drainages, line-of-site, and other features to construct an aesthetically pleasing, user safe, and minimally disruptive trail. The trail width would vary based on design conditions, including resource concerns, anticipated user conflicts, and safety needs. Trail width would vary from two- to five-feet, but may widen to ten-feet to avoid difficulties associated with natural terrain, steep slope, and other features that may restrict safe two-way passage. Trail design guidance from groups including the International Mountain Bicycling

Association and the American Association of State Highway and Transportation Officials was consulted.

Horseshoe Bend Trail: The NPS intends to create a trail at Horseshoe Bend that meets handicap accessibility requirements. The present 3/4-mile trail leading from the Horseshoe Bend parking lot over the hill to the scenic viewpoint would be relocated to the north side of the hill and made accessible. The existing trail would be closed and revegetated. This specific trail segment of the project would not be aligned until professional surveys are undertaken. This segment of the trail identified on Figure 3 is a representation of the trail location.

Trail Construction: To minimize disturbance to soils and vegetation the trail would be constructed to maximize travel over hardened sandstone surfaces that would require no improvement. Some sandstone surfaces would be machine-milled to eliminate tripping hazards, to smooth the trail surface, and to create a visible and defined trail corridor. The milling waste would be reused and be combined with gravel to create a stable base through sandy areas. Sandy areas would be treated with a soil treatment product to create a hardened and defined trail surface. The soil treatment product is an environmentally friendly polymer emulsion, which when mixed with the native soils and the base product bonds soil particles together into a four-inch thick hardened trail surface.

Initial construction would be limited: small areas would be machined or hardened as described above. As problem areas are identified, additional work would take place. Initial construction is not anticipated to include features such as pedestrian bridges or trail drainage features. However, should trail erosion become a problem the NPS would consider constructing bridges, water bars, or other features to prevent erosion and washouts along the trail.

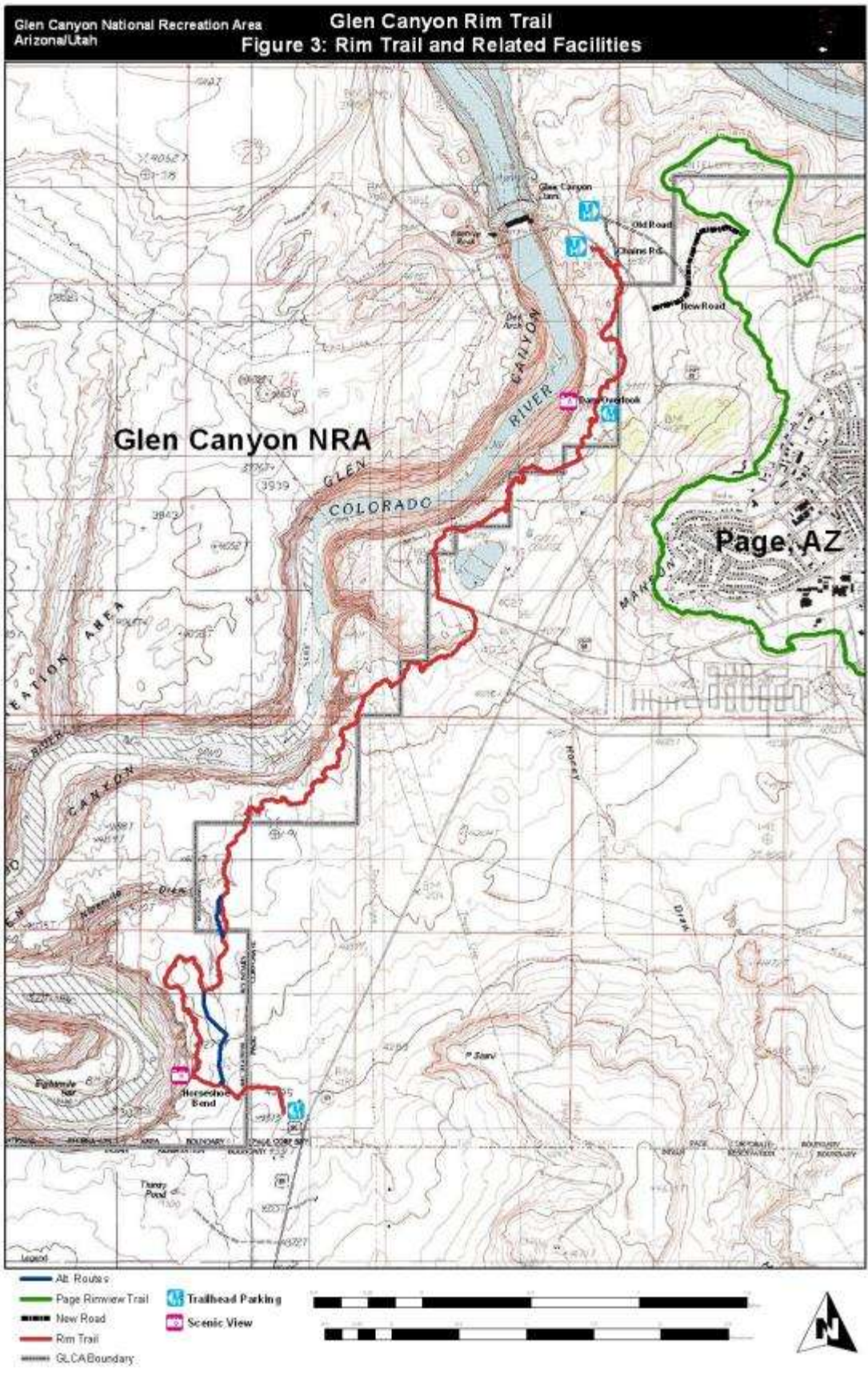
Parking and Access: Parking and access areas would provide for approximately 100 vehicles. The largest parking area exists at the Horseshoe Bend overlook, which is approximately a half-acre in size. Twelve parking spaces exist at the Glen Canyon Dam overlook, while the Hanging Garden parking lot can accommodate a number of additional vehicles. Additional trailhead parking would be pursued at the gravel parking area on U.S. Highway 89 (see Figure 3).

Signs and Facilities: Kiosks would be placed at each major trailhead access point. Trailhead kiosks would include information on the general risks and policies regarding trail use, including trail user etiquette, safety precautions and emergency contact information, a trail map, any immediate advisories or warnings, and other information. Interpretive trail markers would be placed along the trail to provide information on significant natural or cultural features, to provide warnings when necessary, and to indicate the trail path and provide directional features. Posts or monuments would be placed along the trail to indicate distance and location every .5 mile as well as major trailhead locations and junctions. The park would develop trail brochures and maps.

Under the preferred alternative the park would place composting toilets at the Horseshoe Bend parking area and at the Hanging Gardens trailhead. Other facilities may include trash receptacles, sun shades, picnic tables, and bicycle racks or posts, to be determined based on user needs.

Trail Maintenance: The NPS would seek a long-term maintenance agreement with the City of Page to coordinate activities and share costs and responsibilities for maintenance of facilities. Based on the recommendations of the planning team, maintenance would minimally consist of the following:

- Trail Maintenance Survey and Repair: Each year, the NPS would complete a maintenance survey of the entire trail noting general conditions and problem areas, to determine maintenance needs. Maintenance would largely include repairs to the hardened trail surface, and rock and debris removal.
- Drainage: In general, regular maintenance would be needed after each significant rainfall to remove rocks and debris, and to fill holes and cuts made by running water. Should drainage crossings become a recurring problem or a safety hazard, the park would consider constructing bridges to cross the drainage.
- Trail Sign Maintenance: Signs would be regularly checked for weathering and vandalism and replaced or repaired, as appropriate. Signs may be added or replaced to aid in user access or resource interpretation and protection.
- Trail Clean-Up: During routine trail maintenance, litter removal would be completed. Annual cleanups would be scheduled based on needs identified in trail maintenance surveys. Trash cans would be provided wherever possible at trailheads, but only where there is a designated managing agency to ensure regular trash disposal.
- Weeds Removal: Invasive plants often follow disturbance, including the activities of humans. Invasive plant seeds can be carried into the park by hiking shoes, bicycles, and horses. The trail would be surveyed for introductions of invasive alien species of plants on a regular and ongoing basis. Invasive plant removals would be conducted as deemed appropriate.
- Resource Conditions: The NPS would monitor on an annual basis resource conditions along the trail corridor. Natural and cultural resources would be monitored to assess impacts and disturbances associated with trail use and to determine if additional management actions are required to protect park resources.
- Unauthorized Trails: The NPS would monitor and manage unauthorized trails and use areas. Signs and physical barriers would be used to inform trail users of rules and regulations, to close unauthorized routes, and to prevent further incursion into closed areas.



General Management Actions: The following management policies will be incorporated into this plan as part of the proposed action:

- All pets must be kept on a leash while in Glen Canyon
- No overnight camping is allowed on or near the trail
- No horseback riding is authorized on the trail
- Fires are not permitted on or near the trail
- Recreational motor vehicle and off-road vehicle use is prohibited on or near the trail and on all NPS property in the project area
- Bicyclists are restricted to approved trails or roads as defined this environmental assessment after the special regulation is adopted pursuant to Title 36 CFR 4.3
- All NPS and Glen Canyon policies and regulations related to visitor and resource protection apply, unless stated otherwise

2.2 Mitigation Measures

Mitigation measures are specific actions designed to minimize, reduce, or eliminate impacts of alternatives and to protect park resources and visitors. The following mitigation measures have been identified to minimize the degree and/or severity of adverse effects to park resources during trail construction, and would be implemented as needed:

- To minimize the amount of ground disturbance, staging and stockpile areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpile areas would be returned to pre-construction conditions following trail construction. Access to the area for construction would be provided by existing administrative roads.
- All applicable safety standards will be followed to protect the public and employees. This will include identification and fencing of the immediate work site.
- An Arizona Department of Environmental Quality Pollution Discharge Elimination System permit would be obtained prior to construction. This permit requires the completion of a Stormwater Pollution Prevention Plan and erosion control. This plan requires the management of construction equipment including regular maintenance to minimize the occurrence of petrochemical leaks. All leaks will be cleanup in accordance with state and federal regulations.
- To reduce noise and emissions, construction equipment would not be permitted to idle for long periods of time. Construction activities would take place during daylight hours.

- Fugitive dust generated by construction activities would be minimized by spraying water on the construction site, if necessary.

The NPS is implementing project specific mitigation measures to protect cultural resources that may be present in the project area. These mitigation measures are described in detail following section 3.6.6 on Cultural Resources.

2.3 Alternatives Summaries

Table 1 summarizes the major components of Alternatives A and B, and compares the ability of these two alternatives to satisfy the project objectives identified in section 1.4 of the Purpose and Need chapter. As illustrated in the following table, Alternative B, the preferred alternative, satisfies all of the project objectives, while Alternative A, the no action alternative, does not meet project objectives.

Table 1 – Alternatives Summary and Project Objectives

Alternative A – No Action	Alternative B – Construct Rim Trail
The recreational hiking and bicycling trail would not be constructed along the rim of Glen Canyon. The area would remain undisturbed and largely inaccessible to park visitors and local residents.	A recreational hiking and bicycling trail would be constructed along the edge of Glen Canyon to connect the existing Horseshoe Bend overlook trail with the City of Page's existing Rimview Trail. Connected actions include the construction of parking areas and restroom facilities, and the placement of interpretive waysides along the trail corridor.
Satisfies Project Objectives?	Satisfies Project Objectives?
Alternative A would fail to satisfy three of the four project objectives. Failure to construct the recreational trail would result in no additional land-based recreational opportunities for park visitors and city residents, would not provide park visitors with additional opportunities for a positive recreational experience, and would not provide opportunities to foster a stewardship ethic. Not constructing the trail would meet the project objective to prevent impairment and unacceptable	Alternative B would satisfy all project objectives. Construction of the Rim Trail would not result in impairment or unacceptable impacts. The trail would result in a new recreational opportunity for park visitors and local residents seeking healthful, aesthetically pleasing outdoor experiences in the Page area. The trail would be planned, constructed, and maintained to protect the natural environment and not detract from the aesthetic features of the area. Wayside

impacts, minimize environmental impacts associated with trail construction and recreational activity in the project area.	exhibits would foster an appreciation of the natural environment and the role of the National Park Service and the community in maintaining a high quality environment.
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2.4 Environmentally Preferred Alternative

The Council on Environmental Quality (§1505.2(b)) and NPS Director's Order #12 (NPS 2001) require that environmental documents specify the alternative or alternatives which were considered to be environmentally preferable. The NPS, in accordance with the Department of the Interior policies contained in the Department Manual (516 DM 4.10) and CEQ regulations, defines the environmentally preferable alternative as the alternative that will promote the national environmental policy as expressed in NEPA's Section 101 (42 USC §4331).

2.4.1 Consistency with Sections 101 and 102(1) of NEPA

CEQ regulations (1502.2(d)) require that NEPA documents contain a section showing how each alternative would satisfy NEPA Sections 101 and 102(1). Director's Order #12 states that compliance with this CEQ requirement shall be accomplished by providing a comparative summary assessing how each alternative would meet the following criteria listed under NEPA Section 101(b):

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

2.4.2 Summary

Alternative A, no action, meets the above six evaluation criteria for identifying the environmentally preferable alternative. Because the alternative would result in no construction and therefore no disturbance within the project area, the alternative would best meet the criteria to preserve the natural and cultural aspects of the area (Criteria #4). However, the alternative does not support the other criteria as well as Alternative B.

Alternative B satisfies the majority of the criteria listed in Section 101(b) of NEPA, and has been identified by the National Park Service as the environmentally preferred alternative. Alternative B would result in the construction of a recreational hiking and bicycling trail that would allow for productive use of the landscape in a safe and aesthetically pleasing manner. Construction methods and materials would be low-impact, include appropriate mitigation measures, and would be designed to protect the natural and cultural features and resources of the project area. Trail planning would incorporate management practices to protect the area from inadvertent damage due to unacceptable recreational activities and behavior, such as social trail encroachment. Trail design would also incorporate informational wayside exhibits designed to foster a stewardship ethic and a deeper appreciation for the natural environment and cultural histories. Alternative B achieves the best balance between protection of the natural and cultural environment, productive use of local resources, and the enhancement of environmental awareness and stewardship.

2.5 Alternatives Considered but Dismissed

The NPS considered additional options related to recreational trail use in the project area, but these alternatives were dismissed by the IDT. Reasons for dismissing each alternative are provided below.

Equestrian Use: The NPS evaluated equestrian use on the trail. There are recreational equestrian riders in Page. However, the NPS determined that there was little interest in providing for this use, and feedback from the facilities staff indicated that accommodating horse riders may not be feasible with the product used to create the trail surface, and would at a minimum require additional trail upkeep and maintenance.

Wider Trail Width: Guidance provided by some trail building groups and agencies recommend a variety of trail widths, depending on types of trail use and environmental conditions. The NPS considered a variety of trail widths, including up to 12-feet. The intent of this plan is to construct a recreational trail that is suitable for the environment, results in minimal impact to resource, and provides for an aesthetically pleasing and safe user experience. The planning team did not view a continuous 12-foot wide improved trail corridor as an option that was consistent with the project objectives. Rather, trail width will vary from 5-feet to 10-feet based on topography, safety related issues, resource impacts, and user needs.

Off-Trail Bicycling Area: The 1995 *Recreation Use Management Plan* (NPS 1995a) included an off-trail area for bicycling. This concept was rejected in the current plan but may be considered in future planning documents.

2.6 Environmental Impacts Summary

Table 2 summarizes the anticipated environmental impacts for Alternatives A and B. The information contained in Table 2 is based on the environmental analysis presented in detail in Chapter 3 – Affected Environment and Environmental Consequences. Only those impact topics that have been carried forward as identified in Chapter 1 are included in this table.

Table 2 – Environmental Impact Summary by Alternative

Impact Topic	Alternative A	Alternative B
Soils and Geology	Alternative A would result in no disturbance to soils and geologic resources.	Trail construction would cause minor, adverse, site-specific impacts to soils and geology along the trail corridor. Direct impacts would occur due to trail construction. Impacts would continue to occur as the public used the trail and impacted soils and geologic resources in the immediate vicinity of the trail corridor. Impacts would be long-term.
Vegetation	Alternative A would result in no disturbance to vegetation.	Trail construction would result in negligible, site specific, adverse impacts to vegetation. Direct impacts would occur due to trail construction. Indirect impacts would continue to occur as the public used the trail and impacted vegetation along the trail corridor. Impacts would be long-term.
Visitor Use and Experience	Alternative A would result in no change in the availability of recreation opportunities or visitor experiences.	Changes in visitor use and experiences in the project area would be moderate and beneficial. Construction of the trail would result in the enhancement of available recreation opportunities in the project area, and would increase by 60-percent total available recreation trail miles. A negligible to minor increase in visitor conflict may occur, but mitigation efforts would likely be successful. The NPS estimates that 40,000 visitors would utilize some

		portion of the Rim Trail.
Park Operations	Alternative A would result in no impacts to existing operations.	Alternative B would result in a minor, adverse, long-term impact to park operations, as park resources are directed toward maintenance, management, and visitor and resource protection activities for a new park asset and visitor use area.
Wildlife	Alternative A would result in no disturbance of wildlife	Alternative B would result in minor, adverse, long-term impact to wildlife resources in the project area as increased pedestrian and bicycling traffic would cause displacement and ongoing disturbance to some species in the project area.
Archeological Resources	Alternative A would not result in impacts to archeological resources in the project area.	Alternative B would result in minor, adverse, long-term impacts to archeological resources in the project area. Adverse impacts threatening the characteristics of a site contributing to its eligibility that would occur from trail construction are avoided through a combination of modifications to the undertaking and implementing specific mitigation measures. Alternative B would not result in the impairment of archeological resources in the project area.

Chapter 3: Affected Environment & Environmental Consequences

3.1 Introduction

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the proposed project. Topics analyzed in this chapter were identified in Chapter 1 and include: soils and geology, vegetation, visitor use and experience, park operations, wildlife, and archeological resources. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each of these resource topics. Potential impacts are described in terms of type, context, duration, and intensity.

3.2 Methodology

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category:

- general analysis methods as described in guiding regulation
- 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 effects 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

These elements are described in the following sections.

Assumptions

The analysis of impacts follows CEQ guidelines and Director's Order 12 procedures (NPS 2001) and is based on the underlying goal of providing a well-designed, low impact non-motorized recreational pedestrian and bicycling trail to offer users a recreational experience consistent with the purposes and significance of the recreation area and the objectives identified in this document.

The impact analysis and conclusions contained in this chapter were based on park staff knowledge of the resources and site, review of existing literature and park studies, information provided by specialists within the National Park Service and other agencies, and professional judgment. Background information on natural and cultural resources in the project area was obtained from the 1979 *General Management Plan* (NPS 1979)

and the 1995 *Recreational Use Management Plan Environmental Assessment* (NPS 1995a). Any research, studies, or other material used to inform professional judgment for the impact analysis is referenced in the section titled “Existing Conditions” for each impact topic.

Analysis Period

The objectives and implementation of this plan will allow the NPS to manage the Glen Canyon Rim Trail for the next 15 years; therefore, the analysis period used for assessing impacts is up to 15 years.

Future Trends

Visitor use and demand are anticipated to follow trends established in the past decade. Annual visitation to Glen Canyon National Recreation Area has been around 1.9 million visitors during this period.

Geographic Area Evaluated for Impacts

The geographic area evaluated in this environmental assessment is illustrated in Figure 2 and encompasses approximately 2,500 acres of lands belonging to the federal government and the City of Page, Arizona. The size of the analysis area is consistent with the flexibility needed to make minor adjustments to the trail alignment during the construction phase and in the future should monitoring or maintenance activities determine that rerouting is needed. The specific area assessed for cultural resources is described in section 3.6.6 below.

Duration and Type of Impacts

The terms effect and impact are interchangeable for the purpose of this analysis.

Type describes the classification of the impact as beneficial or adverse, direct or indirect:

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 moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Context describes the area or location in which the impact will occur. Are the effects site-specific, local, regional, or even broader?

Duration describes the length of time an effect will occur, either short-term or long-term:

Short-term impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.

Long-term impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.

Intensity describes the degree, level, or severity of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this environmental assessment.

3.3 Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no action and action alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects within the project area. The geographic scope for this analysis includes elements within the project boundaries as identified on Figure 2, while the temporal scope includes projects within a range of approximately fifteen years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future. Note that none of the listed projects are NPS-specific undertakings:

Existing Recreation Trails: The NPS presently maintains a small network of trails in the project area. Two of these trails – the Horseshoe Bend and the Dam Overlook trails – are very popular, but also very short in length. Another trail in the project area is the trail to the Hanging Gardens. All three trails require little operational support and total less than 2 miles in length. These trails have had a negligible impact on resources in the project area.

Utility Rights of Way: The project area for the Rim Trail is zoned in the GMP for development and includes a designated utility planning corridor. Several improved

natural surface roads cross the project area. Some roads originated with construction of the Glen Canyon dam, while others continue to be used to service power lines in the area.

Glen Canyon Dam: The project area is immediately downstream from the Glen Canyon dam. Visual evidence remains of construction activity related to the building of the dam, including access roads, staging areas and abandoned construction equipment and materials. The Bureau of Reclamation maintains small facilities along the rim that serve **Page's water supply needs and continues to access this area by vehicle to maintain and administer Reclamation-related facilities and structures.**

Page Water Supply Intake: The City of Page has proposed to build a Water Intake at the edge of Lake Powell just upstream of the dam. During construction and once in operation the intake structure will be visible from the proposed trail.

Page Wastewater Treatment Facility: The City of Page operates a wastewater treatment facility in the project area. The trail corridor would run adjacent to this facility.

Golf Course: The trail corridor would run adjacent to a defunct 18-hole golf course. A portion of this land is used as an area to apply reclaimed water from the adjacent wastewater treatment facility. Some of this land also is proposed for sale and may be utilized for other purposes in the future.

Residential Development: Residential development is occurring in the project area. Presently one development is planned for lands on Manson Mesa to the northeast of the intersection of Highway 89 and Lake Powell Boulevard. The proposed Rim Trail would be incorporated into this development and would utilize the recently constructed access road. A second development is in construction phase and is located on the rim of Glen Canyon immediately adjacent to NPS headquarters and upslope from the Dam Overlook. The Rim Trail would adjacent to both of these developments.

Commercial Development: Much of the city land in the project area is zoned for commercial development. Recent construction includes a large discount store, fast food outlet, and animal shelter. Additional commercial development reasonably could be anticipated in the project area.

Horseshoe Bend Parking Area: The Horseshoe Bend overlook is a very popular destination. The parking area is often crowded during the tourist season. Because Horseshoe Bend is a planned trailhead for the Rim Trail, increased use of the parking area is likely, leading to additional crowding concerns. The parking area has already been expanded in 2008. The parking area is located entirely on lands owned by the City of Page.

3.4 NPS Impairment Standards

National Park Service's *Management Policies* require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the National Park System, established by the Organic Act of 1916 and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant National Park Service planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. The impact analysis includes findings of impairment of park resources for each of the management alternatives. Impairment findings are made for park resources and values affected by the alternatives. Visitor use and experience and park operations are not considered park resources; therefore, impairment findings are not included as part of the impact analysis for these topics.

3.5 NPS Unacceptable Impact Standards

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the National Park Service will apply a standard that offers greater assurance that impairment will not occur. The National Park Service will do this by avoiding

impacts that it determines to be unacceptable. These are impacts that fall short of **impairment, but are still not acceptable within a particular park's environment**. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with:
 - park programs or activities, or
 - an appropriate use, or
 - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, or
 - NPS concessioner or contractor operations or services

In accordance with NPS *Management Policies*, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impacts could occur to the resources and values of Glen Canyon National Recreation Area, the impacts of the proposed action in this environmental assessment were evaluated based on the above criteria. A determination on unacceptable impacts is made in the *Conclusion* section of the action alternative for each of the resource topics evaluated below.

3.6 Impact Topics Analysis

Determining impact thresholds is a key component in applying NPS *Management Policies* and *Director's Order 12*. These thresholds provide the reader with an idea of the intensity of a given impact within a specific resource topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on regulations, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts.

3.6.1 Soils and Geology

Existing Conditions: The project area is comprised of Navajo sandstone and deposits of sand with little developed soils. The area is characterized by sandstone outcrops, exposed slickrock benches, and open sand covered mesas dominated by blackbrush. The area is cross-sectioned by various sized drainages. Developed soils in the area tend to be shallow and consist largely of blowsand deposits. Soil depth ranges from less than 20 inches up to 60 inches, with slopes of 1- to 15-percent.

Past disturbances to soils along the planned trail corridor include unimproved non-graded tracts created by vehicles as well as improved graded and maintained roads used to service utility facilities. Additional impacts are associated with public use of the area. Impacts to soils and geologic formations within the project area have occurred due to development associated with city and visitor services, including development of residential housing, commercial buildings, a golf course, and a city wastewater facility.

Intensity Level Definitions

- Negligible: Soils or geologic features would not be affected or if affected would not be measurable. Any effects to soil productivity or fertility would be slight, short-term and would occur in a relatively small area.
- Minor: The effects to soils or geologic features would be detectable, but likely short-term. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- Moderate: The effects on soil or geologic features would be readily apparent, long-term, and slightly change the soil or geologic characteristics over a relatively large area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- Major: The effect on soil or geologic features would be readily apparent, long-term, and substantially change the soil or geologic characteristics over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.
- Impairment: The effects would cause a permanent change in a large portion of the overall acreage of the park, affecting the resource to the point that the **park's purpose could not** be fulfilled and the resource would be degraded precluding the enjoyment of future generations.

Impacts of Alternative A – No Action

The no action alternative would not result in impacts to soil and geologic resources in the project area because the trail would not be constructed and increased visitor use of the area would not occur. The project area now receives only light, intermittent public use that occurs in localized areas and is difficult to measure. Under the no action scenario, public use and associated impacts to soils and geologic formations are not predicted to change.

Cumulative Effects: Several other activities within the project area have had an adverse effect on soil and geologic features, including compaction of soils, crushing of areas of sandstone, and the leveling and grading of soils. Activities associated with cumulative effects includes the existing NPS trail infrastructure, residential and commercial development in the area, continued vehicle access for utility rights-of-way and Glen Canyon Dam operations, and possible future use of the former city golf course. This alternative would not result in any additional impacts to soil and geologic resources. Because there is no effect to these resources, this alternative would not incrementally add to adverse cumulative effects to the project environment.

Conclusion: The No Action Alternative would not result in impacts to local soil or geologic resources because no construction activities would occur as a result of this plan. Under this alternative, soils in the project area are not expected to change; therefore, cumulatively, soils would not appreciably change when considered with other past, present, and reasonably foreseeable future actions. Because this alternative would have no impact to soils and geologic features, there would be no unacceptable impacts or impairment to these resources.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

Construction of the trail would result in minor, adverse, site-specific, and long-term impacts to soils and geologic features in the project area. Sandy soils are not subject to compaction but trail construction and subsequent use could increase erosion in these areas. Those limited areas of developed soils along the trail would be impacted by **compaction and erosion. Sandstone edges or ‘fins’ are subject to crumbling with pressure.** Direct impacts to soil and geological resources would occur due to trail construction and subsequent visitor use and would affect approximately ten acres. An additional 1.5 acres is anticipated to be impacted due to secondary trail routes and loop features associated with the main trail corridor. Following completion of the trail, long-term impacts to soils and geologic features would continue due to concentrated visitor use along and adjacent to the trail corridor, as well as impacts from ongoing trail management activities including monitoring, maintenance, and administrative operations. Impacts from use along the length of the trail could also accelerate the already naturally occurring breakdown of the sandstone and may cause erosion-related problems along natural drainages. Impacts may also occur due to creation of social trails, but this is not anticipated to contribute overall to impacts.

Cumulative Effects: Any construction activity in the area has the potential to impact soils and geology. There are several other past, present, and future possible projects in the area that have had or continue to have a negative effect on soil and geologic features. These include the existing trail network, ongoing residential and commercial development in the area, continued vehicle access for utility rights-of-way and Glen Canyon Dam operations, and possible future use of the former city golf course. These actions, when combined with the impacts from implementation of Alternative B, would result in additional cumulative impacts to soil resources. However, impacts from trail construction would result in a minor contribution to the overall impacts to soil resources in the project area.

Conclusion: Adoption of Alternative B would result in minor, adverse, long-term impacts to soils and geologic features in the project area. Direct impacts would occur due to construction of the recreation trail. Indirect impacts would continue to occur due to intensive visitor activity on and adjacent to the trail corridor and due to ongoing trail management activities. Construction of the trail is anticipated to contribute only minimally to cumulative impacts in the project area when considered with other past, present, and future possible actions. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, (2) key to the natural or cultural integrity of the park, or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of Glen Canyon NRA's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of NPS 2006 *Management Policies*.

3.6.2 Vegetation

Existing Conditions: The major vegetative community in the project area is the sand desert shrub complex (Welsh et al, 1987). It is composed largely of sparse and scattered sand sage, Indian ricegrass, fourwing saltbush, yucca, sand dropseed, and various herbaceous annuals. In addition there are large patchy areas composed mainly of blackbrush. Annual bromes, rumex, numerous annual forbs/wildflowers, scattered perennial bunchgrasses, yucca and cacti also are found within the project area (Spence 2009, pers. comm.).

Intensity Level Definitions

Negligible: Individual native plants may occasionally be affected, but no measurable or perceptible changes in plant community size, integrity, or continuity would occur.

- Minor: Impacts to native plants are measurable or perceptible and localized within a relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover.
- Moderate: Impacts to native plants would cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact would remain localized.
- Major: Impacts to native plant communities would be substantial, highly noticeable, and long term, and affect a sizable portion of affected community type in and out of the park. Mitigation measures required to offset the adverse effects would be extensive and their success would not be guaranteed.
- Impairment: Impacts to native plant communities would be substantial, highly noticeable, permanent, cannot be mitigated, and affect a relatively large area in and out of the park.

Impacts of Alternative A – No Action

The no action alternative would not result in impacts impacts to vegetation in the area because the trail would not be constructed. Under the no action scenario, public use and associated impacts to vegetation are not predicted to change.

Cumulative Effects: Other projects in the project area are having an impact on vegetative resources. These include the current trail network, ongoing residential and commercial development, and vehicle access to the area for administrative uses. This alternative would not incrementally contribute to any adverse cumulative effects to the project environment because no activity would occur to affect existing vegetative communities.

Conclusion: The no action alternative would not cause impacts to vegetation resources because no construction activities would occur. As such, this alternative would not contribute to any cumulative disturbance of resources in the project area. Because this alternative would have no impact to vegetation, there would be no unacceptable impacts or impairment to these resources when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

Construction of the trail would result in the removal of individual plants within the trail corridor. Impacts would be less than impacts to soils and would be barely perceptible. Overall, construction of the trail would result in negligible, adverse, site-specific and long-term impacts to plants within the trail corridor. This impact would be limited to individual plants, and would not adversely impact native plant populations in the

project area. Following completion of the trail, indirect impacts to plants may occur as individuals engage in activities along the trail corridor, as well as impacts from ongoing trail management activities including monitoring, maintenance, and administrative operations.

Cumulative Effects: Any construction activity in the area has the potential to impact vegetation. Projects such as private residential development, commercial development, road improvement projects, or other construction projects could have adverse affect on resources in the project area. Alternative B would result in additional cumulative impacts to vegetation resources; however, these impacts would be a negligible contribution to the overall impacts to resources in the project area.

Conclusion: Adoption of Alternative B would result in negligible, adverse, long-term impacts to vegetation in the project area. Direct impacts would occur due to construction of the recreation trail. Impacts would continue to occur due to intensive visitor activity on and adjacent to the trail corridor and due to ongoing trail management activities. Construction of the trail is anticipated to contribute only minimally to cumulative impacts in the project area when considered with other past, present, and future possible actions. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, (2) key to the natural or cultural integrity of the park, or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of Glen Canyon's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of NPS 2006 *Management Policies*.

3.6.3 Visitor Use and Experience

Existing Conditions: Limited hiking and bicycling trail opportunities presently are available in the project area. If constructed, the Glen Canyon Rim Trail would provide approximately nine more miles of trail and would connect to all of these existing trail use areas:

- Horseshoe Bend is a popular hike to a scenic overlook of the Colorado River and the Vermillion Cliffs. The 1.5 mile trail (round trip) is located approximately 5 miles south of the Glen Canyon dam on the west side of Highway 89. Visitor use of this area appears to be high, although the NPS does not have a reliable visitor count for this location. The Horseshoe Bend parking area would be a major trailhead for the Glen Canyon Rim Trail.
- The Dam Overlook is another popular short hike to a scenic overlook of the Colorado River and the Glen Canyon Dam. The Dam Overlook is only a short walk down a flight of stone stairs. NPS visitor counts indicated that 41,000 people visited

this overlook in 2007. The Dam Overlook parking area is planned to be used as a trailhead for the Glen Canyon Rim Trail.

- Immediately south of the Glen Canyon dam is the trailhead for the 2-mile (round trip) hiking trail to the Hanging Gardens. The NPS has no visitor counts for this specific hiking trail. The Hanging Gardens parking area is planned as a trailhead for the Glen Canyon Rim Trail.
- The Chains area is located on the southern shoreline of Lake Powell, adjacent to the Glen Canyon dam. This area is served by a gravel road and includes several parking areas for use by visitors wishing to access Lake Powell. Visitors can also hike cross-country in the sandstone mesa area that leads to Manson Mesa. The Hanging Gardens hiking trail is located in the area and there is a small parking area available at the trailhead. Glen Canyon visitor counts indicated that as many as 43,000 people entered the Chains area in 2007.
- The city's Rimview Trail is located on Manson Mesa and circumnavigates the city. This ten-mile non-motorized trail predominantly is used by local residents for hiking, running, and bicycling.

A survey of trail users in Arizona found that two-thirds (62.7%) of Arizonans are recreational trail users (Arizona 2005). A similar survey of Utah trail users found that half (49.7%) of Utah residents reported using recreational trails (Burr and Reiter 2003). These surveys found that hiking, biking, walking and running on trails are the most popular trail activities. Motivations for trail users include access to view scenic beauty, to be close to nature, and to get away from the usual demands of life (Arizona 2005).

The Page area is experiencing limited population growth with a total population increase of 3-percent between 1990 and 2000 (US Census). However, visitation to the area remains high and is increasing. The NPS recorded 1.3 million recreation visitors passing through the entrance stations at Wahweap in 2007. This represented a 7.8-percent increase in visitation over 2006. NPS statistics show that visitation increased throughout 2008 as well.

Based on the above visitation and survey data, the NPS estimates a minimum of 40,000 recreation visits to the Glen Canyon Rim Trail on an annual basis.

Intensity Level Definitions

Negligible: The visitor experience, enjoyment, and use of park resources would not be affected, or the effects would be at or below the level of detection, would be short-term, and the changes would be so slight that they would not be of any measurable or perceptible consequence.

- Minor: Effects on visitors' experience, enjoyment, and use of park resources would be detectable, though the effects would likely be short-term and localized. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate: Effects on visitors' experience, enjoyment and use of park resources would be readily detectable, long-term, and localized. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- Major: Effects on visitors' experience, enjoyment, and use of park resources would be obvious and long-term and would have substantial consequences. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Impacts of Alternative A – No Action

Adoption of the no action alternative would not result in impacts to visitor use in the project area because the recreation trail would not be constructed. No other recreation projects are contemplated in the project area. Park visitors and local residents would continue to have access to existing recreation resources in the Page vicinity, including access to the Horseshoe Bend trail, the Chains day use area, the Dam Overlook trail, the Hanging Gardens trail, and the existing Rimview Trail on Manson Mesa.

Cumulative Effects: This alternative would not contribute to cumulative impacts within the project area. The availability of recreation resources would remain unchanged. Past projects in the project area related to recreation opportunities are limited to the existing NPS trail network. No present or foreseeable projects within the project area are related to recreation amenities and therefore would have no effect on recreation-related use of the area.

Conclusion: The no action alternative would not impact visitor use within the project area. Public use of recreation resources would not be affected. As such, this alternative would not contribute to any additional cumulative disturbance of recreation-related resources in the project area when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

Alternative B would result in a moderate beneficial impact to visitor use and experience in the project area over the long-term. The construction of an 8.7-mile recreational trail would increase available linear trail mileage by 60-percent, from approximately 12.5 linear trail miles currently available, to over 20 linear trail miles available following trail construction.

The trail would have a moderate beneficial impact on the availability of recreational resources for individuals seeking opportunities for on-trail hiking and bicycling, sightseeing, walking and running, and other trail-based activities. Construction of the trail is expected to result in a large increase in public use of the area during the primary visitor use season of May through September. Based on available data on adjacent hiking trails, the NPS estimates 40,000 annual recreation visits to the Rim Trail.

Recreation conflict between trail users is expected to be negligible to minor and adverse and would require limited mitigation. Conflict is most likely to arise between trail users engaged in different activity types, such as between bicyclists and walkers. Conflicts arise when trail users have different motivations for recreating, and attribute an **unsatisfactory recreation experience to another's behavior.**

Conflict can also be attributed to the natural or managerial setting. Trail users may report conflict due to the presence of litter or vandalism, for instance. Or they may report concerns over trail management, such as use rules, facilities, or trail maintenance that they feel to be inappropriate or lacking.

Overall, trail design incorporated modern planning and management techniques to reduce safety risks and recreation conflict. Trail construction and management strategies include appropriate sightlines, control of speeds (for bicyclists), limitations on inclines, construction techniques to smooth the trail and harden blowsand areas, and clear identification of the trail corridor. Trailhead facilities will present information to educate trail users regarding appropriate trail use etiquette and safe trail use behavior.

Cumulative Effects: Alternative B is expected to have a moderate beneficial impact to visitor use and experience within the project area. The construction of any new recreation amenity has an effect on visitor use by providing additional recreation opportunities. Other projects in the project area have only a negligible adverse impact on visitors to the area as visitation is extremely light and intermittent except within the confines of the existing trail network. Constructing a new recreation trail, when considered in context with past, present, and reasonably foreseeable future actions in the project area, would result in a major cumulative benefit to the recreation experience of park users.

Conclusion: Construction of the Glen Canyon Rim Trail would result in a moderate, long-term beneficial impact to visitor use and experience within the project area. The trail would result in a significant new recreational opportunity. Cumulatively, this alternative would have a moderate beneficial effect to visitor use and experience because ultimately this project combined with other past, present, and reasonably foreseeable future actions would benefit a large number of visitors to the area.

3.6.4 Park Operations

Existing Conditions: The project area currently requires a limited operational commitment from the National Park Service. Rangers monitor the U.S. 89 corridor between the Chains area and Horseshoe Bend, including the Scenic View Road that leads to the Dam Overlook parking and scenic view area. Limited facilities requiring operation and maintenance presently exist at the developed areas along the trail corridor, including Horseshoe Bend, the Dam Overlook, and the Chains area. No routine or planned natural or cultural resource operations occur in the project area. Because the majority of the project area is undeveloped and subject to only light and intermittent visitor use, park service operations in the area have been limited.

Intensity Level Definitions

- Negligible: Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.
- Minor: The effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on park operations. If mitigation were needed to offset adverse effects, it would be relatively simple and successful.
- Moderate: The effects would be readily apparent, long-term, and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- Major: The effects would be readily apparent, long-term, and would result in a substantial change in park operations in a manner noticeable to staff, the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, could be expensive, and their success could not be guaranteed.

Impacts of Alternative A – No Action

Adoption of the no action alternative would not cause impacts to park operations. Under this alternative, the trail would not be constructed. Park resources, including staff time and funding, would not be expended to plan, design, and construct the trail, or to monitor and maintain the trail over the long-term. NPS staff would not be required to increase patrol responsibilities or emergency operations that would be anticipated with construction of the recreation trail. Cultural and natural resources would not be affected and therefore would not require additional NPS resources.

Cumulative Effects: This alternative would not result in additional cumulative impacts to park operations. The other projects in the project area are non-NPS undertakings and do not involve operational responsibilities other than the occasional review or renewal of right-of-way permit applications. As a result, this alternative would not incrementally contribute to any adverse cumulative effects to the project environment because no activity would occur to affect existing vegetative communities.

Conclusion: Alternative A would not cause impacts to park operations. Operational commitments in the project area would remain unchanged and would not contribute to any cumulative impacts to park operations when considered with other past, present, and reasonably foreseeable future actions.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

The impacts of Alternative B would be adverse, minor, and intermittent but long-term. Currently, park operations in the project area are negligible. Park operations are limited to occasional monitoring and maintenance operations at the existing facilities, such as the Horseshoe Bend area, the Dam Overlook, and the Chains parking area. There is a limited need for law enforcement presence in this largely undeveloped area through which the trail is planned to travel. Occasional resource monitoring occurs in the project area. Overall, present NPS operational commitments are limited.

The trail would be constructed using in-house labor, which may require temporarily hiring additional maintenance personnel. In addition to construction cost the trail would require regular maintenance to remove trash, monitor trail conditions, and schedule repairs as needed. These activities constitute an increase over the existing maintenance workload. As a consequence, additional personnel may be hired and costs incurred.

Construction and operation of the trail would require increased uniformed presence. This increased presence is related to routine but necessary intermittent monitoring of visitor use, resource conditions, trail conditions and interpretation of park features. Additionally, unforeseen situations, such as visitor injuries, vandalism, damage caused by weather and other problems are likely to arise throughout the year and would require the attention by law enforcement personnel. Any emergency operations associated with public use of the trail would place an additional burden not only on NPS personnel, but on local law enforcement and emergency personnel from the City of Page as well.

Additional staff time would also be required to monitor natural and cultural resource conditions within the project area would also be required as visitor use of the recreation trail would result in additional impacts to park resources, including natural and cultural resources.

Cumulative Effects: Any time a new recreation resource or facility is planned and established, there is an impact to park operations. Most of the projects listed in the

cumulative effects section are non-NPS projects and are related to private development or ongoing city or electric utility operations. The NPS presence in the area historically has required a minimal operational commitment. Alternative B would result in a minor, adverse, long-term impact to park operations. These impacts would have a minor effect on the operation of existing NPS facilities, leading to an incremental increase in cumulative effects to facility operations in the project area.

Conclusion: The construction of a new recreation trail in the project area would result in a minor, adverse, and intermittent but long-term impact to park operations. Construction of the trail and the increase in visitation to the area would require an additional commitment of park personnel and resources. Cumulatively, the construction of the trail would result in a minor adverse effect on park operations when combined with past, present, and reasonably foreseeable future actions related to park operations in the project area.

3.6.5 Wildlife

Existing Conditions: The project area supports an array of desert wildlife. The area is home to side-blotched and leopard lizards, and a variety of insects including the American painted-lady, cabbage-white and checkered-white butterflies, and several species of wasps, flies, and bees. Birdlife is usually scarce but is typically represented by ravens, white-throated swifts, violet-green swallows, black-throated sparrows and red-tailed hawks.

Mammals in the area are represented by the diurnal antelope ground squirrels and coyotes, as well as desert cottontails and black-tailed jackrabbits which are most active during twilight hours. Nocturnal mammals may include kangaroo rats, wood rats, and pocket mice. Snakes and scorpions may also be present.

Two species of management concern are present in the project area. The Peregrine falcon (*Falco peregrines anatum*) was removed from the federal endangered species list, but remains a species of management concern. Peregrine are known to roost in the project area along the vertical cliffs of Glen Canyon. Two historic and active eyries have been identified in the project area.

Chuckwalla (*Sauromalus ater*), the second largest lizard known in the United States, is another species of management concern known to occur in the project area. In Glen Canyon, Chuckwalla typically are found along the shoreline of Lake Powell. However, at least one population has been identified along the rim of Glen Canyon.

Intensity Level Definitions

Negligible: Wildlife and habitats would not be affected or the effects would be at or below the level of detection, would be short-term, and the changes would

be so slight that they would not be of any measurable or perceptible consequence to the wildlife species population.

- Minor: Effects to wildlife and habitats would be detectable, although the effects would likely be short-term, localized, and would be small and of little **consequence to the species'** population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- Moderate: Effects to wildlife and habitats would be readily detectable, long-term and localized, with consequences at the population level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- Major: Effects to wildlife and habitats would be obvious, long-term, and would have substantial consequences to wildlife populations, in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.
- Impairment: The impact would contribute substantially to the deterioration of natural resources to the extent that the park's wildlife and habitat would no longer function as a natural system. Wildlife and its habitat would be affected over the long-term to the point that the park's purpose (Enabling Legislation, General Management Plan, and Strategic Plan) could not be fulfilled and the resource could not be experienced and enjoyed by future generations.

Impacts of Alternative A – No Action

The no action alternative would not result in impacts to wildlife in the project area because the Rim Trail would not be built. Wildlife present in the project area would not be disturbed by construction activities or the increase in visitor use of the project area.

Cumulative Effects: This alternative would not contribute to any adverse or beneficial cumulative effects to the area because the trail would not be constructed.

Conclusion: This alternative would have a negligible or no effect on wildlife in the project area because construction activities would not occur and visitor use levels would remain unchanged. As such, this alternative would not contribute to any cumulative impacts to wildlife or habitat when considered with other past, present, or reasonably foreseeable future actions in the project area. Because this alternative would have no impact to wildlife and habitat in the area, there would be no unacceptable impacts or impairment to these resources.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

Disturbance to wildlife in the project area would be minor, long-term and adverse. The trail would meander over areas of sand and slickrock, crossing many previously disturbed areas including utility roads, power line right of ways, and areas associated with construction of Glen Canyon dam. In other areas the trail will be constructed through previously undisturbed communities. Disturbance associated with trail construction activities may temporarily disturb diurnal or nocturnal species, most of which occupy burrows that could be affected by the compaction of soils and removal of vegetation, resulting in their displacement. Other species may be temporarily displaced from the area during the project work due to human presence and noise associated with construction. Human-generated noise, the presence of humans, and associated recreational activities would lead to ongoing disturbance to wildlife over a longer period.

The NPS does not believe that this project will negatively affect either Peregrine or Chuckwalla, two species of management concern. The Peregrine locations are located in inaccessible positions on the east face of the 1,000 foot canyon wall. The trail at its closest passes within 300 feet of the canyon rim, but the rim is not clearly visible from the trail. The NPS would monitor known nesting sites during and following trail construction to determine if mitigation may be necessary, including relocating the trail (Spence 2009, pers. comm.).

Harm to Chuckwalla may occur as a result of soil compaction, grinding of areas of sandstone and removal of rocks from the trail corridor, and removal of vegetation, all of which may affect Chuckwalla habitat. Additionally, indirect and direct harassment and harm may occur to Chuckwalla as they sun on nearby sandstone or on the trail. The NPS would use waysides and educational documents to inform trail users of the need to avoid all wildlife that may be present on or along the trail corridor (Spence 2009, pers. comm.).

Kiosks and wayside exhibits would provide information to park visitors on the importance of preserving the desert environment. This education program could reduce impacts to wildlife. The impacts to wildlife are considered minor since the project would utilize low quality habitat located in a development zone, which has been previously disturbed.

Cumulative Effects: Any construction activity or recreational facilities that increase visitor use in a previously lightly used area have the potential to affect wildlife resources. Projects and development occurring on lands adjacent to the recreation area, such as commercial and residential development, have contributed to disturbance of wildlife and wildlife habitat. The present NPS trail network in the area has likely had a negligible impact to wildlife in the area. Under this alternative, wildlife would be affected, and there would be a minor adverse increase in impacts to wildlife and wildlife resources.

when this action is considered with other past, present, and reasonably foreseeable future actions.

Conclusion: There would be minor, adverse impacts to wildlife from trail construction and trail use during both the short-term, and over the long-term. Impacts would be localized and limited to temporary displacement due to construction activities. Long-term impacts are associated with the ongoing use of the trail corridor by park visitors and park staff. The project is not likely to result in measurable impacts to any populations in the project area. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, (2) key to the natural or cultural integrity of the park, or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of Glen Canyon NRA's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of NPS 2006 *Management Policies*.

3.6.6 Archeological Resources

IMPACTS TO CULTURAL RESOURCES AND §106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental assessment/assessment of effect, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both NEPA and §106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to archeological resources and the cultural landscape were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected National Register eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, Assessment of Adverse

Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

In addition to the NHPA, NPS -28B *Archeology* affirms a long-term commitment to the appropriate investigation, documentation, preservation, interpretation, and protection of archeological resources inside units of the National Park System. The NPS is charged with the preservation of the commemorative, educational, scientific, and traditional cultural values of archeological resources for the benefit and enjoyment of present and future generations. Archeological resources are nonrenewable and irreplaceable, so it is important that all management decisions and activities throughout the National Park System reflect a commitment to the conservation of archeological resources as elements of our national heritage.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

A §106 summary is included in the impact analysis sections under the preferred alternative. The §106 Summary is intended to meet the requirements of §106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Existing Condition: Native American culture history of GLCA is generally classified into five different temporal periods, each with implications for stages of cultural development: Paleoindian, Archaic, Early Agricultural, Formative, and Late Prehistoric/Protohistoric (Geib 1996). The culture history of the recreation area spans, although not necessarily continuously, the entire range of prehistoric occupation and represents several different prehistoric and current Native American cultural groups. Many historic sites are also present in the recreation area, including early Latter Day Saints settlements and later mineral exploration and ranching sites.

Relatively little archeological work has been conducted along the rim of the Colorado River gorge below Glen Canyon Dam, and thus relatively little is known about the prehistoric occupation of this particular environmental and topographical niche. Cultural resources inventory of the general vicinity (Phillips 1991; Baker 2008), conducted prior to the Rim Trail Survey, suggested that occupation and/or utilization of the cliff edges overlooking the Colorado River was minimal. A single site was recorded 1.5 km to the south of the dam (AZ C:3:8), consisting of a dense scatter of lithic debris

that may have constituted a lithic source area where procurement and utilization of river cobble deposits occurred. Dominant flake types indicate that early stage reduction strategies were employed at the site with no evidence for tool manufacture.

Cultural materials identified during a 2008 survey associated with Dam Overlook Roof Repair project consist of isolated lithic flakes. Although only five flakes in total were observed, their dominant types reflect the results of later stage lithic reduction with evidence for tool production or reworking. It would appear that the gravel deposits along the edge of the canyon were utilized as lithic resources by mobile groups. These groups engaged in the extraction of resources from source locations and left evidence of their presence elsewhere along the canyon edge through further lithic reduction and tool manufacture.

The above scenario is supported by data recovered from the Rim Trail Survey, though much higher site densities were encountered. Site types consist primarily of lithic scatters representing varying ranges of lithic reduction stages. Artifact assemblage diversity is by and large on the low end. Relatively few lithic tools were encountered and groundstone (2 manos) was the only other artifact class encountered. A few dart point fragments and a single arrow point indicate tentative chronologies that span from at least sometime during the Archaic Period to at least the early Formative Period. Other lithic tools (e.g., retouched or utilized flakes) exemplify an expedient technology for extracting local resources.

More recent historic events are also represented. Historically significant events are associated with grazing and construction of the Glen Canyon Dam, although a fair amount of modern trash also litters the landscape.

Methodology

The NPS conducted an intensive Class III pedestrian survey along the main trail corridor to assess the area for potential impacts to archeological resources. The method involved walking a 15-meter (45-feet) transect along the course of the flagged trail. All sites were identified, inventoried, and recorded by field archaeologists.

In accordance with the Advisory Council on Historic Preservation's (ACHP) regulations implementing Section 106 of the NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources described below were also identified and evaluated by (1) determining the area of potential effects (APE); (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP; (3) evaluating the historic significance of resources; (4) applying the criteria of adverse effect to affected properties; and (5) resolving adverse effects through consultation with the State Historic Preservation Officer, Native American groups, the ACHP, or other interested parties to consider ways to avoid, minimize, or mitigate adverse impacts.

For purposes of analyzing impacts on archeological resources, thresholds of change for the intensity of an impact are based upon the potential of the site(s) to yield information important in prehistory or history as well as the probable historic context of the affected site(s). Within this analysis, impacts on archeological resources were assessed and proposed actions were rated using type and intensity criteria. A finding of adverse effect or no adverse effect is made for each alternative.

Intensity Level Definitions

- Negligible:** Impact is at the lowest levels of detection – barely measurable without any perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of section 106, the determination of effect would be *no adverse effect*.
- Minor:** Adverse – Disturbance of a site is confined to a small area with little, if any, loss of important information potential. For purposes of section 106, the determination of effect would be *no adverse effect*.
- Beneficial – Preservation of a site in its natural state. For purposes of section 106, the determination of effect would be *no adverse effect*.
- Moderate:** Adverse – Disturbance of the site does not result in a substantial loss of important information. For purposes of section 106, the determination of effect would be *adverse effect*.
- Beneficial – Stabilization of the site occurs. For purposes of section 106, the determination of effect would be *no adverse effect*.
- Major:** Adverse – Disturbance of the site is substantial and results in the loss of most or all of the site and its potential to yield important information. For purposes of section 106, the determination of effect would be *adverse effect*.
- Beneficial – active intervention occurs to preserve the site. For purposes of section 106, the determination of effect would be *no adverse effect*.
- Impairment:** A major, adverse impact occurs to an archeological resource whose conservation is necessary to fulfill specific purposes identified in the establishing legislation of Glen Canyon National Recreation Area; key to the natural or cultural integrity of the recreation area; or identified as a **goal in the recreation area’s general management plan or other relevant NPS planning documents**.

Impacts of Alternative A – No Action

The no action alternative represents current conditions. Under this alternative, the park would not construct the Glen Canyon Rim Trail. Archeological resources that intersect or are adjacent to the trail corridor would not be disturbed by construction or maintenance activities, and would not be vulnerable to surface disturbance, inadvertent damage, or vandalism. Archeological resources and contextual evidence, such as surface archeological materials, would remain largely undisturbed for future investigation. This would constitute a long-term negligible impact to cultural remains in the project area. For purposes of Section 106, the no action alternative would result in a finding of no adverse effect.

Cumulative Impacts: The past, present, and future reasonably foreseeable actions with potential to affect cultural resources in the project area are related primarily to increasing random visitation related to encroaching commercial and residential development and secondarily to continued use of administrative roads to service utilities. The no action alternative would not contribute to these cumulative impacts as the trail would not be constructed and visitor use of the area would not increase.

Conclusion: The no action alternative would result in a long-term negligible impact to cultural resources in the project area because the trail would not be constructed and no ground disturbance or planned visitor use would occur. As such, this alternative would not contribute to any cumulative disturbance of cultural resources. Because this alternative would have no impact to cultural resources, there would be no unacceptable impacts or impairment to these resources.

Impacts of Alternative B – Construct Glen Canyon Rim Trail

The determination of park cultural resource experts is that construction of the Glen Canyon Rim Trail would result in minor, adverse, long-term impacts to archeological resources in the project area. The main trail corridor has been inventoried, and segments of the trail have been found to pass through or near archeological sites. Construction of the trail would result in disturbance to soils and vegetation, and may cause direct impacts to surface features related to non-eligible sites. Indirect impacts to cultural resources may occur as changes to soils, vegetative cover, and topographic features alter local erosion patterns, exposing artifacts to the elements and visitors. Indirect impacts may also occur due to administrative activities on the trail, such as routine maintenance. Long-term impacts are related to public use of the trail, which may result in disturbance to surface features in the project area, particularly to those sites located adjacent to the trail.

Cumulative Effects: The construction of the trail and the anticipated increase in visitor use of a previously lightly visited area could result in impacts to cultural resources. It is unknown to what extent projects and development occurring on lands adjacent to the recreation area, such as commercial and residential development, may have had in

contributing to any loss of cultural features. Under Alternative B, cultural resources would be affected, and there would be a minor adverse increase in impacts to cultural resources as a result of this action when this action is considered with other past, present, and reasonably foreseeable future actions.

Conclusion: Adoption of Alternative B would result in a minor, adverse, and long-term impact to archeological resources, in the immediate project area. Construction of the trail would result in immediate and direct impacts. Indirect and long-term impacts would occur as visitation to the area increases, as the trail is maintained, and possibly as a result of erosion that exposes locally isolated artifacts. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, (2) key to the natural or cultural integrity of the park, or (3) identified as a goal in the park's GMP or other relevant NPS planning documents, there would be no impairment of Glen Canyon NRA's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with Section 1.4.7.1 of NPS 2006 *Management Policies*.

Mitigation: These mitigation activities are specific to cultural resources in the project area. Cultural resources would be considered during all phases of planning and construction for the Rim Trail. The main trail corridor has been inventoried, and segments of the trail have been found to pass through or near archeological sites. These segments of the trail will be rerouted and again inventoried prior to construction in an effort to avoid impacts to archeological resources in the project area.

Further, the trail plan includes the potential construction of a loop at Horseshoe Bend and several short spur and side trails that were not surveyed as part of the main trail corridor (Figure 3). These additional segments were not surveyed because their alignment would not be determined until the main trail corridor is first rerouted to avoid identified archeological sites. Should these additional trail segments be constructed or opened to public use, the park would first inventory these segments per section 106 of NHPA and the methodology outlined above. Consultation with the SHPO would occur on any sites identified.

A strong educational component would be incorporated into the trail to inform visitors of the risks to cultural sites and the legal requirements to avoid disturbance to all artifacts in the area.

3.7 Conclusion

As previously described, unacceptable impacts are those that fall short of impairment, but are still not acceptable within a particular park's environment (see section 3.5). Neither alternative is inconsistent with Glen Canyon's purpose and values. Glen Canyon was established for resource protection and visitor enjoyment and both

alternatives protect resources and provide opportunities for visitor enjoyment. Neither alternative impedes the attainment of the parks' desired future conditions.

The analysis of effects on impact topics indicated that there are no major adverse effects as a result of either alternative. Under either alternative, visitors continue to have opportunities to enjoy, learn about, or be inspired by park resources and values.

The effects on soils, vegetation, and wildlife are expected to be acceptable because soil resources and plant and wildlife populations are expected to remain viable and healthy and impacts range from negligible to minor. Archeological resources are not expected to be disturbed due to mitigation efforts. The effect on visitor use is expected to be beneficial, while park operations may be minimally impacted.

As described in Section 3.4, the NPS's threshold for considering whether there could be an impairment is based on major (or significant) effects. This EA identifies less than major effects on soils, vegetation, wildlife, and archeological resources for Alternatives A and B. Guided by this analysis and the Superintendent's professional judgment, there would be no impairment of park resources and values from implementation of Alternative A or B.

Chapter 4 – Consultation and Coordination

4.1 External Scoping

The National Park Service conducts public scoping to identify resources that may be affected by the proposed project and to gather new information and ideas that may result in new alternatives to achieve the proposal while minimizing adverse impacts. For the Glen Canyon Rim Trail proposal, the National Park Service conducted both internal scoping with park resource and management experts, and external scoping with the public, outside agencies, and other interested groups.

External scoping was initiated on March 26, 2008 with a news release to local media outlets, followed by the distribution of a scoping newsletter to interested members of the public and other federal and state agencies. Project information was also posted on the National Park Service’s external project planning website (www.nps.parkplanning.gov). The National Park Service on April 23, 2008 also hosted a public open house at Glen Canyon park headquarters, and invited the public to ask questions and offer comments on the proposed Rim Trail project. Public scoping period was open for the 36-day period between March 26 and April 30, 2008.

In response to scoping efforts, the Lake Powell Chronicle on April 1, 2008 ran an article on the planning efforts for the Glen Canyon Rim Trail. The story discussed the planning process, highlighted the April 23 open house, and directed readers to additional information available on the National Park Service’s park planning website. The Salt Lake Tribune published a similar story on April 2. The Lake Powell Chronicle published a follow up story on April 30 regarding the April 23 public workshop.

During public scoping, five public comments were received. Four of the comments focused on the positive benefits associated with developing the Glen Canyon Rim Trail, while one comment identified a concern with nesting raptors in the project area. The concern with potential impacts to raptors is addressed in Chapter 3 under “Wildlife.”

Letters of support for the Glen Canyon Rim Trail were received from the City of Page, Arizona, the International Mountain Bicycling Association, and Arizona State Parks.

The following federal and state agencies, Native American tribes, and affiliated interests were sent scoping information or were contacted for information regarding this environmental assessment.

Federal Agencies

United States Fish and Wildlife Service, Arizona Field Office
Bureau of Reclamation, Glen Canyon Dam

State Agencies

Arizona Governor's Office

Arizona State Parks

Arizona Game and Fish

Arizona State Historic Preservation Officer

Arizona Department of Transportation

Local Interests

Coconino County Parks & Recreation

City of Page, Arizona

Chamber of Commerce, City Page

Tourism Bureau, City of Page

Grand Canyon Trust

Antelope Point Holdings

Desert Marina Management, LLC.

Tribal Governments

Navajo Parks and Recreation, Navajo Nation

Navajo Historic Preservation Office, Navajo Nation

Navajo Nation Chapters of LeChee, Coppermine, and Gap/Broadway

Hopi Tribe

Kaibab Paiute Tribe

Shivwitts Paiute Band

Ute Mountain Tribe

4.2 Internal Scoping

Internal scoping was conducted with an interdisciplinary team (IDT) of resource, planning, and management professionals from Glen Canyon National Recreation Area and the National Park Service Intermountain Region Support Office. IDT members met on July 8, 2008 to discuss the proposed recreation trail and to identify potential impacts resulting from the project. IDT members also conducted site visits to review evaluate the proposed project site and discuss resource impacts, mitigation requirements, and other planning issues.

Additional scoping was conducted through an informal stakeholders group that consisted of National Park Service staff, Page city officials, representatives from other government agencies, representatives from the local business community, and interest members of the public. The stakeholders group convened under the auspices of the **National Park Service's Rivers, Trails and Conservation Assistance Program (RTCA)**, which provides expert advice and helps to facilitate cooperative ventures between private and public partners. Due to the interagency nature of the trail, the stakeholders group was formed to discuss common interests and concerns related to the trail project, including funding, development, scheduling and timelines, zoning, and long-term maintenance needs. The stakeholders group continues to meet approximately every 3

months to discuss ongoing management and trail development issues. The input of the stakeholders group was crucial to development of this environmental impact.

4.3 List of Preparers & Reviewers

This list presents the individuals who contributed to the technical content of this EA. Some of the individuals below prepared or reviewed specific sections, or provided input to the content and production of this document.

Mr. John Spence, National Park Service
Mr. Michael Duwe, National Park Service
Ms. Chanteil Walter, National Park Service
Ms. Barbara Wilson, National Park Service
Ms. Rosemary Sucec, National Park Service
Mr. Thann Baker, National Park Service
Mr. Kevin Schneider, National Park Service
Ms. Veronica Lane, National Park Service
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Preparer (developed EA content)
Mr. Brian Sweatland, National Park Service

Rim Trail Stakeholder Group
Mr. Joe Winfield, National Park Service
Mayor William Justice, City of Page
Mr. Dwayne Cassidy, Page Tourism Director
Mr. Len Cook, Page City Council
Mr. Bo Thomas, City of Page
Mr. Ernest Rubi, City of Page
Mr. Tom Kliever, Arizona Department of Transportation
Mr. Wayne Shugart, Huntley Group, LLC
Mr. Dave Norton, National Park Service
Mr. Pete Howard, National Park Service

Special Thanks To:

The *International Mountain Bicycling Association*, including Kerry and Collins Bishop, Anna Laxague, Scott Linnenburger, Spencer Powlison, and Jason Wells.

The International Mountain Bicycling Association (IMBA) was instrumental in planning, identifying, and locating the trail corridor. IMBA conducted site visits with park staff. They met with the stakeholder group and park staff to understand the project's objectives. They provided general information on developing recreational trails, as well as specific guidance on trail design and management techniques to meet trail user preferences while minimizing potential user conflicts. Finally, IMBA spent

four days with park staff walking the project area and laying out the proposed trail corridor.

Also, special thanks to Joe Winfield with the National Park Service's *Rivers, Trails and Conservation Assistance* program.

Gerry Nealon, a Volunteer-in-Park for Glen Canyon NRA, contributed important research and data on raptor populations in the project area.

Chapter 5 - Works Cited

Arizona 2005 Arizona State Parks. (2004). Arizona Trail 2005: State Motorized and Nonmotorized Trails Plan. Phoenix, Ariz.

Burr, Steven W., & Reiter, Douglas K. (2003). Utahns and Recreational Trails: Statewide Telephone Survey Summary Results of Utah Residents' Attitudes. Institute for Outdoor Recreation and Tourism No. NR/RF/14. Logan, Utah. Utah State University Extension, 4 pp.

Geib, Phil R., Helen C. Fairley, & Peter W. Bungart. 1986. Archaeological Survey in the Glen Canyon National Recreation Area: Year 1 Descriptive Report, 1984-1985. Northern Arizona University Archaeological Report No. 999, Flagstaff, AZ.

NPS

1979 Glen Canyon NRA/Arizona-Utah Proposed General Management Plan. National Park Service, U.S. Department of the Interior, July 1979.

1995a *Recreational Use and Management Plan Environmental Assessment*, Glen Canyon National Recreation Area, 1995.

1995b Finding of No Significant Impact. *Recreational Use and Management Plan Environmental Assessment*, Glen Canyon National Recreation Area, 1995.

1998 National Park Service -28: *Cultural Resources Management*. Washington, DC.

2001 **Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making and Handbook**. Washington, DC. Available on line at <<http://www.nps.gov/policy/DOrders/DOrder12.html>> and <<http://www.nps.gov/policy/DOrders/RM12.pdf>>.

2006 *2006 Management Policies*, National Park Service, U.S. Department of the Interior, 2005

U.S. Census www.Census.gov

Welsh, S. L., N. D. Atwood, S. Goodrich, and L. C. Higgins (editors). 1987 *A Utah Flora*. Great Basin Naturalist Memoirs, no. 9. Brigham Young University, Provo, Utah.

Personal Communications

Spence 2009 Spence, John. NPS Biologist. Glen Canyon National Recreation Area, pers. comm. February 3, 2009.

Appendix A – Rim Trail Scoping Brochure

Glen Canyon National Recreation Area

National Park Service
U.S. Department of the Interior



Public Scoping for the Glen Canyon Rim Trail Environmental Assessment March 2008

Glen Canyon National Recreation Area is considering a proposal to construct a recreational trail along the southeast rim of Glen Canyon, a spectacular 1,200-foot deep canyon of the Colorado River, just below the Glen Canyon Dam. The proposed trail would be approximately 7.5 miles in length and would link the Horseshoe Bend trail with the city of Page's existing Rim Trail. We are seeking the benefit of your comments to help identify issues and alternatives for consideration in an environmental assessment for the trail.

The Rim Trail Proposal

The initial proposal for the Glen Canyon Rim Trail is to construct a trail connecting the Horseshoe Bend area with the city of Page's Rim Trail. The proposed trail would be located on both National Park Service lands and city of Page lands. Approximately 2.5 miles would be on city of Page lands, while the remaining sections would be on National Park Service lands. The city of Page is participating as a cooperating agency in the development of this environmental assessment.

Staff from the National Park Service, city of Page, and the International Mountain Bicycling Association began identifying a trail corridor in January 2008. A general map of the proposed trail corridor is on the back of this flyer. The trail would start on Manson Mesa near an area locally known as Potato Hill or Indigo Ridge. From there, the trail would descend from the mesa and cross Highway 89 just south of the Chains area. The trail would generally follow the rim of Glen Canyon south to the Horseshoe Bend overlook, where it would join in with the existing Horseshoe Bend trail. Along its course, the trail would pass through

unique Navajo sandstone, slickrock, and geologic formations, providing outstanding vistas of the Colorado River and the Vermillion Cliffs.

The proposed trail would be open to non-motorized uses. The environmental assessment will examine opening the trail to hikers, mountain bikers, and horseback riders.

The existing Horseshoe Bend overlook trail is a popular hiking destination for visitors. This ½-mile trail (one-way) leads to a spectacular overlook of the Colorado River. This EA will examine making the existing Horseshoe Bend trail handicapped accessible.

Currently, there is a very small amount of visitor activity along the proposed trail route. Although no trail currently exists, some individuals hike in this area as a convenient recreational opportunity near Page.

An environmental assessment was prepared in 1995 for this and other projects in the area, and a finding of no significant impact was recommended in 1996. However, the trail was never constructed, partly because funding was not obtained.

Purpose and Need

The purpose of this planning effort is to evaluate alternatives for a proposed non-motorized trail along the rim of Glen Canyon. The trail is needed to help provide additional land-based recreational opportunities for visitors in this area. Currently, there are very few designated trails in this part of Glen Canyon National Recreation Area.

The Planning Process

Scoping is the initial step in an environmental assessment, when the public has the opportunity to provide comments about the issues and alternatives that should be considered. Once public scoping is completed, the National Park Service will prepare the environmental assessment, which will identify a preferred alternative. This document will then be made available for public review and comment. The National Park Service will consider any comments and make a decision about whether or not to move forward with the project. Because this trail project involves lands that are owned by the city of Page, the city is participating as a cooperating agency in the development of this environmental assessment.

Commenting on the Plan

We are looking for your vision for this trail. What do you want the trail to be like? How much interpretative and educational materials are appropriate along the trail? Are there alternative routes you would like to see us consider? Are there particular impacts from this proposed trail that you would like us to analyze? Do you have any specific concerns about the project? These types of comments will help us prepare a better, more relevant environmental assessment.

Public comments may be submitted through any one of several methods. Before including your address, phone number, e-mail, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Comments may be submitted online at: parkplanning.nps.gov/glca

Comments may be mailed to:
Glen Canyon Rim Trail
P.O. Box 1507
Page, AZ 86040



Map of the Proposed Glen Canyon Rim Trail.

Comments may be hand delivered to:
Glen Canyon Headquarters
691 Scenic View Dr.
Page, AZ

Glen Canyon National Recreation Area will hold an open house about the project at park headquarters in Page (at the address above) on April 23, 2008. Staff will be available to answer questions about the project and gather input. The open house will occur from 4 to 6 pm. Interested individuals are encouraged to stop by anytime during these hours.

All public comments must be received by April 30, 2008.

Coconino County

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Apache (Arizona) trout	<i>Oncorhynchus apache</i>	Threatened	This yellowish or yellow-olive cutthroat-like trout has large dark spots on body. Its dorsal, anal, and caudal fins are edged with white. It has no red lateral band.	Apache, Coconino, Gila, Graham, Greenlee, Navajo	>5,000 ft	Presently restricted to cold mountain streams with many low gradient meadow reaches.	Occupies stream habitats with substrates of boulders, rocks, and gravel with some sand or silt through mixed conifer and spruce-fir forests, and montane meadows and grasslands in the White Mountains. Also managed as a sport fish under special regulations.
Black-footed ferret	<i>Mustela nigripes</i>	Endangered	Weasel-like, yellow buff coloration with black feet, tail tip, and eye mask. It has a blunt light colored nose and is 15-18 inches long and tail length is 5-6 inches.	Apache, Coconino, Navajo	<10,500	Grassland plains generally found in association with prairie dogs.	Unsurveyed prairie dog towns may be occupied by ferrets or may be appropriate for future reintroduction efforts. The Service developed guidelines for surveying prairie dog towns which are available upon request. No wild populations of this species are currently known to exist in Arizona. Reintroduced population exists in Aubrey Valley (Coconino County), Arizona.
Brady pin cushion cactus	<i>Peilocactus bradyi</i>	Endangered	Small, semi-globose cactus, 2-4 inches tall and 2 inches in diameter. Spines are white or yellowish-tan. The spine clusters 1-2 central spines and 14-15 spreading radial spines. Flower straw yellow produced at top of the stem.	Coconino	3850-4,500 ft	Benches and terraces in Navajo desert near Marble Gorge	Substrate is Kaibab limestone chips over moenkopi shale and sandstone soil. Plant community dominated by shradscale (<i>Artemisia confertifolia</i>), snakeweed (<i>Gutierrezia sarothrae</i>), Mormon tea (<i>Ephedra viridis</i>), and desert trumpet (<i>Eriogonum inflatum</i>). Protected by CITES and Arizona Native Plant Law.
California Brown pelican	<i>Pelecanus occidentalis californicus</i>	Proposed delisted	Large dark gray-brown water bird with a pouch underneath long bill and webbed feet. Adults have a white head and neck, brownish black breast, and silver gray upper parts.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Coastal land and islands; species found around many Arizona lakes and rivers.	Subspecies is found on Pacific Coast and is endangered due to pesticides. It is an uncommon transient in Arizona on many Arizona lakes and rivers. Individuals wander up from Mexico in summer and fall. No breeding records in Arizona.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
California condor	<i>Gymnogyps californianus</i>	Endangered	Very large vulture (47 in. wingspan to 9 1/2 ft. weight to 22 lbs); adult plumage blackish, immature more brownish; adult wing linings white; immature mottled; head and upper parts of neck bare; yellow-orange in adults; grayish in mature.	Apache, Coconino, Mohave, Navajo	Varies	High desert canyonlands and plateaus.	Recovery program has reintroduced condors to Northern Arizona, with the first release (6 birds) in December 1998. Release site located at the Vermilion Cliffs (Coconino County), with an experimental/nonessential area designated for most of Northern Arizona and Southern Utah. Breeding documented in Arizona. Experimental/nonessential area in Arizona is within a polygon formed by Hwy 191, Interstate 40, and Hwy 93, and extends north of the Arizona-Utah and Nevada borders.
Chiricahua leopard frog	<i>Lithobates (Rana) chiricahuensis</i>	Threatened	Cream colored tubercules (spots) on a dark background on the rear of the thigh, dorsolateral folds that are interrupted and deflected medially, and a call given out of water distinguish this spotted frog from other leopard frogs.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	3,300-8,900 ft.	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Require permanent or nearly permanent water sources. Populations north of the Gila River may be a closely-related, but distinct, undescribed species. A special rule allows take of frogs due to operation and maintenance of livestock tanks on State and private lands.
Gila chub	<i>Gila intermedia</i>	Endangered	Deep compressed body, flat head, dark olive-gray color above, silver sides. Endemic to Gila River Basin.	Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	2,000 - 5,500 ft.	Pools, springs, denegias, and streams.	Found on multiple private lands, including the Nature Conservancy, the Audubon Society, and others. Also occurs on Federal and state lands and in Sonora, Mexico. Critical habitat occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz and Yavapai counties.
Humpback chub	<i>Gila cypha</i>	Endangered	Large (18 inches) minnow flattened head long fleshy snout, large fins, and a very large hump between the head and the dorsal fin.	Coconino, Mohave	< 4,000 ft.	Large warm turbid rivers especially canyon areas with deep fast water.	Critical habitat in Grand Canyon. Species also found in Upper Basin.
Kanab amblesnail	<i>Oxyloma haydeni kanabensis</i>	Endangered	Small <0.7 inch, light amber color, sometimes grayish-amber mottled; right handed shell.	Coconino	2,900 ft.	Traveling seeps and springs in Grand Canyon National Park.	Extremely geographically isolated. Three historical populations, two remaining: one on private property in Utah and one in Grand Canyon National Park; species affected by operations by Glen Canyon Dam. Associated with watercress, monkey flower, and other wetland vegetation.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Little Colorado spinedace	<i>Lepidomeda vittata</i>	Threatened	Small (<4 inches long) silvery minnow which is darker on the back than the belly.	Apache, Coconino, Navajo	4,000-8,000 ft	Moderate to small streams in pools and riffles with water flowing over gravel and silt.	Critical habitat includes eighteen miles of East Clear Creek, eight miles of Chevelon Creek, and five miles of Nutrioso Creek.
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	4,100-9,000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type. In canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are preferred. Critical habitat was finalized on August 31, 2004 (69 FR 53182) in Arizona in Apache, Coconino, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties.
Navajo sedge	<i>Carex speculicola</i>	Threatened	Petential forb with triangular stems, elongated rhizomes. Flower: white June and July.	Apache, Coconino, Navajo	5,700-6,000 ft	Silty soils at shady seeps and springs.	Designated critical habitat is on the Navajo Nation near Inscription House Ruins. Found at seep springs on vertical cliffs of pink-red Navajo sandstone.
Razorback sucker	<i>Xyrauchen texanus</i>	Endangered	Large, up to 3 feet long and up to 6 lbs, high shaped edged keel-like hump behind the head. Head flattened on top. Olive-brown above to yellowish below.	Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pinal, Yavapai, Yuma	< 6,000 ft	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	Big River fish also found in Horseshoe reservoir (Maricopa County). Critical habitat includes the 100-year floodplain of the river through the Grand Canyon from confluence with Paria River to Hoover Dam, Hoover Dam to Davis Dam, Parker Dam to Imperial Dam. Also Gila River from Arizon/New Mexico border to Coolidge Dam, and Salt River from Hwy 60/SR77 Bridge to Roosevelt Dam, Verde River from FS boundary to Horseshoe Lake.
San Francisco Peaks groundsel	<i>Senecio franciscanus</i>	Threatened	Member of sunflower family, dwarf alpine species 1.2-4 inches tall. Leaves deeply lobed. Flowers 0.5 inch diameter 1-6 yellow-gold flowers.	Coconino	> 10,900 ft	Alpine tundra	Found above spruce-fir and pine forests on talus slopes. Designated critical habitat is San Francisco Peaks.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Sentry milk-wetch	<i>Astragalus cremnophyllus</i> var. <i>cremnophyllus</i>	Endangered	< 1 inch high forming a mat 1-10 inches in diameter. Flowers: pale purple April to May.	Cocconino	>4,000 ft	Pinyon-juniper-cliffrose on a white layer of limestone	Grows on Kaibab limestone with little soil in an unshaded opening in pinyon-juniper. Possibly more populations to be found on south rim of Grand Canyon and east rim of Marble Gorge.
Silver cholla cactus	<i>Neofouquieria splendens</i>	Threatened	Small solitary or clustered cactus globose shaped about 5 inches tall and 3-4 inches in diameter. Flowers: yellow with maroon veins.	Cocconino, Mohave	2,800-5,400 ft	Desertscrub transitional areas of Navajo, saguaro and Mohave Deserts.	Grows on gypsiferous clay and sandy soils of Moenkopi formation.
Southwestern willow flycatcher	<i>Empidonax traillii eximius</i>	Endangered	Small passerine (about 6 inches); grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	<8,500 ft	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Migratory riparian-obligate species that occupies breeding habitat from late April to September. Distribution within its range is restricted to riparian corridors. Difficult to distinguish from other members of the <i>Empidonax</i> complex by sight alone. Training seminar required for those conducting flycatcher surveys. Critical habitat was finalized on October 19, 2005 (50 CFR 608.96). In Arizona there are critical habitat segments in Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, and Yavapai counties.
Welsh's milkweed	<i>Asclepias welshii</i>	Threatened	Milkweed family (Asclepiadaceae), rhizomatous, herbaceous perennial, 10-40 inches tall with large oval leaves. Flowers: cream colored, rose tinged in center.	Cocconino	varies	Open stabilized desertscrub dunes and lee side of active dunes.	Designated critical habitat is in Utah.
Rockiesian plains cactus	<i>Pediocactus pedunculatus</i> var. <i>foelschianae</i>	Candidate	Very small (3 inches tall - 1.5 inches diameter) unbranched cactus that retreats into gravelly soils after flowering and fruiting. Tubercles form a spiral pattern around plant. Central spine 3/8 inch long. flowers cream/yellow.	Cocconino, Mohave	4,000-5,000 ft	Exposed layers of Kaibab limestone on canyon margins or hills of Navajoan Desert.	

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate	Medium-sized bird with a slender, long-tailed profile, slightly down-curved bill, which is blue-black with yellow on the lower half of the bill. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 6,500 ft	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	Yellow-billed cuckoos are a neotropical migrant, wintering in primarily South America and breeding primarily in the United States (but also in southern Canada and northern Mexico). As a migrant it is rarely detected, but can occur outside of riparian areas. Cuckoos are found nesting statewide in Arizona below 7000 feet in elevation, but are mostly found below 5000 feet in central, western, and southeastern Arizona. Concern for cuckoos are primarily focused upon alterations to its nesting and foraging habitat. Nesting cuckoos are associated with relatively dense wooded streamside riparian habitat, with varying combinations of Fremont cottonwood, willow, velvet ash, Arizona walnut, mesquite, and tamarisk. Some cuckoos have also been detected nesting in velvet mesquite, netleaf hackberry, Arizona sycamore, Arizona alder, and some exotic neighborhood shade trees.
Arizona bugbane	<i>Oenothera arizonica</i>	Conservation Agreement	Perennial herb in the buttercup family up to 6-7 feet tall. Small white petal-less flowers appear in July-August. Fruit a follicle that splits open on one side as it dries.	Coconino, Gila	5,300-7,000 ft	Moist, loamy soil between coniferous and riparian ecotones.	Rich, fertile soils high in humus content, deep shade, and high humidity appears to be primary habitat requirements for this species. Conservation Agreement signed in June 1999.
Paradise (Kaibab) plains cactus	<i>Pediocactus paradinei</i>	Conservation Agreement	Small, green, globose cactus, usually less than 40 mm tall with half of its stem underground. Plant diameters can reach 60-80 mm. 4-6 spines per areole; flowers are 19-25 mm with cream to pale yellow petals and pink midrib.	Coconino	>4,500 ft	Pinyon-juniper woodland and shrub/grassland	Conservation Agreement between the Service, Kaibab National Forest, and the Bureau of Land Management finalized in October 1996, signed in February 1998.

Appendix C – California condor Conservation Measures

Because the project area is in a location that may be visited by the California condor, the following US Fish and Wildlife Service approved conservation measures will be undertaken by all personnel working at the project site:

1. If a Condor is spotted directly on or over the construction site, activities will cease until the bird leaves.
2. Construction workers and supervisors are instructed to avoid interaction with Condors and to immediately contact the Resources Division (928- 608-6267) at the Park if and when Condor(s) settle at the construction site.
4. The construction site will be cleaned up at the end of each day (e.g., trash removed, scrap materials picked up) to minimize the likelihood of Condors visiting the site.
5. All dead animals found within 500-feet of the construction zone will be immediately disposed of by placing the carcass in the nearest available dumpster. All dumpsters will be emptied on a regular basis so as not to encourage roosting by condors that may be attracted to odor coming from the dumpsters.
6. To prevent contamination and potential poisoning of Condors, a Spill Prevention and Cleanup Plan will be implemented for this project. It will include provisions for immediate clean-up of any hazardous substance, and will define how each hazardous substance will be treated in case of leakage or spill.
7. All construction personnel will be given a copy of the Arizona Game and Fish pamphlet entitled “California Condors in Arizona”.
8. Project personnel are strictly prohibited from hazing Condors (chasing, flapping arms, throwing objects, honking horn, etc.)