Rainbow Bridge National Monument General Management Plan, Development Concept Plan, Resource Management Plan, Interpretive Prospectus, and Environmental Assessment

United States, Department of the Interior, National Park Service

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October 1991
Rainbow Bridge National Monument

General Management Plan
Development Concept Plan
Resource Management Plan
Interpretive Prospectus
and Environmental Assessment
SUMMARY OF THE PROPOSED PLAN AND ALTERNATIVES

This General Management Plan provides the National Park Service with direction for long-range management, development, and use of the Rainbow Bridge National Monument. The plan responds to new issues identified during the planning process when the draft plan was published in September of 1990. A main concern expressed during public review of the draft plan was diverse public expectations for visitor experience, crowding, and the high number of visitors accessing a limited area of Rainbow Bridge. In addition, the plan and environmental assessment address these diverse public expectations along with the issues of a visitor experience, protection of natural and cultural resources, access, interpretive services, and facilities. A range of alternatives including the no-action alternative were considered in detail. The proposal and two alternatives presented in the plan focus on improvements to the monument, which respond to the planning issues. Under the no-action alternative, existing facilities would be retained.

The Colorado River Storage Project Act (Public Law 84-485, 70 Stat. 105, April 11, 1956) changed the way Rainbow Bridge was accessed from land to water, connected it to the recreation area, and, in time, significantly increased visitation because of easier access. Today's visitor is more oriented to water-based recreation and sightseeing than to the special importance of the monument. Boat and visitor use has increased in an uncontrolled manner in the physically limiting space of narrow canyons. Modern day uses of Lake Powell have led to an unregulated urban/natural recreation experience for most visitors and brought about current resource impacts. Management to either increase development to protect resources or to decrease the number of visitors to more moderate levels has been analyzed within the document to protect natural and cultural resources at the monument.

The proposal provides a variety of recreational experiences and settings for visitors to the national monument. Management methods used to implement the plan respond to the need to achieve use levels falling within the monument's natural, biological, physical, and social carrying capacity levels. This provides for regulating use levels through the staged implementation of actions that will eventually lead to a shuttle service. Staged implementation includes tour boats, a signing and information system, an entrance
contact station, and a reservation system. Visitor use levels will be managed in a manner to accommodate slight annual increases over past use while providing opportunities for visitors to experience the significance of the national monument's quiet and tranquility. Interpretive services would use a variety of techniques based on the management period. Developments would be limited to those necessary to meet basic visitor and resource protection needs. The plan allows for flexible dock location to adjust to fluctuating lake levels and minimal development to maintain a natural setting. Developments will be sized, located, and designed to minimize intrusions upon natural, cultural, and social values.

Alternative A was designed to maximize the number of visitors that could be accommodated at Rainbow Bridge. During the heavy use season, the volume of use would create visitor experiences similar to that of a rural or urban environment. A shuttle system would be implemented to meet use demands while protecting resources and minimizing safety problems created by boat use in Forbidding Canyon. In the short term and first phase, a seasonal contact station would be constructed within Forbidding Canyon, an entrance fee would be charged at the contact station, NPS interpreters would be provided on concession tour boats, and improvements would be made to the monument for the protection of resources. The entrance contact station would limit use to coincide with the monument's carrying capacity and protect park resources. The alternative would accommodate a 150 to 240 percent increase in visitor use over existing use levels. Phase II includes provisions for a seasonal shuttle transportation system to be used in the future to protect resources at Rainbow Bridge as visitation rises beyond existing limits.

Alternative B would provide semiprimitive recreation opportunities for visitors to the national monument. Use limits would be imposed to reduce the number of visitors allowed in the monument at any given time. Opportunities to experience quiet and tranquility would be provided year-long. Visitor services and interpretation would be minimized. Interpretive services would provide self-guiding brochures and personal services would be minimal. Visitor self-reliance would be required to totally understand and experience the wonders of Rainbow Bridge. Developments would be limited to those necessary for resource protection and would require turning away 150,000 to 170,000 visitors to the monument—a 60-70 percent reduction in current visitation levels. It would also require a 10-15 percent reduction in tour boat traffic. The alternative allows for a flexible dock location to adjust to fluctuating lake levels and minimal development to maintain a natural setting. A natural setting relatively free of human intrusions and opportunities for natural quiet would be emphasized. This alternative would cost the least.

The environmental consequences of the proposed action and other alternatives are fully disclosed within this document. Consequences of implementing the proposal include temporary effects of construction of trails with hardened surfaces using material that subtly delineates differences between natural surfaces and trails available for pedestrian traffic on soil and water; increased safety to visitors from the effects of rockfall, flash floods, and crowded boating conditions; reduction of noise at the monument; and an improved visitor experience through the scheduled use of the monument. This General Management Plan contains four appendix documents - (A) Carrying Capacity, (B) Interpretive Prospectus, (C) Resource Management Plan, and (D) Flash Flood Mitigation Plan. The document is intended to provide for all of the planning needs of Rainbow Bridge National Monument.

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PURPOSE AND NEED FOR THE PLAN

INTRODUCTION

This plan and environmental assessment is the second release of the Draft General Management Plan and provides the National Park Service with direction for long-range management, development, and use of the Rainbow Bridge National Monument. The plan responds to new issues identified during the planning process when the first release draft plan was published in September of 1990. As a result of substantive public comment, the National Park Service chose to reassess the range of alternatives presented and revise the environmental assessment. Concerns expressed during public review of the draft plan included diverse public expectations for visitor experience, crowding, and the high number of visitors accessing a limited area of Rainbow Bridge.

Rainbow Bridge is in the heart of some of the Nation’s most rugged canyon country. It is bounded on three sides by the Navajo Reservation (Navajo Mountain Chapter) and lies in the Third Congressional District of Utah. A thin finger of Lake Powell extends to the monument boundary in its northwest corner, forming a common boundary between Rainbow Bridge National Monument and Glen Canyon National Recreation Area. The monument’s total area is 160 acres.

Rainbow Bridge is in a region of outstanding recreational, scenic, scientific, and historic interest. The adjacent Glen Canyon National Recreation Area features a manmade lake in an otherwise arid environment. Following the course of the Colorado River for almost 200 miles, the recreation area abuts Canyonlands National Park, Capitol Reef National Park, and Grand Canyon National Park, with Lake Mead National Recreation Area farther downstream. This immediate area constitutes a significant part of the outstanding national parklands in the general region.

This plan sets forth the basic management philosophy for the Rainbow Bridge National Monument and provides strategies for addressing issues and management objectives. The plan includes measures for the preservation of the area’s resources; indications of the types and general intensities of development (including visitor circulation and transportation patterns, systems and modes) associated with public enjoyment and use of the area, including timing of implementation and anticipated costs; and identification of and implementation of commitments for visitor carrying capacities for all areas of the unit.

The environmental assessment discloses the potential environmental consequences that may result from implementation of various alternatives. It documents the process used by the National Park Service (NPS) in preparing a general management plan (GMP), a development concept plan (DCP), a resource management plan (RMP), and an interpretive prospectus (IP) for the monument.
PARK PURPOSE

The purpose of the park relates to its uniqueness as the world's largest natural bridge and as an outstanding example of eccentric stream erosion.

The Rainbow Bridge was recognized by President William H. Taft, who issued Presidential Proclamation Number 1043 on May 30, 1910, setting aside a 160-acre tract of land under the authority granted him by Section Two of the 1906 Act for the Preservation of American Antiquities. His proclamation read in part "Whereas, an extraordinary natural bridge, having an arch which is in form and appearance much like a rainbow, and which . . . is of great scientific interest as an example of eccentric stream erosion, and it appears that the public interest would be promoted by reserving this bridge as a National Monument...I do hereby set aside as the Rainbow Bridge National Monument, one surveyed tract of land, embracing said natural bridge."

The bridge itself has a span of 275 feet, reaches a height of 290 feet, and is 42 feet thick at the top and 33 feet wide at the narrowest point. To many American Indians, Rainbow Bridge is a sacred place.

PERTINENT LEGISLATION/AUTHORITIES

There are many authorities, memorandums, and pieces of legislation that have had an effect on Rainbow Bridge. Two general areas are important to Rainbow Bridge and have an effect on alternatives for its basic management direction. These are (1) those documents that have had a direct effect on the lands inside the monument boundary and (2) those documents that have had an effect on access and indirectly may affect lands within the monument boundary. Those documents that directly affect lands inside the monument boundary are:

Antiquities Act of 1906, entitled "An Act for the Preservation of American Antiquities." Section two of this act gave the authority to the executive branch to establish Rainbow Bridge, by Presidential Proclamation.

The Act of August 25, 1916, 39 Stat. 535; 16 U.S.C. 1, established the National Park Service. This tasked the National Park Service as the managing Agency for Rainbow Bridge with two primary objectives: "...to provide for the enjoyment" of persons visiting parks and monuments and "in such a manner and by such means as will leave them unimpaired for future generations."

Presidential Proclamation Number 1043, of May 1910. This Presidential Proclamation established Rainbow Bridge National Monument.

American Indian Religious Freedom Act of 1978, Public Law 95-431, Stat. 469. This act established that it is the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions and rites, to include access to traditional sites and the use and possession of sacred objects. The National Park Service must assure that its general regulations and
basic management on access to, and use of, park lands and park resources, such as Rainbow Bridge National Monument, are applied in a balanced manner that does not unduly interfere with an American Indian group’s use of historically traditional places or sacred sites located within the bounds of a park unit.


Those documents affecting access to or indirectly affecting lands within the national monument are:

The Act of August 7, 1946, 60 Stat. 885 ; 16 U.S.C. 17j-2. This act provided appropriations to the National Park Service for: (b) administration, protection, improvement, and maintenance of areas under the jurisdiction of other Agencies of the Government, devoted to recreational use pursuant to cooperative agreements.

Public Law 84-485, 70 Stat. 105, Colorado River Storage Project Act, April 11, 1956, “To authorize the Secretary of the Interior to construct, operate, and maintain the Colorado River Storage Project and participating projects...”. This act authorized the construction of Glen Canyon Dam and eventually changed the way Rainbow Bridge National Monument was accessed by the public from primarily land to water. Section 8 of this law directed the Secretary of Interior “...to investigate, plan, construct, operate and maintain public recreational facilities on lands withdrawn or acquired for the development of said project or of said participating projects, to conserve the scenery, the natural, historic, and archaeological objects, and the wildlife on said lands, and to provide for public use and enjoyment of the same and of the water areas created by these projects by such means as are consistent with the primary purposes of the projects.”

Memorandum of Agreement between the Bureau of Reclamation and the National Park Service, September 24, 1956. Under the above authority, the Secretary of the Interior established Glen Canyon Recreation Area in 1958 and designated the National Park Service the administering Agency.

Public Law 85-668, 72 Stat. 1666, “To provide for the exchange of lands between the United States and the Navajo Tribe...”, dated September 2, 1958. Sec. 2 (a) describes parcels “A” and “B” lands. Along that portion of Lake Powell extending from the Page townsite eastward along the Colorado and San Juan Arm, lands below the 3,720-foot contour were acquired by the Federal Government. In relinquishing these lands (known as Parcel “B” lands), the tribe retained the mineral rights. The legislation also specifies that these lands “will not be utilized for public recreational facilities without the approval of the Navajo Tribal Council.” This affects lands where water-based transportation facilities could be constructed.

Public Law 90-537, Colorado River Basin Project Act of 1968. This law established an
operational program for the upper and lower basin portions of the Colorado River. It established a full pool for Lake Powell at elevation 3,700 feet. With this legislation, Rainbow Bridge had its primary access changed from land to water.

September 11, 1970, "Memorandum of Agreement among the National Park Service, the Bureau of Indian Affairs, the Bureau of Reclamation, and the Navajo Tribe of Indians, on the use and development of the Glen Canyon National Recreation Area and adjacent Tribal lands." This agreement recognizes Navajo Tribe preference rights to operate concessions on Parcel "B" lands.

Public Law (P.L.) 92-593, October 27, 1972, 86 Stat. 1311. This law established Glen Canyon National Recreation Area to "...provide for public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto in the States of Arizona and Utah and to preserve the scenic, scientific, and historic features contributing to public enjoyment of the area...: Rainbow Bridge National Monument is accessed from the Glen Canyon National Recreation Area.

MANAGEMENT OBJECTIVES

Management objectives outlined in the monument's Statement for Management are:

- To preserve Rainbow Bridge by such means as will leave this outstanding natural resource unimpaired for the enjoyment of present and future generations.
- To identify, determine the significance of, and protect the cultural resources within the national monument.
- To promote public understanding and appreciation of Rainbow Bridge and the monument's other natural resources in a setting as free as possible from the influence of human activities.
- To determine and interpret the cultural significance of Rainbow Bridge.
- To cooperate with the Bureau of Reclamation to assure that management of the Lake Powell impoundment is compatible to the greatest degree possible with the long-term preservation of Rainbow Bridge.
- To foster and maintain a cooperative relationship for the use and protection of the national monument with the Navajo Tribe.

PLANNING BACKGROUND

Rainbow Bridge is a unique natural resource of national and international significance. It is managed under the general guidelines contained in the General Management Plan for Glen Canyon National Recreation Area. When completed, the Rainbow Bridge GMP/DCF/IP/RMP will be compatible with the Glen Canyon NRA GMP.

A major issue in the past has been the protection of Rainbow Bridge from any adverse impacts due to the impoundments of Lake Powell. In an act dated April 11, 1956, titled "Monument to be protected from impoundment in connection with Colorado River Storage project," Congress authorized the Secretary of the Interior to take adequate protective measures to preclude impairment of the Rainbow Bridge National Monument. In a suit settled August 1973 (Friends of the Earth, et al. v. Armstrong, et al.), the 10th Circuit Court decreed that the Bureau of Reclamation monitor effects of Lake Powell incursion into Rainbow Bridge National Monument for 10 years. That was completed in June 1985, and showed no change or adverse effect on the structural stability of the bridge. The Bureau of Reclamation and National Park Service have elected to continue the monitoring program indefinitely.

A Memorandum of Agreement among the National Park Service, Bureau of Indian Affairs, Bureau of Reclamation and Navajo Tribe, on the use and development of the Glen Canyon NRA and adjacent tribal lands, was approved September 11, 1970. The agreement may have an effect on the alternatives considered in the plan. It states that the Navajo Tribe is authorized to construct, contract for, and manage all income-producing concession facilities on Navajo Sites and on Parcel "B" lands, excluding the then existing Rainbow Bridge Marina. It also says that the facilities and services on Parcel "B" lands will be administered "as outlined in a management and development plan to be written and approved by both the tribe and the Service." The Service is also authorized to use Parcel "B" lands for construction of non-income-producing recreational facilities "mutually agreed to be needed in connection with recreational development and use." This agreement also recognizes the Navajo Tribe as having the first right of preference for income-producing concession operations to Rainbow Bridge, if these operations are located on Parcel "B" lands.

The Rainbow Bridge has religious importance to the Navajo Nation. The American Indian Religious Freedom Act of 1978 established a policy for protecting and preserving the American Indians' right to believe, express, and exercise their traditional religion. This includes guaranteeing access to traditional sites and use of sacred objects. The National Park Service must assure that its general regulations on access to, and use of park lands and park resources are applied in a balanced manner that does not interfere with an American Indian group's use of historically traditional places or sacred sites located within park boundaries. Rainbow Bridge is such a place.

Support services and staff for the monument are currently located at Dangling Rope Marina, which is ten miles west of the monument on Lake Powell. This marina replaced a marina near Forbidding Canyon to solve problems of human waste, isolation of employees, crowding and inadequate fuel storage facilities. Travel time for boats from Lake Powell's main pool to the monument varies from 1 to 3 hours, but most boats cannot make a round trip to Rainbow Bridge without a fuel stop. Rainbow Bridge is a major visitor destination on Lake Powell. The planning for both visitor safety and experience needs to coordinate the relationship of Dangling Rope and its staff and support facilities to the management of the monument.
The following issues constitute the significant subjects identified for analysis, they provide the focus for this planning effort.

HOW SHOULD THE MONUMENT BE MANAGED TO PROVIDE QUALITY VISITOR EXPERIENCES?

There is a need to define the desired character of the visitor experience within the monument. Rainbow Bridge is a natural wonder and a place that has religious significance to the Navajo people. Visitor use of the monument needs to be managed in such a way that it will be compatible with these factors. Current management of the area does not strongly differentiate its use from that of Glen Canyon NRA, so that visitor use is oriented to water-based recreation and sightseeing. The following issues should be addressed:

- Establishment of a carrying capacity for the monument, which will provide for a quality visitor experience and opportunities to experience the natural quiet and tranquility of Rainbow Bridge. Carrying capacity should consider experience levels, physical constraints, resource protection, and safety.
• Defining appropriate uses of the monument.

HOW SHOULD RAINBOW BRIDGE BE MANAGED TO INSURE PROTECTION OF THE MONUMENT'S NATURAL AND CULTURAL RESOURCES?

There is a need to establish management guidelines and policies that insure the protection of the monument's resources. Of foremost concern is the protection of Rainbow Bridge itself against any human impacts, as this was the specific purpose in the creation of the monument. While extensive monitoring of the bridge has shown no adverse impacts from the impoundment of Lake Powell, management needs to provide protection against other human impacts such as graffiti and general degradation of the natural scene due to visitor use.

Visitor use has resulted in significant impacts to the monument’s resources, including trampling of vegetation and multiple trailing, rock graffiti, litter, and increased noise levels (caused by voices, boats and overflights), which disturb the tranquil setting of the monument. In addition, increased levels of visitor use pose a threat to water quality and to the archeological and historical resources within the monument. Therefore there is a need to provide a balance between preservation of the monument and visitor use.

Additional resource concerns are the invasion of tamarisk (an exotic tree species that is widespread in the Colorado River Basin) and the potential impacts from livestock should the monument not be protected by fencing. Tamarisk has spread rapidly in the monument in recent years and adversely impacts the natural vegetation and visitor views of the monument.

Cultural resource issues that must also be addressed are: Which cultural and natural resources do contemporary American Indians define as significant, and what are the forms and frequencies of use? How do traditional uses affect the resources, and what does traditional use imply for the management of the monument?

Rainbow Bridge has a range of traditional resource uses to the Navajo people, and possibly other American Indians. There is a need to research the importance of the bridge to these groups and their traditional uses of the monument. Based on the findings of this research, the National Park Service must manage the monument in such a manner that it does not interfere with an American Indian group’s use of traditional sites or sacred objects. Specific requirements are spelled out in the National Park Service Management Policies, 1988. In general, there is a need to determine how the traditional use of resources of the monument should affect the interpretation and visitor use of the area.

WHAT INTERPRETIVE THEMES, SERVICES AND FACILITIES SHOULD BE PROVIDED TO MEET VISITOR NEEDS AND EXPERIENCES AT THE MONUMENT?

There is a need to develop themes that will help guide interpretive programs. These themes may include the geologic significance of Rainbow Bridge, its natural and human history and its traditional use by American Indians. An important goal of the monument’s interpretation, as well as its overall management, is to convey to the visitors the message that the monument is a special place, apart from the rest of Lake Powell, and that it was set aside, not for recreation, but to preserve a natural wonder.

There is also a need to determine what services and facilities are required to effectively convey the interpretive message to the public. Is the interpretive message best conveyed through personal contacts or are exhibits and displays adequate? What interpretation should be done in Glen Canyon NRA to inform visitors about Rainbow Bridge? How can tours be used to better convey the interpretive message? What facilities (exhibits, etc.) are needed at the monument for an effective interpretive program and where would they best be located? Are memorials to persons involved in the history of the monument appropriate for the monument and if so, where should they be located? How can programs and facilities best be made accessible to the visually, mentally, hearing, and physically impaired?
WHAT FACILITIES AND SERVICES NEED TO BE PROVIDED AT THE MONUMENT TO SERVE ITS VISITORS AND PROTECT ITS RESOURCES?

There is a need to determine the types of facilities and levels of staffing required to protect the monument's resources, protect its visitors and provide needed services for its visitors. Some of the issues are listed below.

- How should the problem of human waste be handled?
- Should the trails within the monument be upgraded?
- What views of Rainbow Bridge should be provided?
- What signing and navigational aids are needed to control the monument's visitors, both on land and on water?
- What access-related facilities are needed, both in the monument and in Glen Canyon NRA?
- What concession services are required to serve the visitors?
- What fencing is required to protect the monument from livestock?
- How should litter be handled and controlled?
- What rockfall hazards exist within the monument and how should the public be protected from this hazard?
- What docks and walkways need to be provided?
- What level of staffing is required to control the monument's visitors, protect its resources, maintain its facilities and to provide interpretation for its visitors?

THE PROPOSAL AND ALTERNATIVES

INTRODUCTION

The proposal presented in this chapter constitutes the Park Service's proposed General Management Plan, Development Concept Plan, Resource Management Plan and Interpretive Prospectus for the Rainbow Bridge National Monument. Alternatives, also displayed in this chapter, were developed to address the issues in various ways. Each alternative has a different emphasis. Consequently, each provides a different response to the issues.

ALTERNATIVES CONSIDERED, BUT REJECTED

Several alternatives or management options were considered by the interdisciplinary team during the alternative formulation process. Following is brief description of those alternatives or options considered and brief explanations as to why they were not included in detailed analysis:

- Consideration was given to locating all trails at the monument on the southwest side of the channel. This was eliminated because this would have disturbed previously undisturbed areas of the monument, space for a trail under the bridge was too narrow, and a trail on this side would allow easy access for people wanting to climb on top of the bridge.

- Consideration was given to moving the path system below contour 3,705 on the east side. This would have required the excavation of a path into Kayenta sandstone. The effect on the appearance of the bridge made this unacceptable.

- Consideration was given to a mini shuttle within the monument boundary. Under this alternative, a second shuttle would be run within the boundary from the existing dock to the shore. This was eliminated because of expense, disruption of visitor experience, and the fact that it could not easily accommodate the disabled visitor.

OVERALL MANAGEMENT

The following management guidelines apply to all alternatives:

- Inappropriate visitor uses and activities will be prohibited in the monument. The following activities are not considered to be appropriate or compatible with visitor experience, visitor safety, and resource protection of Rainbow Bridge National Monument: water sports of any kind, camping, swimming, climbing, diving, sunbathing, hunting, fishing, overnight use, rock-throwing, feeding wildlife, and special events. Pets will also be prohibited. Monument memorials, except as specifically permitted by the National Park Service, will be prohibited.

- Geologic hazards exist all along the entrance canyon to the monument from Lake
Powell and at the Rainbow Bridge NM itself. Before entering the monument, visitors will be informed of the potential hazards of the monument area.

- **Long-Term Structural Stability of the Rainbow Bridge.** With the inundation of Lake Powell and the establishment of the Glen Canyon NRA, the structural stability of Rainbow Bridge became a major issue. Rainbow Bridge was monitored for stability by the Bureau of Reclamation (BOR) from 1974 to 1984. The BOR report issued in 1985 summarizing a ten year study indicated that no movement had been detected. Since this study, the BOR has continued the monitoring program with improved techniques.

- **Flash Floods.** Details of the Flash Flood Mitigation Plan are contained in Appendix D. There are four components of the Flash Flood Mitigation Plan: a wayside exhibit, additional signing, evacuation and emergency preparedness procedures and a warning system. Wayside exhibit information would be provided that would reduce the flash flood hazard to visitors. Signs would alert visitors in the flood hazard zones where to move in case of a flood. Evacuation and emergency preparedness measures would be identified for the monument. A chain of command and responsibilities for specific actions would be identified. Emergency supplies would be stored at Dangling Rope and Rainbow Bridge.

Supplies needed, their exact locations, and any necessary support facilities would be identified. A warning system that provides at least five minutes warning would be installed. With this time visitors could be expected to be evacuated to areas of safety. Visitors would be alerted to evacuate by warning devices at the dock and signing at land trails within the monument. Signs and warning devices would be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. Ranger assistance would help insure an expedient evacuation and greater assurance of success.

**PROPOSAL PLAN, Manage Rainbow Bridge to Accommodate Slight Increases in Visitor Use While Providing Opportunities for Natural Quiet and Tranquility**

Diverse public expectations and needs have been identified for Rainbow Bridge. This proposal attempts to satisfy these expectations and needs by providing a variety of recreational experiences and settings for visitors to the national monument. Management methods used to implement the plan respond to the need to achieve use levels falling within the monument’s natural, biological, physical, and social carrying capacity levels outlined in Appendix A. This provides for regulating use levels through the staged implementation of actions that will eventually lead to a shuttle service. Staged implementation include tour boats, a signing and information system, an entrance contact station, and a reservation system. Visitor use levels will be managed in a manner to accommodate slight annual increases over past use while providing opportunities for visitors to experience the significance of the national monument’s quiet and tranquility. Developments would be limited to those necessary to meet basic visitor and resource protection needs. They will be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. This proposal was selected because it best responds to issues and problems. A variety of quality recreational experiences will be provided; natural and cultural values will be protected; monument access will be managed to minimize safety concerns; and interpretation will convey to the visitor that Rainbow Bridge is a special place, apart from the rest of Lake Powell.

**Land Use and Management**

Management zoning shows the long-term allocation of the land resources within Rainbow Bridge National Monument. Two primary management zones are shown on the Management Zoning Map on page 16 and are identified as follows: 1) a Natural Zone, which contains about 87 percent of the monument area or 139.6 acres, including an Outstanding Natural Feature subzone (0.4 percent of the monument area or 0.64 acres) and 2) the Reservoir or Recreation and Utilization Zone, which includes about 20.4 water surface acres to the mean high water mark of Lake Powell (elevation 3,711 feet) within the monument boundary and is about 13 percent of the monument area. This area can contain dock facilities during time of high water. The Reservoir Recreation Utilization Zone in Glen Canyon National Recreation Area would contain a Development Subzone of about 1.6 acres to accommodate Rainbow Bridge development during periods of low water.

The Natural Zone provides for the conservation of natural resources and processes, and accommodation of uses that do not adversely affect these resources and processes. The Outstanding Natural Feature subzone provides for public appreciation and interpretation of geological or ecological features possessing unusual intrinsic value or uniqueness. The Reservoir Zone is used for the major impoundment of Lake Powell, whose mean high water line enters the monument’s boundary on the northwest corner. The Reservoir Zone would include docks and related facilities required to provide water-based access to the monument. The Development Subzone in Glen Canyon National Recreation Area is land set aside to serve the needs of park management and visitors. This includes areas where park development and or intensity of use alter the natural environment.

**Land Protection/Adjacent Lands**

Rainbow Bridge is surrounded by the Navajo reservation. Trails through Navajo Mountain are used by the Navajos and others to access the monument. The National Park Service would continue its coordination with the Navajo Nation on use of lands surrounding Rainbow Bridge.

The proposal would also modify management within Glen Canyon National Recreation Area by restricting use of Forbidding Canyon to ingress and egress to Rainbow Bridge. This will serve to improve safety, reduce noise, and bring visitor experience levels with acceptable limits of carrying capacity. It is consistent with management outlined for the Glen Canyon General Management Plan.

**Resource Management**

The following strategies for natural and cultural resource management apply to this proposal. Details of resource management are described in the Resource Management Plan contained in Appendix C.
Natural Resources. The following strategies apply to natural resources:

**Long-Term Monitoring of The Monument.** Under this proposal, cooperation with the Bureau of Reclamation and long-term monitoring would continue.

**Exotic Plant Management.** Tamarisk, an exotic tree species, whose seed is widely dispersed by wind, threatens to change the character of the monument. This species in a mature state has the potential to influence the developing riparian communities in the monument. Also, it has the potential to alter the natural visual characteristics of the monument. Exotic plant management strategies would strive to eradicate tamarisk from visitor viewing areas through a removal program of burning, cutting, or treatment with herbicides. This will require an annual commitment as new plants germinate each year.

**Human Impacts Management.** Some areas of vegetation, off the designated path system, have been trampled by visitors. The existing trails are also heavily worn. Visitors use a network of paths and trails, established randomly from use, to view the monument area. Human impact management strategies proposed at the monument would increase staff for interpretation, enforcement and litter management; provide a low-impact trail; confine visitors to a low-impact trail system; prohibit off-trail access to the monument, except permitted American Indian religious activities; completely remove graffiti and restore vandalized rock facing; and institute a rehabilitation program for impacted areas.

**Rockfall and Geologic Hazards.** Exfoliating rocks falling from Navajo sandstone have created natural geologic hazard areas on the monument, which pose a safety threat to visitors. The water access through the narrow canyon entrance from the main part of Lake Powell is lined with vertical sandstone walls, which are potential geologic hazards. Large pieces of sandstone have been known to fall from the cliffs above into Forbidding and Bridge Canyon waters. Rockfall, where the existing dock abuts the shore, pose a potential threat to the safety of visitors. There is a potential for serious injury or death in the monument area as a result of falling rocks. Strategies to minimize the threat to visitors would move existing signs and interpretive area away from the rockfall area; locate structures, docks, and trails away from rockfall areas to the maximum extent possible; and inform visitors of the hazards before they enter the monument area. The Bureau of Reclamation would continue to perform annual rockfall inspections and the National Park Service would periodically authorize the reduction of high rockfall hazard areas.

**Noise Management.** There are three types of noise associated with the monument - noise from visitor activities, aircraft, and boats. Visitor Noise. Each year thousands of visitors are funneled from dispersed recreation areas on Lake Powell to the confined 2,000-linear-foot walkway system at Rainbow Bridge. Management of this concentrated use requires a different strategy than that used at Glen Canyon. First, visitation will be limited to the monument's carrying capacity in both phases, thus limiting noise and overcrowding. Second, interpretation would be
used to inform visitors that the monument is special, one held sacred by the Navajo, and a natural wonder. The interpretive program would attempt to convey reverence for the uniqueness of Rainbow Bridge, help set it apart from the recreation area, and promote respect for it among visitors. **Aircraft Overflights.** There are occasional scenic aircraft overflights of the monument. These overflights have been flown at 400-2,500 feet above ground level. Aircraft overflights create excessive noise and can interfere with visitor experience and appreciation of the monument. **Noise management strategies would provide continued cooperation with the FAA and the U.S. Air Force for enforcement of altitude regulations; and continued monitoring of aircraft noise impacts.** **Boat Noise.** Boating noise would be regulated by limiting use to carrying capacity limits. The dock location would respond to the fluctuating water levels of Lake Powell. During times of low water, dock placement would reduce boat noise. In addition, after implementation of the shuttle, boats accessing Rainbow Bridge from Lake Powell would be limited, reducing boat noise at the monument.

**Unique, Rare, and Endangered Species Management.** The monument would continue to be monitored for the presence of threatened and endangered plant and animal species. If any such species are found to exist, appropriate mitigation measures would be determined and implemented.

**Cultural Resources.** The following strategies apply to natural resources:

**Maintenance of Cultural Resources Sites.** Cultural resources sites recorded in the monument area are being disturbed and damaged through unrestricted access by visitors. Visitors climb, touch, and deface petroglyphs with graffiti on canyon walls, causing some to have become degraded. Cultural site maintenance management would restrict visitor access to the defined low-impact trail; and provide maximum interpretation and enforcement via ranger presence during normal hours of operation at the monument.

**Maintenance of American Indian Access to the Rainbow Bridge National Monument.** Access to the monument by American Indians for cultural and religious purposes will be reained.

**Visitor Use and Interpretation**

**Experience Levels.** (See Appendix A - Carrying Capacity.) Management would strive to provide a daily mix of varied recreation experience opportunities. A daily variance or window of between 4 to 6 hours would be managed to help meet use demands and provide an opportunity for most visitors to see Rainbow Bridge in a rural setting. During these periods a rural experience in a natural setting would result most of the time because of the presence of humans and encounters with groups. This window would also be designed to approximate existing use patterns. During other periods, outside of the 4-6 hour window, semiprimitive experiences would be provided where visitors have the opportunity to experience the quiet and tranquility of Rainbow Bridge. These conditions would also occur during the off-season the majority of the time.

**Carrying Capacity.** Specific results of carrying capacity analysis are contained in Appendix A - Carrying Capacity. Carrying capacity numbers are not exact. They are an approximation of limits that would be approached under the prescribed management for the monument. This means it may be possible under some circumstances to exceed the monument's carrying capacity. But in general, the conditions as described within Appendix A would be met most of the time. When the national monument is managed for semiprimitive opportunities, capacity is estimated at 30-40 people-at-one-time (PAOT). This estimate is based on management of the social setting necessary for natural quiet. When managed for rural opportunities, about 200-220 PAOTs could be accommodated at the national monument.

About 50 percent of the total annual capacity will be set aside for tour boat use during initial phasing -- initial signing and information system, an entrance contact station, and a reservation system. When the shuttle service is implemented, all use during the peak season period would be allocated to the shuttle service. A more in-depth study would be required to determine the detailed aspects of shuttle implementation, including the possible use of tour boats to provide shuttle service. Existing tour boat visitation represents about 23 percent of total visitation. Capacity outlined in this proposal will meet this demand with accommodations for increases. With the implementation of the proposed sequencing of visitor use, estimates indicate that a 25 to 50 percent increase could be accommodated in the future without loss of visitor experience.

**Access.** Access to the monument would be regulated during initial implementation of the plan by informational signing and a contact station at the mouth of Forbidding Canyon. Use within Forbidding Canyon would be restricted to ingress and egress to Rainbow Bridge. During the initial implementation stages, primary access to the national monument would continue to be by private boats as well as concessioner-operated tour boats. Boats would be required to stop at a check point to confirm reservations and insure conformance with carrying capacity limits. The contact station near the mouth of Forbidding Canyon along with the reservation system would help regulate use. There may be a fee associated with the reservation system to defray costs. The reservation system would further allow for the sequential timing of visits to the monument for private boat owners and tour boats, which would alleviate backups of boats at the mouth of the channel. A slow zone from the mouth of Forbidding Canyon to the Narrows and a wakeless zone from the Narrows to the monument would be enforced for all boats. If enactment of the reservation system and contact station do not provide adequate resource protection for the monument, a shuttle system would be implemented. Private boat access during the peak season would be eliminated and visitors would be required to use the shuttle. Visitors could be required to pay a fee to defray the costs of a shuttle. Prior to implementation of the shuttle, a visitor transportation study would be completed to address the point of origin of the shuttle, who will operate the system, season of operation, and cost to the visitor. After implementation of the shuttle system a check point would insure compliance from private parties during the peak use season and the wakeless zone might no longer be necessary. Trails from Navajo Mountain would continue to provide land access.
Interpretation and Visitor Services. Details of the interpretive proposal are described in the Interpretive Prospectus contained in Appendix B. Interpretation would convey to the visitor that Rainbow Bridge is a special place, apart from the rest of Lake Powell. Interpretive services would vary based on the management of visitor experience level. During the 4 to 6 hour daily rural window, interpretive services would rely on personal services as well as on printed and audio media. During the hours of semi-primitive time, self-guiding brochures and other printed media would be used. Personal services would be minimal during this period, enough for rangers to answer questions and distribute information. Visitors would be on their own to experience the monument's natural quiet and tranquility.

Programs would vary based upon implementation stages. Prior to full implementation of the shuttle, printed material, self-guiding audio, and some personal services would be emphasized. During this time most interpretation would occur at the monument. After implementation of the shuttle, the mix of interpretive services would be more heavily rely on personal services, most interpretation would be presented aboard the shuttle, and personal services would be reduced moderately at the monument with visitors left more on their own to experience the monument as a special place.

Concessions. Scheduling of boat tours would be coordinated by park management with the concessioners, recognizing the varied experience opportunities that will be provided. A majority of boat tours will be provided when the monument is managed for rural experience opportunities, limited tours could be provided during semiprimitive periods. Use would be limited to 50 percent of the park's carrying capacity, including tour boats that are limited to carrying no more than 50 percent of the PAOT capacity.

Park Operations

Under the proposal, full implementation would require 24.7 full-time equivalent employees. Interpretation, security, fire, and emergency medical services (EMS) would be provided by the National Park Service.

Facilities for housing would be built and maintained by the NPS for NPS employees. The shuttle and housing would be provided at various marina sites depending on need.

The following are staffing estimates, the levels of which apply to the entire operation and are not limited to NPS needs. They include staff to operate the proposed shuttle system.

Initial Signing/Information/Resource Improvements

Maintenance:

- Check Point - Contact Station 1.5 FTE
- Trail maintenance
- Tamarisk eradication
- Flood monitoring/alarm system
- Graffiti removal
- Floating interpretive platform 0.6 FTE

Housing and utilities 1.0 FTE

Resource Management:
- Tamarisk eradication/graffiti removal 1.0 FTE
- Vegetation rehab/increased monitoring 1.0 FTE

Visitor Services:
- Increased interpretation at the monument 2.1 FTE
- Enforcement in the channel (no private boats) Subtotal 6.2 FTE

Reservation

- Reservation System 5.0 FTE
- Subtotal 5.0 FTE

Shuttle (Preliminary estimate only, could change based on origin of shuttle.)

Shuttle System Operation (NPS):
- Boat pilots (one permanent, 8 seasonal) 5.0 FTE
- Deck hands (8 seasonal) 4.0 FTE
- Security/EMS/fire at transfer dock 1.0 FTE
- Boat mechanics 1.5 FTE
- Dock maintenance 0.5 FTE
- Dock sewer/water/fuel/trash/elec. 1.0 FTE
- Fiscal clerk 1.0 FTE
- Subtotal 14.0 FTE

TOTAL 25.2 FTE

Estimated annual operations and maintenance budget associated implementation of the initial signing, information, and resource improvements is $146,000 for salary and $98,000 for supplies; implementation of the reservation system is estimated at $118,000 for salary and $79,000 for supplies; implementation of the shuttle system is estimated at $330,000 for salary, $220,000 for supplies, $277,000 for gas and oil, and $140,000 for engine replacement. Total implementation cost for the proposal is $594,000 for salary, $397,000 for supplies, $277,000 for gas and oil and $140,000 for engine repair and replacement, for a total of $1,408,000 annually.

General Development/Development Concepts

Enclosed maps show the development concepts for the monument and adjacent areas within Glen Canyon NRA.
Access. During initial implementation of the plan, access would be regulated by informational signing and a contact station at the mouth of Forbidding Canyon (See map for location). The implementation of a reservation system would restrict entry by boat to Rainbow Bridge.

Water Based. The dock's appearance at the monument would be improved with new facilities. Docks and docking facilities would accommodate private and commercial watercraft, including tour boats, houseboats, and small water craft. The existing dock capacity would be retained. Slips would also be reserved for National Park Service use. Dock capacity could be reduced upon implementation of the shuttle.

Rest rooms, storage, and minimal interpretive displays would be provided at the monument. Facilities will be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. Dock facilities such as floating walkway would be located as necessary to adjust to fluctuating lake levels. Vertical elements of facilities would be limited to those necessary for health and safety.

Land Based. A modified trail system would be provided from the point at which the dock accesses land to an area immediately before Rainbow Bridge. Trails with hardened surfaces would use material that subtly delineates differences between natural surfaces and trails available for pedestrian traffic. The proposal would use natural viewing points and areas where the existing landform provide opportunities for congregation, to accommodate up to 40 visitors for interpretive presentations during the rural/natural period. No modifications to natural conditions would take place under Rainbow Bridge.

Lake Powell Low Water Scenario. The level of Lake Powell generally can fluctuate from 3,700 to 3,600 feet. When water levels fall below 3,650 feet, exposed sediment bars make accessing the shore extremely difficult. In these instances, facilities such as accordion matting or other similar material would be used to access and stabilize the land trail below the high water line. The old land trail, normally submerged, would also be modified and used for access.

Development Costs, Phasing, and Major Equipment

The total cost along with implementation stages is shown in Table 1a.

Additional Plans and Studies

The proposal contains an estimated cost for construction of housing and utility upgrades at various marina locations. A separate environmental document as well as development concept plan revision would be needed at marinas before actions can occur at this location.

Detailed studies to design and implement a visitor use reservation system will be required prior to full implementation of this proposal. This should include location of reservation outlets, relationship to tour boat programs, and information distribution regarding the reservation system to all visitors to Lake Powell. This study should also address the
location and operation of the contact station needed to regulate access to Forbidding Canyon.

Current ease of access from Lake Powell is the primary determinant of increased use at the monument. The Bureau of Reclamation is conducting an environmental impact study of existing conditions for the Glen Canyon Dam. The effects that fluctuating water levels at Lake Powell have on use at the monument need to be part of that study.

The proposal indicates that a shuttle system would be implemented if the reservation system is not effectively resolving the resource management and visitor safety concerns. Prior to implementation of the shuttle system, a visitor transportation and market study would be completed. This study would address issues including origination point for the shuttle, schedule and season of operation, size and type of shuttle vessels required, operational costs and whether they would be entirely passed along to the visitor or partially subsidized, and facilities necessary for the shuttle staging area. This study would also determine whether tour boat passengers would be required to use the shuttle system or if tour boats would be allowed to continue to access the monument directly.

<table>
<thead>
<tr>
<th>Table 1a</th>
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<tbody>
<tr>
<td><strong>Equipment Costs</strong></td>
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<tr>
<td>Capital investment for 5 shuttle boats</td>
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<tr>
<td>60 passenger/ 500,000 es</td>
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<tr>
<td>1 Work barge @ $50,000</td>
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<tr>
<td>Fuel Boat @ $200,000</td>
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<tr>
<td>Small patrol boat 6 @ $35,000 es</td>
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<tr>
<td><strong>Total Equipment Costs</strong></td>
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<table>
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<tr>
<th>Item</th>
<th>Gross Construction Costs</th>
<th>Advance &amp; Proj. Ping. Costs</th>
<th>Total Project Costs</th>
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<tbody>
<tr>
<td>Initial Signing/Information/Resource Improvements</td>
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<td></td>
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<tr>
<td>Rainbow Bridge</td>
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<tr>
<td>Implement flash flood mitigation</td>
<td>$91,700</td>
<td>$17,500</td>
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<td>Improve restroom LS</td>
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<td>Provide improvements for land access trail 900 ft</td>
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<td>Improve land connection for dock 20ft 10w</td>
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<td>Wayside exhibits</td>
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<td>Trail with natural surfaces 800 ft</td>
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<td>Check Point, contact station, and signing LS</td>
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<td>Various Measures including Dangling Rope</td>
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<tr>
<td>Construct three 6 person dorm 1,400 sf es</td>
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<td>$89,250</td>
<td>$556,920</td>
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<tr>
<td>Upgrade utility system</td>
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<td>Reservations</td>
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<td>Computized reservation system LS &amp; communications equipment</td>
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<td>Various Measures</td>
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<td>Expand Capacity – 150 slips</td>
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<td>Ticket sales/storage LS</td>
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<td>Construct 3-6 person dorm 1,400 sf es</td>
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<td><strong>Total Capital Cost</strong></td>
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ALTERNATIVE A, Manage Rainbow Bridge to Accommodate a Maximum Number of Visitors

This alternative was designed to maximize the number of visitors that could be accommodated at Rainbow Bridge. During the heavy use season, the volume of use would create visitor experiences similar to that of a rural or urban environment. A shuttle system would be implemented to meet use demands while protecting resources and minimizing safety problems created by boat use in Forbidding Canyon.

Land Use and Management

Management zoning applicable to this alternative includes: 1) a Natural Zone, which contains about 84 percent of the monument area or 134.8 acres, including an Outstanding Natural Feature Subzone (0.4 percent of the monument area or 0.6 acres); 2) the Reservoir Zone, which includes about 20.4 water surface acres to the mean high water mark of Lake Powell (elevation 3,711 feet) within the monument boundary and is about 13 percent of the monument area, and 3) the Development Zone, which contains about 3 percent of the monument area, or 4.8 acres. Management of these zones is similar to that described in the proposal.

Land Protection/Adjacent Lands

Rainbow Bridge is surrounded by the Navajo reservation. Trails through Navajo Mountain are used by the Navajos to access the monument. The National Park Service would continue its coordination with the Navajo Nation on use of lands surrounding Rainbow Bridge.

The alternative would regulate recreational use of Forbidding Canyon during the heavy use season to Rainbow Bridge. This will serve to improve safety, reduce noise, and bring visitor experience levels with acceptable limits of carrying capacity and is consistent with management outlined for the Glen Canyon General Management Plan.

Resource Management

Except as described below, strategies for natural and cultural resource management displayed for the proposal also apply to this alternative.

Natural Resources. The following strategies apply to natural resources:

Noise Management. There are three types of noise associated with the monument - noise from visitor activities, aircraft, and boats. Visitor Noise. Management of concentrated use requires a different strategy than that used at Glen Canyon. This alternative addresses this problem in two ways. First, visitation will be limited to the monument's carrying capacity in both phases, thus limiting noise and overcrowding. Second, interpretation would be used to inform visitors that the monument is special, one held sacred by the Navajo, and a unique natural wonder. The interpretive program would attempt to convey reverence for the uniqueness of Rainbow Bridge, help set it apart from the recreation area, and promote respect for it among visitors. Both phases of the plan offer increased opportunities for the NPS to convey its message. Aircraft Overflights. There are occasional aircraft overflights of the monument. These overflights have been flown at 400-2,500 feet above ground level. Aircraft overflights create excessive noise and can interfere with visitor experience and appreciation of the monument. Noise management strategies would provide continued cooperation with the FAA and the U.S. Air Force for enforcement of altitude regulations; and continued monitoring of aircraft noise impacts. Boat Noise. Phase I of the proposal would manage boating noise by limiting use to carrying capacity levels. Phase II would dramatically reduce boating noise levels by prohibiting all private boats during the visitor season.

 Visitor Use and Interpretation

Visitation is exceeding 200,000 visitors annually. This occurs within the narrow confines of Bridge Canyon and the limited walkway of about 2,000 linear feet in Rainbow Bridge National Monument. Under this alternative, the use of visitor services and interpretation plays a major role in maximizing the opportunity for visitors to see Rainbow Bridge and maintaining a quality visitor experience.

Experience Levels. Management would provide a seasonal mix of varied recreation experience opportunities. A seasonal peak use period would be managed for a rural or urban experience with the off-season managed for a rural experience with semiprimitive opportunities. During the six month heavy use season, social settings created by large numbers of visitors at the national monument would provide a rural or urban environment within a relatively natural setting. Management controls necessary to accommodate this volume of use would be more intense, and would further contribute to increased noise. The physical setting would be altered with developments necessary to accommodate large volumes of visitors.

Carrying Capacity. Specific results of carrying capacity analysis are contained in Appendix A - Carrying Capacity. During the off-season, normal visitation pattern would allow for a rural experience although the social setting would provide semiprimitive opportunities in some parts of the monument. The monument capacity would vary between 25 to 230 PAOT. During the six month heavy use period, the monument capacity would be approximately 390 PAOT. This includes the capacity of a floating dock interpretive platform, a low-impact trail system, and a hardened congregating area.

Fifty percent of total capacity is set aside for concession use. Existing tour boat visitation represents about 23 percent of total visitation, this capacity represents a substantial increase over the existing situation. Visitation from private boats will also be allowed to increase from current levels to a total of 196 PAOT. This alternative allows for the orderly sequencing and scheduling of visitors to the monument and helps to alleviate peak day financial as well as peak season, flows of visitors. With the implementation of the proposal, estimates indicate that a 150 to 240 percent increase over current visitation could be accommodated and still maintain a rural or urban experience.
Access. Access would be managed with a two-phase approach. This would restrict the use of private boats in the monument during the heavy use season. The exact dates would be established by the superintendent after an annual review of the previous year’s visitation figures.

Phase I would require all boats to stop at the contact station and pay a fee prior to proceeding to the monument. If the monument were full (above the carrying capacity limits shown for this alternative), no boats would be allowed to proceed. In addition, boats traveling beyond the contact station would be required to travel at wakeless speed, thus eliminating the wake and safety problems currently existing in Bridge and Forbidding canyons. Concession tour boats would be required to stop and pick up an interpreter at the contact station prior to proceeding with their trip to the monument. During the off-season, the contact station would be closed and all boats allowed to proceed cautiously to the monument.

Phase II would implement a seasonal shuttle transportation system. This would include the expansion of the contact station dock into a transfer dock for the shuttle system, the purchase of shuttle boats, and the addition of housing at Dangling Rope. Phase II would only be implemented if, in the judgement of the staff, visitation rises to a point that clearly threatens the protection of resources at Rainbow Bridge or that navigation in the water channel becomes unsafe. To use the shuttle, visitors from private boats would board the shuttle at the transfer dock and proceed to the monument. It is estimated that shuttle tour boats, having a capacity of 30 persons each, would take 10 minutes to load and unload, 10 minutes to transport visitors each to and from the monument, and would provide a 30-minute stay at the monument. During off-season use (October 16 to May 14), private boats would be allowed access during normal hours of operation.

The estimates of economic feasibility used for this alternative assume constant visitation at various ticket prices for the shuttle system, with the break-even point in the neighborhood of $4 to $8. Experience has shown that visitation will likely decrease with the imposition of fees. Therefore, the alternative calls for the completion of a market study prior to the implementation of Phase II. The purpose of the study would be to provide close estimates of visitation at various ticket prices. Information obtained may dramatically affect the National Park Service’s operating budget or potential concessioner profitability.

Interpretation/Visitor Services. Interpretive goals and objectives displayed in the proposal also apply to this alternative. This alternative differs from the proposal in that NPS-provided personal services would be more intensive through the use of on-board interpreters on all shuttle and tour boats.

Concessions. Scheduling of boat tours would be coordinated by park management with the concessioners. Use would be limited to 50 percent of the monument’s total carrying capacity.

Park Operations
Under this alternative, the shuttle boats would be provided and maintained by either the National Park Service or a concessioner. The transfer dock would be built and maintained by the National Park Service. Interpretation on the shuttle, dock security, fire, and emergency medical services (EMS) would be provided by the National Park Service.

Facilities for housing would be built and maintained by the concessioner for their employees and by the National Park Service for their employees. Housing would be at Dangling Rope.

The following staffing estimates represent requirements for NPS operations only.

Maintenance: 3.0 FTE
Resource Management: 1.0 FTE
Visitor Services: 2.7 FTE
Shuttle System Operation: 16.5 FTE
TOTAL 23.2 FTE

Estimated annual operations and maintenance budget associated with Phase I of the alternative is $251,730 for salary and $167,820 for supplies, for a total of $419,550.

Estimated annual operations and maintenance budget associated with the completion of Phase II of the alternative (includes Phase I and Phase II annual costs), were the shuttle operated by the National Park Service, is $521,441 for salary, $347,527 for supplies, $128,000 for gas and oil and $138,600 for engine repair and replacement, for a total of $1,135,568.

General Development/Development Concepts
Enclosed maps show the development concepts for the monument and adjacent areas within Glen Canyon NRA.

Access. Access would be regulated by a contact station at the mouth of Forbidding Canyon (see map page 30 for location).

Water Based. Contact Station and Transfer Dock. Under this alternative, a contact station/transfer dock facility between the mouth of the Forbidding Canyon and the Narrows would be constructed. Phase I facilities would include a small contact station, with slips for visitor and administrative docking. Phase II would expand the contact station to a transfer dock, which would include additional slips for visitor and administrative use, an indoor comfort station with chemical-oil operated toilets, and a...
Water Access Alternative A
FORBIDDING CANYON
RAINBOW BRIDGE NATIONAL MONUMENT
115 / 80.016 -A
May 91: MINO

Highlights
- Manages for an urban/natural experience
- Long term -- Shuttle from Rainbow Bridge
- Flexible services
- Information signing
- Key information
- Transfer dock/shuttle from Forbidding Canyon
- Dock location adjusts to lake levels
- Development for maximum number of visitors
- Interpretive exhibits
- Personal services, exhibits, printed and audio media
- More intense
- Accommodates 150 to 240 percent increase in visitor use

Contact Station, with a Natural History Association outlet.

Monument Dock. The existing courtesy docks would be expanded to accommodate the increase in private boat visitation during Phase I of the proposal. The dock would be realigned to be situated in the middle of the channel and as far away from existing rockfall areas as possible. The existing toilet would be relocated so that it did not block initial views of Rainbow Bridge. The dock area and rest room facility would be color-coordinated to blend in with the natural surroundings.

Permanent Floating Interpretive Platform. Probably the most impressive view of Rainbow Bridge is from the water. Under this alternative, the existing dock area would be modified to provide a permanent floating interpretive platform in the center of the channel. The dock area would also be relocated toward the center of the channel away from existing rockfall areas. The floating interpretive platform would rise and fall with the fluctuating lake level. A small moveable dock connection would slide back along the northern bank to allow different connection points at fluctuating lake levels from approximately elevation 3,660 to 3,700 feet.

The floating interpretive platform area would provide enough space for interpretive displays and provide the stage for interpretive talks to large groups. This alternative calls for a 1,600-square-foot platform. This area has enough capacity to serve 32 persons at one time, or four parties of eight persons each, about the size of one shuttle boat-load of visitors.

Land Based. Land based facilities would characterize a rural or urban physical setting. Development of a small, low-impact trail and congregating area, while retaining the existing natural and native features of the existing trail and Rainbow Bridge, is proposed.

Low-Impact Trail. This alternative includes constructing a low-impact trail generally following the existing trail alignment terminating at the congregating area. The trail would be carefully molded to the natural contours and fit the character of the existing landscape. The trail color and material would be coordinated to blend with the color of the existing Keyenta Sandstone. Access for disabled persons would be improved.

Low-Impact Congregating Area. The proposal calls for the construction of a 1,600-square-foot congregating area. The area would be large enough to accommodate 28 visitors at one time and interpretive displays.

Existing Land Trail. This trail would be retained. Some eroded areas along the trail would be rehabilitated.

Lake Powell Low Water Scenario. The level of Lake Powell generally can fluctuate from 3,700 to 3,800 feet. When water levels fall below 3,650 feet, exposed sediment bars make accessing the shore extremely difficult. In these instances, facilities such as accor-
access. The floating walkway and interpretive platform would be removed from the monument and stored at Wahweap or Dangling Rope. The interpretive waysides would be relocated from the floating platform to the low-water land trail. The courtesy docks would be connected to the land trail with a short walkway and the moveable land connection section.

Development Costs, Phasing, and Equipment

The total cost along with implementation stages are shown in Table 1b.
ALTERNATIVE B - Manage Rainbow Bridge to Emphasize Opportunities for the Visitor to Experience Quiet and Tranquility

This alternative would provide semiprimitive recreation opportunities for visitors to the national monument. Use limits would be imposed to reduce the number of visitors allowed in the monument at any given time. Opportunities to experience quiet and tranquility would be provided year-long. Visitor services and interpretation would be minimized. Visitor self-reliance would be required to totally understand and experience the wonders of Rainbow Bridge. Developments would be limited to those necessary for resource protection. A natural setting relatively free of human intrusions would be emphasized.

Land Use and Management

Management zoning applicable to this alternative includes: 1) a Natural Zone, which contains about 87 percent of the monument area or 139.6 acres, including an Outstanding Natural Feature subzone (0.4 percent of the monument area or 0.64 acres) and a development subzone (3 percent of the monument or 1.6 acres; and 2) the Reservoir Zone, which includes about 20.4 water surface acres to the mean high water mark of Lake Powell (elevation 3,711 feet) within the monument boundary and is about 13 percent of the monument area. Management of the natural and reservoir zones is similar to that described in the proposal. In the development subzone the retention of natural settings and processes will be given priority.

Land Protection/Adjacent Lands

Rainbow Bridge is surrounded by the Navajo reservation. Trails through Navajo Mountain are used by the Navajos to access the monument. The National Park Service would continue its coordination with the Navajo Nation on regulation of use of lands surrounding Rainbow Bridge.

This alternative would also modify management within Glen Canyon National Recreation Area by severely restricting recreational use of Forbidding Canyon to ingress and egress to Rainbow Bridge. This will serve to improve safety, reduce noise, and bring visitor experience levels within acceptable limits of social carrying capacity and is consistent with management outlined for the Glen Canyon General Management Plan.

Resource Management

Strategies for natural and cultural resource management displayed for the proposal also apply to this alternative.

Visitor Use and Interpretation

Experience Levels. Management would strive to provide year-round semiprimitive experiences where visitors have the opportunity to experience the quiet and tranquility of Rainbow Bridge (see Appendix A - Carrying Capacity).

Carrying Capacity. Specific results of carrying capacity analysis are contained in Appendix A - Carrying Capacity. When the national monument is managed for semiprimitive opportunities, capacity is estimated at 40 people-at-one-time (PA0T). This estimate is based on management of the social setting necessary for natural quiet.

About 50 percent of the total annual capacity will be set aside for concessioner tour boat use. Existing tour boat visitation represents about 23 percent of total visitation and capacity of tour boats would not be sufficient to meet this demand. This would require about a 10 to 15 percent reduction in tour boat trips to the monument. Estimates indicate that were this alternative implemented, a 60 to 70 percent reduction in current visitation would be required, turning away 150,000 to 170,000 visitors.

Access. Primary access to the national monument would continue to be provided by private boats as well as concessioner-operated tour boats. All recreational use within Forbidding Canyon would be restricted to ingress and egress to Rainbow Bridge. A contact station near the mouth of Forbidding Canyon along with the reservation system would regulate use. No entrance fee would be charged, but there may be a fee associated with the reservation system to defray costs. Boats would be required to stop at a check point to confirm reservations and insure conformance with carrying capacity limits. The reservation system would further allow for the sequential timing of visits to the monument for either private boat owners or tour boats. Boat numbers to Rainbow Bridge would be severely reduced to conform to carrying capacity limits. A slow zone from the mouth of Forbidding Canyon to the Narrows and a wakeless zone from the Narrows to the monument would be enforced for all boats. Trails from Navajo Mountain would continue to provide land access, but regulation of use of the monument through the reservation system would be required.

Interpretation and Visitor Services. Details of the interpretive proposal are described in the Interpretive Prospectus contained in Appendix B. Personal services would be minimal, enough for rangers to answer questions, distribute information, and provide resource protection. Printed media would be the primary tool used to provide interpretation at the monument. Visitors would be on their own to experience the monument's natural quiet and tranquility.

Concessions. Scheduling of boat tours would be coordinated by park management with the concessioners. Use would be limited to 50 percent of the monument's total carrying capacity.

Park Operations

For this alternative all operations and maintenance would be completed by the NPS. Facilities for housing would be built at Dangling Rope.

NPS staffing levels necessary to implement this alternative are as follows:
Estimated annual operations and maintenance budget associated with this alternative is $264,000 for salary and 176,000 for supplies and equipment, for a total of $440,000.

General Development/Development Concepts

Enclosed maps show the development concepts for the monument and adjacent areas within Glen Canyon NRA.

Access. Access to the monument would be regulated by signing and provision of a contact station at the mouth of Forbidding Canyon.

Water Based. Dock facilities at the monument would be reduced and their appearance improved. Docks would accommodate private and commercial watercraft, including tour boats, houseboats, and small water craft. The existing dock capacity would be reduced to 6 slips. No more than 40 private or tour boat visitors would be scheduled and allowed at the dock at any given time. One boat slip would be reserved for National Park Service use.

No rest rooms, storage, and or interpretive displays would be provided. Site facilities such as signing would be limited to those necessary for health and safety. These would be sized, designed, and located so that it would not intrude on the setting of the monument.

Land Based. A slightly improved natural trail system would be provided.

Lake Powell Low Water Scenario. The level of Lake Powell generally can fluctuate from 3,700 to 3,600 feet. When water levels fall below 3,650 feet, exposed sediment bars make accessing the shore extremely difficult. In these instances, facilities such as accordion matting or other similar material would be used to access the land trail. The old land trail, normally submerged, would also be modified and used for access.

Development Costs, Phasing, and Equipment

The total cost along with implementation stages are shown in Table 1c.
Table 1c

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<tr>
<th>Item</th>
<th>Gross Construction Costs</th>
<th>Advance &amp; Proj. Ping. Costs</th>
<th>Total Project Costs</th>
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<td>Implement flash flood mitigation</td>
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<td>Provide improvements for land access trail 2000 ft</td>
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<tr>
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<td>Total Capital Cost</td>
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</table>

**ALTERNATIVE C - No Action**

Under this alternative existing conditions and existing management strategies would be retained.

**Land Use and Management**

Existing management zoning includes: 1) an Outstanding Natural Feature Zone of 139.6 acres or 87 percent of the monument, and 2) the Reservoir Zone, which includes about 20.4 water surface acres to the mean high water mark of Lake Powell (elevation 3,711 feet) within the monument boundary and is about 13 percent of the monument area.

**Land Protection/Adjacent Lands**

The Glen Canyon National Recreation Area general management plan includes recognitions of Rainbow Bridge with appropriate management zoning adjacent to the national monument's borders. No formal relationship for land protection has been established with the Navajo Nation.

**Resource Management**

Little staff or financial resources have been available for resource management programs. Therefore little has been done resulting in damage and problems described earlier in this document.

**Visitor Use and Interpretation**

**Experience Levels.** A specific experience level is not managed for. During the six month heavy use season, use volumes result in a rural experience. Other periods of the year are more conducive to semiprimitive experiences.

**Carrying Capacity.** A specific carrying capacity does not exist under current management. Existing facilities can accommodate about 220 PAOTs.

**Access.** Unrestricted water access is presently available through Forbidding Canyon. Trail access through the Navajo Reservation also exists.

**Interpretation and Visitor Services.** No on-site interpretation or visitor services are available. Some informational brochures can be obtained from Glen Canyon visitor contact points.

**Concessions.** Concessioneer provided tour boats are permitted to access Rainbow Bridge. Current tour boat use comprises about 23 percent of annual visitation.
Park Operations

Three employees from Glen Canyon are stationed at Dangling Rope, one ranger (0.2 FTE), one interpreter (0.8 FTE), and one maintenance person (0.2 FTE). FTEs illustrate the amount of time Glen Canyon personnel dedicate to Rainbow Bridge.

General Development/Development Concepts

Existing facilities at Rainbow Bridge include 1,300 feet of floating dock walkway, a courtesy dock with capacity of 20 boats, ½-mile maintained trail, and two interpretive rests along the trail.

INTRODUCTION

Rainbow Bridge National Monument is in southeastern Utah in San Juan County. Totaling 160 acres, the monument is bounded on three sides by the Navajo Indian Reservation and on one side by the Glen Canyon National Recreation Area. The Rainbow Bridge itself spans 84 meters (275 feet) and arches to a height of 88 meters (290 feet). The top is 13 meters (42 feet) thick and 10 meters (33 feet) wide at the narrowest point.

Rainbow Bridge is located in an unsurveyed portion of San Juan County, Utah. It is approximately 30 miles east-northeast of Page, Arizona, and about 6.5 miles north of the Arizona-Utah line. The precise location outlined in the proclamation that established the monument is as follows: "the southeast corner of the 160 acre tract is located N 80 degrees 25 minutes west from milepost 179 of the Arizona-Utah boundary a distance of 7 miles and 67 and 87/100 chains" (Taft 1910).

Primary access to the monument is by water through a thin tributary of Lake Powell. The Bridge Canyon water channel enters the monument area on the northwest corner of the boundary. There is also a trail across Navajo Mountain, which accesses the monument by land. Few visitors use the trail because of the length of time it takes to access the monument using the trail; usually more than a day, one way.

Weather and precipitation in the southwest is irregular. Precipitation averages about 7 inches (17.8 cm) per year with a range of 2.5 to 10 inches. Most precipitation is rain, falling in a two-season pattern – late summer thundershowers and cool winter rains or snow. The thundershowers are a significant planning variable because they cause high surface runoff and flash floods in desert drainages. Flash flooding can occur in the Bridge Canyon area of the monument.

Strong, gusty, southerly winds are common from June through September, particularly in the afternoon, while light breezes are frequent between February and May. Windy conditions can exist in Bridge Canyon when prevailing winds come from the southeast. Winds also can be amplified within the canyon when wind direction is just right. Normally, however, the canyon walls offer some protection from wind gusts off the higher desert and scarps above. This can have an effect on boats within the channel and on docking facilities placed there.

Summer temperatures are high, average July maximums being 95 to 97 degrees Fahrenheit, with some record temperatures approaching 115 degrees. The average minimum winter temperature is 24 degrees Fahrenheit, with the record lows approaching 4 degrees. Surface water temperature of Lake Powell and the canyon tributary varies from approximately 79 degrees Fahrenheit in July, to a low of 44 degrees Fahrenheit in January. The canyon aspect can offer significant shading. In addition, water and the rock mass can create microclimates and modify temperature extremes. Left in the open, however, diurnal temperatures are significant -- a 30 degree range is common -- and the
effect of intense sun during the summer is amplified by reflectivity from light-colored soils and water surface. In addition, shading and cooler microclimates from conditions described previously are important to visitor comfort.

View of Rainbow Bridge from Water Channel

EXISTING CONDITIONS AND DEVELOPMENT

Existing Resource Conditions

Conditions of natural resources have deteriorated within the monument because of increased ease of access by people using boats from Lake Powell. The issues described in the first chapter describe deteriorating conditions resulting from uncontrolled visitor use. Protection of natural resources has been lax and has resulted in vandalism and graffiti. Uncontrolled visitor use off of established trails has resulted in surface damage and trampled vegetation. Below the high water line concrete has been used to stabilize the trail for access at times of low water. In addition, tamarisk, spread along the shorelines of Lake Powell, grows along the shore inside the monument boundary. If left unchecked, it will eventually block the view of the Rainbow Bridge. See Existing Conditions map, page 44.

Existing Development

Facilities at Rainbow Bridge include 1,300 feet of floating dock walkway, a courtesy dock, a maintained trail, which is a ¼-mile walk up the canyon to the bridge, and two interpretive rest areas along the trail. The existing boat dock can hold about 20 boats.

Three employees from the Glen Canyon NRA stationed at Dangling Rope—one ranger and a maintenance person (two tenths (0.2) of the time) and one interpreter (eight tenths (0.8) of the time)—spend part of their time at Rainbow Bridge NM.

NATURAL RESOURCES

Geology/Soils

Geology, description. The topography of the canyons in the area of Rainbow Bridge is a direct result of the area's geology and the climatic environment discussed previously. Events that created Rainbow Bridge are described in Archeological Survey in the Glen Canyon National Recreation Area, Year 1 Descriptive Report, 1984-1985, Chapter 2. *Meandering streams flowing from Navajo Mountain cut into the underlying bedrock. As downcutting progressed, boulders and gravels were deposited by Bridge Canyon Creek along the inside of the bends on the canyon, while faster water on the outside formed alcoves in the cliff walls. As the streams encountered the more erosion resistant Kayenta sandstone, the rate of downcutting diminished, and the stream's energy was concentrated on widening its channel. At one point a sharp meander created a loop around a narrow wedge of sandstone. Alcoves were eroded on opposite sides of this rock wedge. Eventually the rear walls of the alcoves were breached by the stream, the loop was abandoned, and water began flowing through the incipient arch. Continual downcutting and exfoliation resulted in the formation of the natural wonder known as Rainbow Bridge.*

Geology at Rainbow Bridge is comprised of two sandstone formations—Kayenta and Navajo. The Navajo resides on top of the Kayenta formation. Both formations have low water permeability through their pores, so ground water circulation is controlled almost entirely by bedding planes, truncation planes, and joints. These provide a ready passage for water. The eccentric stream erosion exposes the Kayenta formation about halfway down the canyon wall. Steeps and springs are abundant. Hanging gardens are also prevalent, attracted to the microclimates provided between planes.

The Navajo sandstone consists of uniformly well-rounded quartz sand cemented with iron oxide and calcium carbonate. The rock is softer than Kayenta. In addition, relief joints in the Navajo formation produce exfoliation, releasing pressure, and rapidly removing rock by erosion. The formations are characterized by joint-controlled rockfall, predominating over weathering as the primary erosive process. Hence, there are areas of known rockfall within the monument boundary, which may have an effect on placement of facilities.

For the most part, the exposed portion of the underlying Kayenta formation has a high bearing strength and is resistant to erosion. Because of this, it often forms ledges, caps,
The monument is an example of geologic diversity and unquestioned national significance. As an outstanding example representing a major stage of earth’s evolutionary history, Rainbow Bridge was nominated for status as a World Heritage Site. Geologic processes on view at the monument are wind and water deposition, consolidation, periods of deformation by folding, warping, and faulting, normal erosion, and accelerated erosion brought about by general uplift. The result of these processes is a river system deeply entrenched in the sedimentary rocks of the Colorado Plateau.

**Geologic Stability.** Rainbow Bridge was monitored for stability by the U.S. Bureau of Reclamation from 1974 through 1984 as part of the court settlement of a lawsuit contesting Bureau actions in allowing the reservoir waters of Lake Powell to enter the monument. The purpose of the monitoring was to detect any adverse effects on the stone arch caused by rising lake waters in the canyon beneath the arch’s foundation. Measurement was to detect any movement or shifting of the bridge structure.

The BOR report in 1985, which summarized the results of the ten-year study, indicated that no movement had been detected. Since the study, more modern equipment and techniques are now available and BOR continues the monitoring program, using improved techniques.

**Rockfall Hazard.** Erosion is a natural process throughout the monument but is accelerated by wave action, lake level fluctuations, and multiple trailing. Rockfall due to natural processes poses a threat to the safety of visitors. The photo on page 47 shows a rockfall at the monument dock area. Currently BOR makes an annual inspection of the monument for possible rock hazard safety problems.

"Numerous rockfall hazards exist to visitors of Glen Canyon National Recreation Area and Rainbow Bridge National Monument... Rockfalls are not unusual events along the shoreline and in the canyons surrounding Lake Powell... The creation of Lake Powell and later development of recreational opportunities on the lake have transformed rockfalls, which occurred in desolate canyon regions into life-threatening hazards to recreationalists, who now frequent these canyon areas." (Rockfall Hazard Report for Rainbow Bridge National Monument (RHR), BOR, 1988) The most common rockfall in the area occurs for stress relief on massive sandstone rock walls.

Two rock units associated with rockfall can be identified within the monument, 1) Exposed Kayenta formation sandstone in the inner channel of Bridge Creek Canyon that forms the foundation of Rainbow Bridge; 2) The Navajo sandstone formation exposed within the monument. Rockfall associated with the first area is considered low. Because of the Navajo formation’s tendency to develop stress relief joints, massiveness and exposed high vertical cliffs, the associated rockfall potential of the second area “is considered high to extreme in the monument.” (RHR, p. 3).

"Several rockfalls have occurred along Lake Powell shorelines that have caused loss of life to boaters... It is not feasible to provide complete ‘no risk’ protection from rockfalls platforms and benches, and can be considered fairly stable for construction purposes.
to visitors of the monument... mechanical stabilization or removal could be utilized on individual isolated slabs in areas determined of critical nature with some success." \( \text{(RHR, p. 4.)} \) The most cost effective way is to... utilize the strategic placement of visitor facilities with respect to the proximite of canyon walls and areas of recognized potential of rockfall hazard... to locate (when practical) trails and docks a safe distance from vertical walls." \( \text{(RHR, p. 4.)} \)

Specific recommendations made regarding rockfall by the BOR report include:

Strategic placement of visitor facilities is the most realistic, cost effective and aesthetically pleasing approach to achieving a reduction of potential rockfall hazards to visitors of the monument. Field review of the proposed and modification to existing facilities should be conducted during the planning and design phases of projects to ensure that geologic hazard considerations are incorporated.

Where potential rockfall hazards cannot be avoided, siting of facilities should be accomplished to minimize the duration of time visitors are exposed to a particular hazard.

Due to the ever-changing nature of the canyon walls, periodic field inspections should be made of existing visitor facilities to ensure that changes in geologic conditions do not unnecessarily place the monument visitor at risk.

The BOR would continue to perform established landslide and rockfall surveillance programs annually within the Rainbow Bridge National Monument and along Lake Powell's shoreline. In addition, the BOR would, upon request, continue to provide geologic and geotechnical assistance to the National Park Service.

Soils, Description. Fine sandy soils from the Entrada and Navajo geologic formations are most prevalent throughout the area with caliche and bentonite deposits occasionally found near the surface. Many visitors using the area immediately around Rainbow Bridge have created a network of paths or multiple trails. This has resulted in erosion, soil compaction, loss of vegetative cover, and mass wasting in sandy areas.

In areas near the bridge and shoreline where the trail is less defined, as much as a foot of the limited topsoil has been lost. Some places are worn down to the Kayenta formation bedrock with no soil left.

Impact of the Proposal.

Geologic Stability. The purpose of continued monitoring is to obtain a continuous record of the exact position of the arch and detect any shifting or movement caused by the reservoir or outside influences. Monitoring will also provide baseline data on the arch to permit evaluation of natural weathering and other processes affecting the span. The BOR's monitoring program would continue and the National Park Service would continue to cooperate with the BOR and its programs. There would be no effect as a result of these alternatives.
Impact on rocks, trails, and soil. Trails would be constructed in a manner that minimizes disturbed areas. All trails would be constructed in a manner that minimizes disturbed areas. A low-impact hardened trail system for visitors and to protect soil and vegetation resources is proposed for Rainbow Bridge.

Impervious surfaces would collect and divert precipitation to adjacent areas and would be constructed in a manner that minimizes disturbed areas. The runoff not collected and diverted to natural drainages could pour out on adjacent areas, increasing the local soil moisture regime. The increased runoff in these areas may result in some localized increases in erosion of sandstone. Altered vegetative composition would also create slight changes in soil chemistry. To the maximum extent possible, water runoff from impervious surfaces would be directed to natural drainages, minimizing the impacts of increased available moisture.

Soils in and around trails, congregating areas, and interpretive facilities could be affected by foot traffic. The primary impact on soils would be compaction, which would decrease permeability, locally alter the soil moisture and diminish the water storage capability. Direct impacts on soil in areas where visitors walk off trail surfaces would result in slower rates of water transmission within soils and increased runoff on the surface, increasing soil erosion. The trail system, capacity limits, and moderate level of visitor use would help mitigate some of these effects.

Impact of Alternative B.

Geologic Stability. This is the same as previously described under impacts of the proposal.

Rockfall Hazard. This is the same as previously described under impacts of the proposal. Decreased visitation would decrease the numbers of visitors exposed to rockfall.

Soils. Decreased visitor use would substantially reduce visitor-related impacts on
Impacts

Trample and compact large areas adjacent to the existing trail system. Compaction of soils in these areas would occur either deliberately or as a result of settling, due to the weight of material used on trails. Some additional site preparation on trails would require either minimal removal or addition of earth for leveling and destruction of the soil structure in the area of the trail. All trails would be constructed where the slopes are less than 15 percent, to minimize the soil erosion created by foot traffic. Trails with natural materials delineating areas of pedestrian traffic would encourage visitors to remain on trails. The trail system and low visitor use levels would reduce impacts to a minimum and protect soil and vegetation resources by guiding visitors to remain on trails.

Compacted surfaces would collect and divert precipitation to adjacent areas and would be constructed in a manner that minimizes disturbed areas. A small amount of runoff not collected and diverted to natural drainages could pour onto adjacent areas, increasing the local soil moisture regime. Previously disturbed areas would be planted with native seedling species to speed rate of recovery and minimize the potential for the encroachment of invading species. Minimal runoff in these areas could result in some localized erosion of sandstone. To the maximum extent possible, water runoff from compacted surfaces would be directed to natural drainages, minimizing the impacts of increased available moisture.

Soils in and around trails could be affected by foot traffic. The primary impact on soils would be compaction, which would decrease permeability, locally alter the soil moisture and diminish the water storage capability. The reduced levels of visitation is expected to result in a negligible amount of soil erosion.

Impacts of the No-Action Alternative.

Geologic Stability. The purpose of continued monitoring is to obtain a continuous record of the exact position of the arch and detect any shifting or movement caused by the reservoir or outside influences. Monitoring will also provide baseline data on the arch to permit evaluation of natural weathering and other processes affecting the span. The BOR's monitoring program would continue and the National Park Service would continue to cooperate with the BOR and its programs. There would be no effect as a result of this alternative.

Rockfall Hazard. None of the recommendations of the BOR report would be implemented and the threat to the safety of the visitors would not be reduced.

Soils. Because there are no defined edges for the existing trail system, the likelihood of keeping visitors on trails is low. Visitors would probably continue to trample and compact large areas adjacent to the existing trail system. Soil erosion would continue at an increasing rate.

Vegetation

Description. The monument is located within the Colorado Plateau primarily supporting desert-shrub vegetation. The plant communities are riparian (near the water), grassland, blackbrush, talus slope (sparsely vegetated shrubland growing on talus slopes), and hanging gardens (specialized wetland vegetation growing along seeplines). There is a wide diversity of plants in these communities due to the numerous micro-climates in the monument.

Within the canyon area, the effect of aspect and water is evident by the microclimates they create for plants. Vegetation within the monument area, which reflects the scarcity of rainfall, lies on the southern facing slopes and flat exposed areas of the inner Bridge Canyon. These include areas sparsely covered with saltbush (Atriplex confertifolia), blackbrush (Coleogyne ramosissima), bottlebusher (Eriogonum inflatum), prickly pear (Opuntia erinacea), and various grasses.

On northerly facing slopes and canyons, Utah juniper (Juniperus osteosperma), narrow leaf yucca (Yucca angustissima), rabbit brush (Chrysothamnus nauseosus), joint fir (Ephedra spp.), and a few squawbush (Rhus trilobata) can be found.

In narrow canyons protected from exposure that create microclimates on their own, Gambel's Oak (Quercus gambelii) and redbud are evident. Buffalo berry (Shepherdia rotundifolia), rabbit brush (Chrysothamnus nauseosus), Indian ricegrass (Oryzopsis hymenoides) are prevalent as dense undergrowth against canyon walls.

Where seeps in the sandstone exist, maidenhair ferns (Adiantum capillus veneris), monkey-flowers (Mimulus), mosses thrive. Moist drainage bottoms support cottonwoods (Populus fremontii) and reeds (Phragmites communis). Tamaskis (Tamarix ramosissima), an exotic species, is prolifically reproducing itself on the shoreline areas of Bridge Canyon. The photo on page 62 shows tamarisk near Rainbow Bridge.

Two definitive changes took place within the monument that were a direct result of the storage project - significantly increased visitor use and a change in the plant ecology of the area. Previously, the monument was accessed by land trails and was relatively isolated. With the lake inundation came increased access. Visitor use climbed to over 210,000 in 1987 and Rainbow Bridge became a major destination point for tourists. The water storage changed the ground water characteristics of the area, resulting in a later change in plant ecology. Exotic species like tamarisk, whose small seed is widely distributed by the wind, are now prolific along the shoreline of the monument.

Impact of the Proposal, Alternative A, and Alternative B. Two variables, use level and trail system, influence the probability of impact on vegetation. In all cases, the effects on vegetation should be minimal because visitors would be confined to a defined trail system. The question becomes how successful would each alternative be in
accomplishing this goal. The proposal with moderate use levels uses surfaces with natural materials to delineate areas of pedestrian traffic. Alternative A with increased use levels calls for a low-impact, hardened trail system, which would clearly mark edges of the trail. Alternative B with substantially reduced use levels like the proposal would also use surfaces with natural materials to delineate areas of pedestrian traffic. Because of the direct effect of decreased use, Alternative B would most likely have the greatest chance of success for mitigating vegetation trampling, followed by the proposal, and then Alternative A.

In Alternative A, precipitation that falls on impervious surfaces would not be absorbed. Where this runoff is not efficiently collected and diverted to natural drainage systems, it would pour into adjacent vegetated areas, which could alter the natural composition of vegetation.

Manual methods of scarification would be used for rehabilitation before planting seedlings in areas denuded of vegetation. This would minimize the overall loss of topsoil caused by development and encourage revegetation. During the recovery period for areas of existing trampled vegetation, the artificially seeded or replanted native vegetation would not be identical in composition to vegetation in adjacent areas.

Existing vegetation would also be impacted by the removal and continuing control of the exotic, Tamarisk (see Visual Resources for discussion).

Impact of the No-Action Alternative. Plants that invade disturbed areas would become more common. Increased erosion would lead to exposure of root systems and the later death of more mesic plants. Germination of some plant species may be inhibited by soil compaction resulting from foot traffic. The impacts of trampling would range from complete exclusion of vegetation to slight shifts in species composition. Tamarisk would eventually obstruct the view of Rainbow Bridge.

Flooding and Wetlands

Description. Appendix D, Flash Flood Mitigation Plan, describes the specific actions recommended by this plan. The main area of concern for the monument revolves around flash floods. The NPS final procedure for implementing E.O. 11988 and 11990 (45 Federal Register 35918 as revised by 47 Federal Register 36718) defines a "flash flood" as a flood in which the waters rise so rapidly there is insufficient time for warning and evacuation of persons threatened by the flood. When elevation levels for Lake Powell drop below the full operating pool of 3,700 feet, some of the monument is in a flash flood, high hazard area. The 100-year and 500-year flood elevations from Bridge Creek above the lake are estimated to be 7.5 and 10 feet above the bottom of the channel, respectively (memo and personal conversation, Smillie, 9/89). That area can be defined as the area of Bridge Canyon Creek immediately before entry to Lake Powell. The high hazard area is undeveloped and there are no structures or trails within the area, from which humans would seek shelter. Flash floods are most likely to occur during times of the highest visitor use, the summer thunderstorm season (memo, Smillie, 6/89).

Steps outlined in the Floodplain Mitigation Plan are based on information received from the Water Resource Division of the National Park Service (Smillie, memos, 6/3/89 and 9/89) that indicated a potential problem created by water from flash flood waters entering Lake Powell near Rainbow Bridge. This divided hazards from flood flows in Bridge Creek into three general areas: 1) above the lake; 2) a short reach near the terminus of the lake (transition area); 3) the lake beyond the transition area. The delineation of these areas will vary based on the elevation level at Lake Powell. At full operating level of 3,700 feet, the dock facilities would be located more than 2,000 feet from the end of the water channel. At lake elevation 3,650, some floating dock facilities could be located as close as 400 feet to the end of the water channel. For a full discussion on fluctuating lake levels see Water Resources.

For the area above the lake, analysis indicated that the trail that follows the creek was located on a bench well above the channel and is above the 100- and 500-year floodplains near Rainbow Bridge.

For the transition area near the terminus of the waters for Lake Powell, analysis indicated that the actual location at any time would vary according to fluctuating lake levels and flood magnitude. At normal levels, the transition area would include Rainbow Bridge itself and the existing floating walkway (memo, Smillie, 6/89). The transition area would be subject to water surface elevation increase, surface turbulence, and significant velocities. The walkway and any other facilities within the transition area would become unstable and could be torn from its moorings, making evacuation from the site dangerous. The transition area is not within the high-hazard flash flood area, but is subject to the effects of a flash flood. These factors need to be taken into account during the design of the facility's anchoring system.

For the lake beyond the transition area, analysis indicates little or no discernible water surface increase would occur and surface turbulence would be limited. The lake beyond the transition area is not within the high hazard flash flood area and is not subject to the effects of a flash flood although some surface waves may be present below the transition zone.

Although no wetlands are affected by any alternative, there are some areas that support perennial riparian species, such as the Phragmites and the hanging gardens described previously.

Impact of All Alternatives and the Proposal. None of the alternatives would affect the water resource values of the floodplain related to the natural moderation of floodwaters, maintenance of water quality, and groundwater recharge. There are no critical actions (fuel storage facilities, sewage treatment plants larger than 40,000 gallons-per-day [gpd], emergency clinics or hospitals, or areas that contain irreplaceable documents or objects) associated with any alternative.

There are no known secondary effects on floodplains or wetlands. A small amount of excavation material may be discharged when docks are anchored to land.
No developed areas are within the 100-year or 500-year floodplains. The existing land trail is outside of the 100- and 500-year floodplains. Dock facilities at the monument, however, are susceptible to wave surges caused by flash floods.

**Flash Floods.** When Lake Powell is at full operating pool (elevation 3,700 feet), flash flood areas are in the Bridge Canyon drainage, just outside the monument. When Lake Powell lake levels drop to 3,660 feet, the decreasing reservoir pool exposes land within the monument, flash flood areas increase, and flash flood areas move into the monument. All facilities are outside of the 100-year and 500-year flash flood areas, however, facilities on the water at Rainbow Bridge National Monument could be affected by wave surges created by flash floods. For that reason, a flash flood mitigation plan (Appendix D) was developed within NPS guidelines for compliance with Executive Order 11988 (Floodplain Management). Executive Order 11988 was developed "in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practical alternative," (E.O. 11988; 42 FR 26951).

Consistent with these guidelines the National Park Service has developed the following objectives (listed in priority order) for floodplain management at Rainbow Bridge: protect life, allow existing visitor use areas to remain open to the public wherever possible, and protect property.

Three types of floods are considered in the Appendix D—100-year, 500-year, and probable maximum flood (PMF). The 100-year flood is a flood that can be expected to be equaled or exceeded on average once every one hundred years. Floods of this magnitude occur frequently enough to pose a serious threat to all facilities and people. The area affected by a 100-year flash flood consists of facilities located in the transition zone defined above. In this area, estimates for the 100-year flood and 500-year flood are about 7.5 feet and 10 feet above the existing channel bottom, respectively (memo, Smilie, 9/89). Existing trails are located outside the area of 100- and 500-year floods.

The PMF is the largest flood that can ever be expected to occur in an area; however, these floods are rare, and their statistical probability of occurring is uncertain. No PMF is recorded for the area. Worst case estimates for the PMF and assumptions made by this plan are that all facilities are within the PMF. Actual delineation of the PMF will be done at the time of plan implementation. PMF limits will be used to set signing and provide visual information for a wayside exhibit.

The maximum number of persons who could be exposed to the effects of flooding is related to the carrying capacity of the monument -- 220 for the proposal, 390 for alternative A, 40 for alternative B, and unlimited for the no-action alternative, alternative C.

There are four components of the Flash Flood Mitigation Plan -- a wayside exhibit, additional signing, evacuation and emergency preparedness procedures and a warning system. Visitors would be alerted to evacuate by warning devices at the dock and signing at land trails within the monument. Signs and warning devices would be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. Additional signs would be added telling visitors in the flood hazard zones where to move in case of a flood. Evacuation and emergency preparedness measures would be identified for the monument. A warning system would be installed and would be in operation for the time for the area to be evacuated and loss of life prevented. Acceptable warning times would be determined at the time of system design by the National Park Service Fort Collins Water Resource Unit and safety officials.

**Water Resources**

**Description.** There are several specific water resource-related areas directly affecting this project: the fluctuating water levels of Lake Powell, affecting access, and potential pollution affecting water quality.

**Fluctuating Water Levels of Lake Powell.** The Colorado River Storage Project Act, which established Glen Canyon Dam and created Lake Powell, had significant effect on the Rainbow Bridge. The finger of Lake Powell that is located inside the monument area can fluctuate radically. Normal lake operating ranges are from between 3,490 and 3,700 feet in elevation. The minimum elevation for operation of power generating units at the Glen Canyon Dam is 3,490 feet. The maximum elevation is 3,711, and the minimum 3,370 feet above sea level (dead storage). The highest historical reading is 3,708.34 feet (July 1983). Lake levels are normally the highest in midsummer from spring runoff, and the lowest in March or April. Full operating pool is 3,700 feet, while normal low operating pool is 3,680 feet.

Fluctuating reservoir levels have a direct effect on this project from a land access and facility design standpoint. According to a Reservoir Level Probability Study done for Lake Powell in 1986, a typical year would draw the reservoir down to elevation 3,683 feet, a 17 foot vertical elevation drop from the normal operating level of 3,700 feet. A later study done in 1990 for projections from 1990 to 2067, indicated that 75 percent of the time the reservoir should remain above 3,630 feet and 64 percent of the time the reservoir level should exceed 3,650 feet (Sedimentation Report, 1990). Water levels are now below 3,650 feet and sedimentation produced by deposition and buildup of silt at the confluence of the stream and Lake Powell has now made it difficult to maintain fixed docking in the area.

Landform beneath the water is steep. Previous to the establishment of Lake Powell, Rainbow Bridge had been accessed by a land trail through Forbidding and Bridge canyons. The trail is shown in the photograph on page 59. Design of land-based trail facilities needs to accommodate land access from the monument dock during periods of low water levels.

The entry point to the channel from land can be anywhere between these two elevations. With a vertical drop of 50 feet (3,700-3,650), any land access from the dock area will require a landform that will accommodate side hill ramping on a 12 percent grade. At an elevation of 3,650 feet, this requires 416 feet of linear ramp to negotiate the grade. Facility design will need to consider these relationships.
A water level below 3,650 feet would require the use of the old land trail and would limit access to persons with disabilities.

Water Quality and Pollution. The water quality of the monument and Bridge Creek is monitored regularly and is considered good. No occasions of contamination have been found. The water on Lake Powell is usually of high clarity and quality and would be expected to meet standards for full-body contact sports, such as swimming and water skiing. Water near the dock area, however, is often times contaminated with fuel spills from outboard motors.

There are a few hanging gardens and one spring located in seeps associated with the Navajo sandstone of the monument. Water quality from Navajo sandstone is typically of good quality.

Impact of the Proposal, Alternative A, and Alternative B. Boat motors are the primary source of water pollution. The most significant source of pollution by motors is caused by leakage of oil and gas through the crankcase. A small fraction of nonvolatile hydrocarbon is not removed by evaporation from water exposed to submerged, two-cycle engine exhaust emissions. Reducing water pollution at the monument is dependent upon the number of boats entering the monument. The proposal upon implementation of the NPS shuttle would reduce water pollution the most by limiting access to the monument to the least number of boats. Alternative A with the least regulation of boat numbers would mitigate the impact of water pollution substantially. Alternative B would also reduce water pollution substantially by limiting the number of boats accessing the monument.

Based on estimates described above for fluctuating water levels, there is a 36 percent chance of future lake levels eliminating land access for persons with disabilities, where lake levels drop below 3,650 feet. In addition, estimates indicate a projected decline in Lake Powell water levels beyond year 2000.

In low-water years (lake elevation between 3,490 and 3,650 feet), primary access to the monument would be the now submerged, old land trail through Bridge Canyon. At the time of this writing water levels have dropped to within this range and the dock is now located outside of the monument boundary. The effect of this has been that it has eliminated access for persons with physical disabilities and has made fixed docking locations impractical.

Construction activities may cause a temporary increase in erosion, increasing turbidity. The amount would be minimal in comparison with the yearly effects of spring runoff.

There are no water developments proposed.

Impact of the No-Action Alternative. Based on estimates described above for fluctuating water levels, there is a 10 percent chance of future lake levels eliminating land access for persons with disabilities, where lake levels drop below 3,650 feet. No viewing of the Rainbow Bridge would be provided for persons with disabilities if the lake elevation dropped below 3,650 feet. In addition, estimates indicate a projected decline in Lake Powell water levels beyond year 2000, but based on topographic data, there is no indication that docks within the monument boundary would ever sit on dry land.

In low-water years (lake elevation between 3,490 and 3,650 feet), access to the monument would have to be via the now submerged old land trail through Bridge Canyon. The courtesy docks would be moved along this trail to a location where adequate water access is feasible. Should this occur, some erosion may result, producing a small amount of sediment.

There are no water developments within the monument. Water pollution from boat motors would continue.

Air Quality

Description. Rainbow Bridge is established as a Class II Federal air quality area. The air quality of the area was monitored before the start-up of the Navajo Generating Station in Page, Arizona. Page was identified as a rural industrial area for Total Suspended Particulates (TSP) because it previously had violations and it contained major industrial development (Navajo Generating Station).

Air quality studies began in 1972 for the Lake Powell region. This data was used as background data for future monitoring and indicated that local air quality was excellent (Walter et al., 1977). TSP monitoring indicated violations of the National Ambient Air Quality Standards for particulates in 1976 and 1977, which were apparently due to construction activity in Page. Page is classified as an attainment area for all regulated air pollutants, including particulates.

The average visibility described in 1974 as "excellent" (about 125 miles) is now noticeably less. The NPS in cooperation with other state and federal agencies and private industry has developed an extensive monitoring plan for gaseous and particulate constituents of the atmosphere. Research objectives include an in-depth analysis of the regional airshed and the identification of emission sources.

Impacts of the Proposal, Alternative A, and Alternative B. The improvement of the existing land trail to a low-impact trail, would reduce dust levels through surface improvements and by helping to confine visitors to a defined trail system. Construction activities temporarily increase the amount of particulates in the area.

Impacts of the No-Action Alternative. Vegetation along existing dirt trails is subject to the adverse effects of dust generated by heavy visitor foot traffic. Vegetation adjacent to the existing land access trail could be covered with dust and eventually die. In some areas this, as well as off-trail visitor traffic and trampling, has resulted in large areas being stripped of vegetation. Dust problems would remain under the no-action alternative.

Noise

Description. Noise levels can affect natural resources as well as archeological sites.
They can also interfere with visitor experience. Records show that an increasing number of people under the bridge increases the sound level in the area.

Information obtained in 1986 and 1989 on noise is relevant to problems identified at Rainbow Bridge. According to a National Park Service Noise Level Monitoring program done in 1986, visitor activity results in the greatest auditory threat to the monument. Noise levels from aircraft, boats and visitors, as well as the types of aircraft and boats with their direction of travel, approximate altitude of aircraft, and time of observation were recorded. Noise level readings from aircraft varied from 51 to 70 decibels, averaging 61.3. Tour boat horns and tour/houseboat motors registered the loudest noise of 78 and 74-72 decibels, respectively. Noise levels were associated with activities not considered appropriate in the monument area. Of particular relevance is the fact that when 80 or more people were under Rainbow Bridge, decibel levels reached 79. This can be compared to a decibel level of less than 35, when less than 20 visitors were under Rainbow Bridge.

Noise level monitoring done in 1989 by the NPS indicated that background noise at Rainbow Bridge was relatively low, generally ranging from 20-35 decibels. The data clearly shows that the increased noise levels occur in patterns that are discernable when boats are on Lake Powell.

**Impact of the Proposal, Alternative A, and Alternative B.** Two variables contribute to noise at the monument, boats and visitors. Boat motors are the primary source of noise. The proposal, upon implementation of the NPS shuttle, would reduce boat noise the most by limiting access to the monument to the fewest boats. It would also reduce noise produced by visitors through interpretive programs and increased visitor compliance. Alternative A, with the least regulation of boat numbers would mitigate the impact of boat noise and reduce noise produced by tourists through interpretive programs and increased visitor compliance. Alternative B would also reduce boat noise substantially by limiting the number of boats accessing the monument. Because this alternative allows use of the monument by the fewest visitors, it would probably also result in the greatest reductions in noise produced by visitors.

**Impact of the No-Action Alternative.** Visitor conflicts would continue to occur. Noise from tour boats and visitor distribution of 80 persons or more under Rainbow Bridge would continue.

**Wildlife**

**Description.** Animal life is typical of a semidesert climate. Mule deer, coyote, and gray fox range widely throughout the area and use the monument. Jackrabbit, birds, rodents, and reptiles inhabit the monument. Fish species are extensive throughout Lake Powell and in Bridge Canyon. The fish species in the monument include striped bass, crappie, largemouth bass, carp, and bluegill. Fishing is not allowed in the monument.

**Impact of the Proposal, Alternative A, and Alternative B.** By restricting visitors to trails, there would be a reduction in disturbance to wildlife.
Impact of the No-Action Alternative. There would continue to be some human disturbance to wildlife due to unrestricted access of the monument by visitors. Existing conditions at the monument would remain unchanged.

Threatened and Endangered Species

Description. According to the U.S. Fish and Wildlife Service (9/15/89), the endangered bald eagle (Haliaeetus leucocephalus), the endangered peregrine falcon (Falco peregrinus anatum), the endangered humpback chub (Gila cypha), the endangered bonytail chub (Gila elegans), and the endangered Colorado squawfish (Phrychocheilus lucius) are found in Glen Canyon National Recreation Area.

According to the U.S. Fish and Wildlife Service (9/15/89), current candidate species that could occur within the planning area are the ferruginous hawk (Buteo regalis), the western yellow-billed cuckoo (Coccyzus americanus occidentalis), and the razorback sucker (Xyrauchen texanus). According to park biologists, none of these have been recorded in the monument area. In addition, although there are no endangered, threatened, or rare plant species in the monument, Primula speculica, (primrose family) exists in the monument. It is considered as a 3(C) category by the U.S. Fish and Wildlife Service. (3(C) is a category used for plants that have been determined to be too widespread, or lack sufficient threats to warrant further consideration under the Endangered Species Act.)

According to park biologists, two endangered species, the peregrine falcon and the bald eagle use the monument. In 1989, a pair of peregrine falcons established an aerie near the arch during their nesting season and bald eagles use the monument area in the winter. The Navajo Mountain vole is known to occur nearby at an elevation of 10,000 feet elevation. Currently, it is not known to inhabit the monument. Monitoring for endangered, threatened, and rare species is carried out on a continuing basis by park staff.

Park biologists indicate that no humpback chubs, bonytail chubs, or Colorado squawfish are known to exist within the monument. While the squawfish need variable flows, high silt loads and turbulence. Neither is present at Rainbow Bridge, so the likelihood of finding these species in the future is small. Presence of the razorback sucker has never been recorded at Rainbow Bridge. Both the yellow-billed cuckoo and the ferruginous hawk are transient and could inhabit the monument; from time to time. The cuckoo's habitat includes wood and bushes especially during tent caterpillar outbreaks. The hawk feeds entirely on rodents. Neither have been sighted at the monument, but biologists indicate there is a need to monitor for all endangered and candidate species. This action is recommended for all alternatives as part of the RMP (Appendix G).

Impact of All Alternatives and the Proposal. Trails, visitation, and other evidence of human presence have existed since the creation of Lake Powell gave access to Rainbow Bridge. Nesting activity for peregrine falcons is being monitored. Future conflicts could arise with eagles or peregrine falcons. If use did interfere with either species, areas in conflict with visitors would be closed to avoid affecting endangered populations.

Based on current indications and actions outlined in all alternatives and the proposal, the park has determined that these alternatives would have no effect on the endangered bald eagle, endangered peregrine falcon, the endangered humpback chub, the endangered bonytail chub, or the endangered Colorado squawfish. The need for establishment of a monitoring program is part of the proposal and all alternatives. The National Park Service will seek concurrence with the U.S. Fish and Wildlife Service on their finding of no effect.

SOCIOECONOMIC ENVIRONMENT

Regional Economy

Description. Tourism to Lake Powell and Rainbow Bridge contributes to the Page, Arizona, and Southern Utah economy. Tourism is a major element of regional economy. Page. Page is located approximately 40 miles southwest of Rainbow Bridge. "Lake Powell, the Navajo Generating Station, and tourism are major economic factors in Page. . . . Tourism and recreation to date have created a demand for a wide variety of consumer goods and services. Therefore, 70 percent of the employers are in the retail trade and services sector, with over 50 percent of the total employed." (Community Profile, Page, Arizona, Department of Commerce.) The community relies heavily on tourism for the retail trade. Taxable sales grew 20 percent between 1986 and 1988.

Utah. Visitors from out-of-state contributed more than $1.5 billion in 1986 with 25 percent of the expenditures on food and 25 percent on public transportation. Travel expenditures generated $425 million in wages and salary and more than 47,000 jobs. This accounted for $82 million in state tax revenue and nearly $28 million for local governments (The Utah Tourism Study, Executive Summary, 1987). Lake Powell, Rainbow Bridge, and the tourism generated by recreational facilities is important to the economy of Utah.

Impact of Alternative A, Alternative B, and the Proposal. Providing a quality recreational experience of Rainbow Bridge National Monument, one that would be remembered, could help increase recognition of the heritage this area can provide and protect the recreational value of the monument. In turn, this would contribute to growth in the tourism-dependent economies of southern Utah and Page, Arizona, by protecting the true value of the monument, and insuring the continuance of Rainbow Bridge as a special place. The Proposal provides for the most improvement of the monument's value by providing management allowing for slight increases in visitation, a broad range of visitor experience, and protection of monument resources, while alternative B provides the least. Alternative A provides for the most improvement in most visitation, but the subsequent increases in infrastructure requirements to protect monument resources diminishes the special importance of Rainbow Bridge and limits recreational opportunities to the urban/natural spectrum (see carrying capacity). Alternative B is the most restrictive, substantially reducing visitation to Rainbow Bridge. While this protects the values of the monument, it would require 150,000 to 200,000 visitors be turned away from the monument each year.

Page. Page is located approximately 40 miles southwest of Rainbow Bridge. "Lake Powell, the Navajo Generating Station, and tourism are major economic factors in Page. . . . Tourism and recreation to date have created a demand for a wide variety of consumer goods and services. Therefore, 70 percent of the employers are in the retail trade and services sector, with over 50 percent of the total employed." (Community Profile, Page, Arizona, Department of Commerce.) The community relies heavily on tourism for the retail trade. Taxable sales grew 20 percent between 1986 and 1988.

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Impact of Alternative A, Alternative B, and the Proposal. Providing a quality recreational experience of Rainbow Bridge National Monument, one that would be remembered, could help increase recognition of the heritage this area can provide and protect the recreational value of the monument. In turn, this would contribute to growth in the tourism-dependent economies of southern Utah and Page, Arizona, by protecting the true value of the monument, and insuring the continuance of Rainbow Bridge as a special place. The Proposal provides for the most improvement of the monument's value by providing management allowing for slight increases in visitation, a broad range of visitor experience, and protection of monument resources, while alternative B provides the least. Alternative A provides for the most improvement in most visitation, but the subsequent increases in infrastructure requirements to protect monument resources diminishes the special importance of Rainbow Bridge and limits recreational opportunities to the urban/natural spectrum (see carrying capacity). Alternative B is the most restrictive, substantially reducing visitation to Rainbow Bridge. While this protects the values of the monument, it would require 150,000 to 200,000 visitors be turned away from the monument each year.
Impact of the No-Action Alternative. Continued deterioration of the natural and cultural resource attractions provided by Rainbow Bridge could decrease visitation to the area. Within the context of the broader regional economy, the effect would be small.

Visual Resources

Description. The preservation of the natural scene is a primary natural resource objective. The presence and continued expansion of tamarisk, shown above threatens to impair this natural scene. The growth of tamarisk along the trail from the floating walkway to the bridge obscures photo opportunities, causing visitors to leave the path to get a clear photograph of the bridge. By leaving the path, visitors accelerate the soil compaction problem and damage the native vegetative cover.

Impact of the Proposal, Alternative A, and Alternative B. The use of low-impact trails, no development under Rainbow Bridge, and the selective or complete removal of tamarisk called for in these alternatives would help to insure the preservation of a natural scene.

Impact of the No-Action Alternative. If left unchecked, as would be the case in this alternative, tamarisk could eventually block the view of the bridge from the current viewing point. In addition, continued trailing and erosion with undefined trails will continue to mar the natural scene.

Visitor Experience and Use, Concession Tour Boats, and Economic Feasibility of Shuttle Transportation

Description. Incorporating elements of recreational experience helped to define the alternatives presented in this document. Carrying capacity in Appendix A defines the elements necessary in determining different levels of visitor experience—1) Urban/Natural-Sights and sounds of humans are dominant, no opportunity to experience natural quiet or tranquility; 2) Rural/Natural-Limited opportunity to experience natural quiet or tranquility; and 3) Semiprimitive—Predominantly isolated from the sights and sounds of humans, opportunities to experience natural quiet and tranquility may be attained.

The Colorado River Storage Project Act (Public Law 84-485, 70 Stat. 105, April 11, 1956) changed the way Rainbow Bridge was accessed from land to water, connected it to the recreation area, and, in time, significantly increased visitation because of easier access. Today’s visitor is more oriented to water-based recreation and sightseeing than to the special importance of the monument. Boat and visitor use has increased in an uncontrolled manner in the physically limiting space of narrow canyons. Modern day uses of Lake Powell have led to an unregulated urban/natural recreation experience for most visitors and brought about current resource impacts. Management to either increase development to protect resources or decrease the number of visitors to more moderate levels has been analyzed within the document to protect natural and cultural resources at the monument.

In addition, the landform and the linear trail system that characterizes the monument further restricts its use. Although the Rainbow Bridge National Monument comprises about 160 acres, the space directly accessible by the public and from where Rainbow Bridge can be viewed and appreciated by visitors comprises less than one percent of monument’s total area. The linear relationships of the narrow canyon walls and viewing points within this area limits use of the monument. The actual physical capacity for this area to hold people and boats at any one time is one element analyzed in the carrying capacity study.

Visitor use at Rainbow Bridge has shown significant increase in recent years, peaking in 1986 at 285,000 visits, ending 1987 at 210,000 and 1988 at 238,000. Peak use season is April through October. Monthly peaks have reached as high as 65,000 visits (July 1986) or about an average of 270 persons at one time during an 8-hour operational period. Figure 2 (page 64) illustrates total yearly visitation for each year from 1979 to 1988. The park’s seasonal visitation pattern has marked a dramatic increase from winter to summer, going through about a 200 percent increase from January to August. Figure 3 (page 64) illustrates total visitation for each month in 1988. Figure 4 (page 65) uses linear regression analysis to project visitation through the year 2000 based on past visitation from 1979. This indicates that if present trends continue, visitation would approach 450,000 by the year 2000.
Table 2, shows passenger breakdown for concession tour boat operations run to Rainbow Bridge for 1987 and 1988 seasons. Currently, there are no restrictions on the number of tour boats at the monument at any one time.
A subsidy required upon implementation of a shuttle is estimated between $20-$25 per ticket over a 10 year period. Estimates indicate (DGMP/EA, 1990, pp. 80-87) ticket prices of between $4 to $8 could be charged for a shuttle to recover costs and sustain operations. Variables examined in determining estimates were numerous and there is a strong likelihood there would be a decrease in visitation upon implementation of a fee. Phase II of alternative A included the requirement of the shuttle system. The amount of completion of a market study to determine initial pricing and, if necessary, the amount of subsidy required could be to support the pricing structure and visitation levels displayed for a shuttle system.

The monument would accommodate up to 390 people-at-one-time with 50 percent of the capacity supplied by tour boats. Controlled and intensive interpretive programs would emphasize personnel services to sensitize visitors to the significance of Rainbow Bridge. Native American opportunities would be provided during off season and low use periods.

Impact of Alternative B. Because of restrictions on use, visitor experience would be restricted to a primitive/natural recreation opportunity. No other recreational opportunities would be accommodated. Visitors to the monument would have their group experience improved. Existing use levels would not be accommodated. Estimates indicate alternative B would require that 150,000 to 200,000 visitors be turned away from the monument each year. Existing tour boat operations would be severely curtailed.

The monument would accommodate up to 40 people-at-one-time. Interpretation would be minimized. The emphasis would be on visitor self-reliance. Native American opportunities could be provided all season long.

Impact of the No-Action Alternative. Visitor experience would continue in an unregulated urban/natural environment.

Visitor Safety

Description. According to a summary of visitor safety for 1988 submitted by park staff (Visitor Safety Summary, Glen Canyon NRA staff, 1988), there were a variety of visitor safety or law enforcement incidents. These occurred within the monument and are investigated by park rangers. Incidents vary from the need for minor medical assistance to boating accidents. The predominant visitor safety problem was swamping of smaller boats caused by larger boats going too fast within the narrow channel, causing large wakes. Incidences of private rental boat operators also creates a problem. Additionally, a potentially hazardous environment for loading and unloading passengers. The predominant visitor safety problem was swamping of smaller boats caused by larger boats going too fast within the narrow channel, causing large wakes. Incidences of private rental boat operators also creates a problem. Additionally, a potentially hazardous environment for loading and unloading passengers. The predominant visitor safety problem was swamping of smaller boats caused by larger boats going too fast within the narrow channel, causing large wakes. Incidences of private rental boat operators also creates a problem. Additionally, a potentially hazardous environment for loading and unloading passengers.

In addition, categories previously mentioned that can affect visitor safety include rockfall...
Indians.

Impact of the Proposal. Upon implementation of the shuttle/reservation system, regulation of boating within the channel during peak season, regulation of access in accidents. Increased management of visitors, visitor awareness and staffing at the monument should reduce the potential for accidents.

Impact of Alternative A and Alternative B. A wakeless zone would decrease the potential for accidents and increase visitor safety. Increased visitor awareness and staffing at the monument should help reduce it as a potential for accidents.

Impact of the No-Action Alternative. The potential for accidents would remain.

CULTURAL RESOURCES

Archaeological Resources

Description. There are two aspects to cultural resources within Rainbow Bridge—its importance from an archeological standpoint and its importance to living American Indians.

Archeological Resources. Detailed archeological investigations were not made until the 1950s. Surveys done between 1952 and 1956 recorded 11 prehistoric sites located near Rainbow Bridge. Most were small habitation dwellings. Two sites were excavated in the 1950s.

In 1985, archeologists from Northern Arizona University (Archeological Survey in the Glen Canyon National Recreation Area: Year 1 Descriptive Report, 1984-1985) intensively surveyed 100 acres of the monument. As a result of this survey, eight archeological sites (42SA17328 through 42SA17335) and three isolated finds (IF-UT-V-13-007 through IF-UT-V-13-009) were recorded in a 70-acre area of the monument. Of the eight sites recorded, six of the sites are thought to be eligible for inclusion on the National Register of Historic Places according to the criteria in 36 CFR 60.4. Some of these sites are readily accessible to visitors at the monument and their locations will have a bearing on placement of facilities and regulation of visitor use. The 60 acres on the cliff tops of the monument still need to be surveyed, but are outside of the area where trails and other facilities exist, or are proposed.

Structures are defined as works of humans consciously constructed to serve some form of human activity. The structures are usually immovable by nature or design. There are no structures in the monument. Physical remains of early historic use along the Colorado River have all been inundated by Lake Powell. Physical remains of the Rainbow Lodge, and other structures along the Rainbow Trail are located outside of the monument. However, numerous early registers from the lodge are currently in possession of the park. Plaques dedicated to the "discovery" party have been placed along the trail within the monument boundary.

Museum Collections. Glen Canyon NRA has a small collection of historic photographs and documents about the history of Rainbow Bridge and its visitors. The Rainbow Bridge photographic collection needs to be organized and cataloged and segregated from the Glen Canyon collection. The majority of the documents have already been cataloged and approximately 20 historic documents about Rainbow Bridge are currently stored as museum objects.

The photographic collection is currently located at the Wahweap District Ranger's office and is in fair condition. None of the collection is stored in compliance with Special Directive 80-1, and it is expected that substantial deterioration of the photos will be revealed when they are finally examined and their storage is upgraded. The historic documents range in condition from poor to good.

A Scope of Collections Statement also needs to be prepared to identify possible additions to the Rainbow Bridge museum collection. It is probable that the need for acquisition of historic and ethnographic documents, files, and historic photographs will be identified.

Ethnographic Overview. Ethnographic resources, in this context, are defined as park resources, that have traditional subsistence, sacred ceremonial or religious, residential, or other cultural meaning for members of contemporary park-associated ethnic groups, including American Indians.

Rainbow Bridge is important to some Indians, especially the Navajos of the Navajo Mountain Chapter, for traditional and ceremonial rites. Some twentieth-century Navajos and San Juan Paiutes, influenced by the Navajos, consider Rainbow Bridge to be a sacred place. There is evidence that veneration of Rainbow Bridge is an elaboration of a traditional Navajo attitude toward all natural arches and bridges.

The monument is occasionally used by members of the Navajo Tribe for religious ceremonies near the bridge. Surveys were taken by Glen Canyon NRA staff during 1988 to study the significance of the area to Indian people and inventory contemporary uses. The surveys were confined to present and former residents of the Navajo Mountain Chapter of the Navajo reservation. Most Navajos visit the bridge using the natural land trail either on foot or on horse. Since the Navajo culture considers itself to be living with nature, all things that nature has made are considered sacred. For Indians, Rainbow Bridge should be kept in as much of a natural setting as possible. Known in the Navajo tongue as Tsi-Na-Ne-Ah (meaning arch rock or rock bridge), Rainbow Bridge is considered to be the most significant of natural bridges in the area due to its relationship and western proximity to Navajo Mountain. Ceremonies are private and passed on from generation to generation. Additional ethnographic study is needed to better understand the religious significance to and traditional uses of the monument by American Indians.
There is the potential for visitor use to conflict with religious ceremonies in the immediate area of the bridge. In 1981, the Tenth Circuit Court of Appeals rendered an opinion in favor of the United States in Lamar Badoni, et al., v. R. Keith Higginson, 10th Cir. No. 78-1517, turning down plaintiff's contention that tourists were desecrating American Indian sacred sites and preventing them from accessing these sites so they could conduct religious ceremonies. Because of the private nature of ceremonies, the exact religious significance of the bridge to American Indians has never been clear to non-Indians. Regardless, the National Park Service must manage the monument in such a manner that it does not interfere with an Indian group's use of traditional sites or sacred objects.

Impact of the Proposal, Alternative A, and Alternative B. The construction of surfaces defining pedestrian traffic areas could destroy currently unknown archeological resources if inadvertently unearthed during construction. The likelihood of this happening will be minimized through mitigation measures described in the proposal. Construction activities would affect the uppermost layers of the earth as machines compact the soils and alter the horizontal and vertical distribution of buried archeological remains. These activities could also destroy surface sites by damaging and destroying artifactual remains and their contextual environments.

Cultural resource sites would be maintained and preserved. Cultural site maintenance management would restrict visitor access to the defined low-impact trail, and provide maximum interpretation and enforcement via ranger presence during normal hours of operation at the monument. In all alternatives Indian rights would be considered in management of the monument.

Impact of the No-Action Alternative. Cultural resource sites would continue being disturbed and damaged through unrestricted access by visitors. Visitors could continue to climb, touch, and degrade petroglyphs on canyon walls. Although Indian access is maintained at the monument, no specific recognition of the importance of Rainbow Bridge to the Navajo Tribe has been made.

Currently unknown archeological resources adjacent to, or easily accessible from, active recreational areas would be vulnerable to surface disturbance, inadvertent damage, and vandalism. A loss of the surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence would result. Resources in these areas could be vulnerable to both inadvertent disturbance and deliberate and illicit disturbance in the form of digging and collecting of archeological materials.

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>PROPOSAL</th>
<th>ALTERNATIVE A</th>
<th>ALTERNATIVE B</th>
<th>NO ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology and Soils</td>
<td>Monitoring - would continue - No Effect</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
</tr>
<tr>
<td>Geologic Stability</td>
<td>Reduction of risk to visitors from buried water table</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
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<tr>
<td>Rockfall Hazard</td>
<td>Small increase in the number of visitors</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
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<tr>
<td>Silt</td>
<td>Temporary effects from construction</td>
<td>Substantial increase in the number of visitors</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Reduction in vegetation by compacting of a trail with natural surfaces</td>
<td>Substantial decrease in number of visits</td>
<td>Same as proposal</td>
<td>No Effect</td>
</tr>
<tr>
<td>Flood Plains and Reaches</td>
<td>No developed areas in 100,000-year floodplain</td>
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<td>Same as proposal</td>
<td>Same as proposal</td>
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<tr>
<td>Flash Floods</td>
<td>Reduction of risk to visitors from flash flood</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
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<tr>
<td>Water Resources</td>
<td>34% chance of enormous destruction due to sediment blocking drainage, may flood rock location during periods of low yield</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
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<tr>
<td>Water Quality and Pollution</td>
<td>Temporary increases in contamination-water quality would continue</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>No effect</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Reduction of salt levels at the mouth of the park</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
</tr>
<tr>
<td>Noise</td>
<td>Boat and visitor noise would be reduced slightly</td>
<td>Same as proposal</td>
<td>Same as proposal</td>
<td>No reduction in boat and visitor noise</td>
</tr>
</tbody>
</table>
Cultural Resources

Protection of the monument as a special place where prior activities are inconsistent with a range of recreation opportunities.

Visual Resources

Preservation of the natural scene. Upon implementation of the shuttle, substantially less recreation area would be present.

Visitor Use/Experience

Visitor experience would be reduced and congestion improved.

Cultural Resource Sites

Protection of the monument as a special place would reduce the potential for cultural resource sites to be damaged.

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Cultural Resource Sites

Protection of the monument as a special place would reduce the potential for cultural resource sites to be damaged.
the planning project and soliciting public input. The scoping brochure was released in December of 1988. Comment time allowed for public input on the initial issues outlined in the scoping brochure was 30 days. Responses were received and incorporated into planning for this project and were considered during the formulation of alternatives. Consultation with concessioners, the Navajo Tribe, and other federal/state agencies has also taken place.

In September 1990, the National Park Service distributed the Draft General Management Plan, Development Concept Plan, Resource Management Plan, Interpretive Prospectus and Environmental Assessment (GMP/EA) for Rainbow Bridge National Monument. The GMP/EA presented a proposal and three alternatives for addressing issues and mitigating impacts on the environment. Representatives of National Park Service met with concessioners, the Navajo Tribe, and other federal/state agencies during the 90-day review period. A total of 86 comments were received. As a result of substantive public comment, the National Park Service has chosen to reassess the range of feasible alternatives presented and reissue the GMP/EA. The reassessment is contained within this document.

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REFERENCES

BUREAU OF RECLAMATION, U.S. DEPARTMENT OF INTERIOR


1986 Reservoir Level Probabilities for Lake Powell, Colorado River Storage Project. Memorandum to the Superintendent, Glen Canyon National Recreation Area from Regional Director, Bureau of Reclamation.


MISCELLANEOUS


NATIONAL PARK SERVICE, U.S. DEPARTMENT OF THE INTERIOR


1981 Memorandum to Director, National Park Service from Assistant Solicitor, Parks and Recreation opinion rendered on Lama Badoni, et al., v. R. Keith Higginson, 10th Cir. No. 78-1517.


1988 Staff Survey of Use at Rainbow Bridge. Glen Canyon National Recreation
Area. National Park Service.


STATE OF ARIZONA

1989 Community Profile, Page. Arizona Department of Commerce.

STATE OF UTAH

1987 The Utah Tourism Study, Executive Summary. Prepared for the Utah Travel Council. Salt Lake Convention, and Visitor Bureau by the U.S. Travel Data Center, Dan Jones and Associates, Bureau of Economic and Business Research of the University of Utah, RL Associates, and Grant and Associates.

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1978 Geologic Analysis of Rock Deterioration at Selected National Park Service Archeological Sites, Rock Motion Hazard. Wachter, Bruce G., Western Archeological Center, Tucson, Arizona.
CARRYING CAPACITY FOR RAINBOW BRIDGE NATIONAL MONUMENT

Carrying capacity alone will not solve the problems of the monument. The establishment of carrying capacity is important only when part of a broader solution, as defined within the context of the planning alternatives. When part of a broader solution, carrying capacity is important for controlling adverse impacts to natural and cultural resources from too much visitor use and improving the recreation experience of the monument visitor.

Carrying capacity for the monument relies on extending the techniques used for determining Lake Powell’s carrying capacity – Recreation Opportunity Classes (source: The Carrying Capacity of Lake Powell -- A Management Analysis of Capacity for Boater Recreation, November 1987, NPS (ROS)). Five levels of experience opportunities were described—primitive, semiprimitive, rural/natural, urban/natural, and urban. The primitive spectrum does not apply to Rainbow Bridge because of the associated sights and sounds of humans and support facilities. The urban class does not apply because this class would violate NPS management objectives regarding levels of use and physical settings for Rainbow Bridge. The three remaining experience levels were used to help set the parameters in determining the carrying capacity at Rainbow Bridge—semiprimitive, rural/natural, and urban/natural.

To determine boating capacity, the Lake Powell study (ROS, p. 42) used a limiting factor method in various lake zones. This included physical, safety, water quality, shoreline impacts (biological), and social capacity (recreation experience) factors. Each factor provided a maximum limit for number of boats at one time. The most limiting factor became the constraint chosen for the zone.

When applied to Rainbow Bridge, the physical, safety, water quality, and biological carrying capacity factors were all considered with specific mitigation and management measures included with each alternative. Persons-at-one-time (PAOT) was found to be more applicable to use than boats-at-one-time. The following rationale illustrates how carrying capacity factors were considered.

The physical factor and carrying capacity limit is described in the 1990 Draft General Management Plan, Development Concept Plan, Resource Management Plan, Interpretive Prospectus and Environmental Assessment (DGMP/E), Appendix A. This is the maximum capacity of the monument docks and trails, 390 PAOT. This limit was approached within the alternative containing an urban/natural experience level.

The safety factor is concerned with boater safety in Forbidding Canyon. It is addressed in the proposal and alternative mitigation measures, which include a wakeless zone, a contact station at the mouth of Forbidding Canyon controlling access to the canyon for the purpose of ingress and egress to Rainbow Bridge, a shuttle, and a reservation system. A contact station near the mouth of Forbidding Canyon along with the reservation system would regulate use.

Monitoring completed for the 1987 carrying capacity found water quality degradation was created by human waste on the shoreline and in the lake. The water quality factor is addressed in the proposal as are alternative mitigation measures that would provide public rest rooms. It is also being addressed in other operational aspects of Glen Canyon such as the use of self contained boats.

The biological factor is related to vegetation trampling, soil erosion, and associated sedimentation. It is addressed in the proposal and alternative mitigation measures including trails with natural surfaces to delineate areas for pedestrian traffic, enforcement measures to confine visitors to designated trails, increasing trail infrastructure (congregating areas and trail type) with a corresponding increase in use, personal services/interpretation, and providing a monitoring program. The mitigation measures consider the desert environment, the physical limits of useable terrain within the narrow canyon, and the highly erosive nature of sandstone soils. For further discussion see the environmental consequences for each alternative.

The remaining factor, social, considered semiprimitive, rural/natural, and urban/natural experience opportunities. This factor was found to be limiting and used to set management parameters and carrying capacity for each alternative. The criteria, listed below, were used to determine alternative parameters as well as carrying capacity. These consider desired future condition and recreation experience opportunity for visitors.

The determination of number of visitors associated with each recreation experience class is based on professional judgement, personal observations, and research displayed in Visitor Impact Management (VIM), A Review of Research, 1990. It should be noted from the literature that carrying capacity numbers are not exact and may vary greatly even within a single social setting. Carrying capacities are an approximation of limits that would be approached under a prescribed management scenario while still maintaining a particular recreation experience opportunity.

Visitor surveys conducted in 1989/1990 at Rainbow Bridge revealed that the party size for private boats ranges from 7 to 8 visitors. The review of research (VIM, pp. 212-213) provided a synopsis of previous studies using visitor encounter norms. These studies ranged from backcountry wilderness areas to river users and white water rafters. It also included boaters and number of boats seen. In semiprimitive backcountry areas the median acceptable encounter level ranged from 2.5 to 8.5 for backpacker parties. For the purposes of our analysis, a median acceptable encounter level of 5 was used. As the plan is implemented, encounter levels and their effects on experience levels need to be monitored to confirm or refute the encounter levels prescribed by the plan.

The VIM study also included median encounter levels for more developed areas — areas receiving more substantial use. These levels ranged from 25 to 50 parties seen or encountered on a trip. As is the case with semiprimitive, the area will be monitored to confirm or refute the encounter level prescribed.

For the urban/natural experience level, capacity is governed by the space requirements and the physical capacity of the monument. A detailed study was provided in Appendix...
A of the previous draft plan (DGMP/EA, 1990). The study found the physical limit of the monument for an urban/natural experience would be about 390 persons at one time.

The following criteria characterize the parameters used to construct the range of alternatives described within the document and characterize the elements of social carrying capacity.

**Experience Criteria**

**Urban/Natural:** Sights and sounds of humans are dominant, no opportunity to experience natural quiet or tranquility.

**Rural/Natural:** Limited opportunity to experience natural quiet or tranquility.

**Semiprimitive:** Predominantly isolated from the sights and sounds of humans, Opportunities to experience natural quiet and tranquility may be attained.

**Physical Setting Criteria**

**Urban/Natural:** Landscape modified with facilities to provide major visitor services for highly intensified use. Strong evidence of designed roads, walks, and structures.

**Application to RABR:**

Constructed walks, walkways, or boardwalks to clearly delineate areas of pedestrian traffic.

Constructed congregating areas to accommodate large groups (up to 40 people) for interpretive presentations.

Docks and docking facilities provided to accommodate private and commercial watercraft, including tour boats, houseboats, and smaller watercraft. Docking facilities designed to accommodate physical capacity of monument walks, walkways, and congregating areas.

Facilities constructed to regulate on-site and off-site.

Comfort stations, contact station, storage facilities, and interpretive displays provided for visitor comfort and convenience.

Areas of soil compaction mitigated, areas of barren soil reduced, visible erosion reduced because of level of development.

Impacts to fauna and microflora, ground cover, archeological sites, graffiti, and plant species reduced.
Rural/Natural: Predominately natural-appearing landscape with small scale developments that remain visually subordinate to the surrounding landscape.

Trails with hardened surfaces using material that delineate differences between natural surfaces and trails available for pedestrian traffic.

Use of natural viewing points, areas where landform provides opportunities for congregation, to accommodate up to 40 visitors for interpretive presentations.

Docks and docking facilities to accommodate private and commercial watercraft, including tour boats, houseboats, and small water craft. Dock capacity will be tailored to PAOT limits.

Facilities to regulate use located off-site.

Rest rooms and minimal interpretive displays provided.

Areas of soil compaction, barren soil, erosion barely visible.

Impacts to fauna and microflora, ground cover, archeological sites, graffiti, and plant species reduced.

Application to RABR:

Trails with natural surfaces to accommodate small levels of use.

Docks and docking facilities limited to those necessary to accommodate PAOT limits.

Facilities to regulate use located off-site.

No areas of soil compaction, barren, soil, and soil erosion.

No impacts on fauna and microflora, ground cover, archeological sites, graffiti, or plant species.

Semiprimitive: Predominantly natural setting that may have alterations that do not draw the attention of the visitor. Facilities generally limited to those necessary for life, health, safety, protection, and basic visitor needs.

Application to RABR:

Trails with natural surfaces to accommodate small levels of use.

Docks and docking facilities limited to those necessary to accommodate PAOT limits.

Facilities to regulate use located off-site.

No areas of soil compaction, barren, soil, and soil erosion.

No impacts on fauna and microflora, ground cover, archeological sites, graffiti, or plant species.

Managerial Setting Criteria

Urban/Natural: Regimentation and controls obvious and numerous.

Application to RABR:

Presence of numerous uniformed personnel for interpretive and protection purposes. Personnel provided on a scheduled basis, usually during daylight hours.

Signs, displays, and waysides provided to warn visitors of hazards and restrictions governing use of the national monument.

Persons and groups highly regulated and confined to developed trails. Social trails eliminated.

Rural/Natural: Regimentation and controls are noticeable but harmonize with the natural landscape.

Application to RABR:

Presence of uniformed personnel for interpretive and protection purposes. Personnel provided on a scheduled basis during peak use periods.

Signs and displays provided to warn visitors of hazards and restrictions governing use of the national monument.

Persons and groups regulated and confined to developed trails. Social trails eliminated.

Semiprimitive: Regimentation and controls located off-site or presented in publications or other subtle media.

Application to RABR:

Presence of uniformed personnel provided for protection purposes, on an unscheduled basis.

Signs provided to warn visitors of hazards.

Persons and groups unregulated. Social trails not expected to occur.

Social Setting Criteria

Urban/Natural: Large number of visitors in large groups on-site with near constant contact with others.
Application to RABR:
May accommodate up to 390 persons-at-one-time.
Controlled and intensive interpretive programs emphasizing personnel services provided to sensitize visitors to the significance of Rainbow Bridge.
Native American opportunities provided during off-season and low-use periods.

Rural/Natural:
Moderate contacts, some in large groups, on-site.

Application to RABR:
May accommodate up to 220 persons-at-one-time.
Intensive interpretive programs emphasizing self-guiding media provided to sensitize visitors to the significance of Rainbow Bridge.

Semiprimitive:
Contacts with others minimized, infrequent contact with large groups may occur.

Application to RABR:
May accommodate up to 40 persons-at-one-time.
Interpretation minimized, emphasis on visitor self-reliance.
... Around the first bend in the canyon we saw it—Nonne-zoche Not-se-lid, the incomparable, the indescribable.

It was hard to believe that this thing was of hard cold stone. In the setting sun it was warm, radiant, glorious...

We crept closer. We found that we had not realized the great size of the arch, for it is so wonderfully graceful and so perfectly proportioned that its beauty rather than its colossal size first engages the attention. One could place the Capitol under it, however, and then have considerable room...

For hours we walked and sat and looked. Hardly a word was said. At last we slept. At the foot of the Rainbow, we had not found the pot of gold, but content and happiness.

-- Clyde Kluckhohn
To The Foot Of The Rainbow
The Century Company, New York, 1927
On May 30, 1910, President William H. Taft proclaimed the Rainbow Bridge a national monument. The words of that proclamation still provide the basis for all National Park Service efforts to preserve and interpret the significance of this most impressive masterpiece in stone.

... an extraordinary natural bridge, having an arch which is in form and appearance much like a rainbow, and which is three hundred and nine feet high and two hundred and seventy-eight feet span, is of great scientific interest as an example of eccentric stream erosion, and it appears that the public interest would be promoted by reserving this bridge as a National Monument, together with as much land as may be needed for its protection...
INTERPRETING RAINBOW BRIDGE

Rainbow Bridge warrants protection not only for its geological significance but also because of its unique natural beauty. The vast majority of visitors to the bridge first glimpse the soaring structure from the waters of Lake Powell that have backfilled Bridge Canyon up to and under the span. From the wide expanse of Lake Powell's main channel, visitors travel through the ever-narrowing Forbidding Canyon and the even more restrictive Bridge Canyon.

Since access to the monument is primarily by boat from the Lake Powell corridor, responsibility for the bridge's preservation and interpretation was placed with Glen Canyon National Recreation Area. However, increasing visitation facilitated by Lake Powell's easy access has accelerated wear and tear on the monument's resources. Furthermore, visitors accustomed to Lake Powell's recreational opportunities, have expanded the pursuit of these opportunities, such as swimming and rock-climbing, to the bridge. The National Park Service thus was confronted with visitors to Rainbow Bridge who did not recognize the monument as having values separate from and distinct from neighboring Glen Canyon.

The General Management Plan addresses the need to rid the monument of conflicting visitor uses by prescribing control of visitor access. The contact station and tour boat interpreters in Phase I and the shuttle boat system in Phase II provides an opportunity for interpreters and personal services to redirect visitor attention from recreational pursuits to viewing the world's largest natural bridge.

Fully controlled access, as called for in Phase II, will provide a consistently high-quality introduction to the monument by NPS Interpreters that will offer visitors information basic to understanding and appreciating the geological processes that created Rainbow Bridge; the bridge's niche in the Colorado Plateau; and man's interaction with the bridge from pre-Columbian times, to the present. An important aspect of the contemporary story is the impact on the monument's ecosystems resulting from the impoundment of Lake Powell. Additionally, visitors will have a heightened safety awareness while in the area, and will be exposed to the park preservation ethic and the role that an individual can play in it.

Controlled access will also allow interpreters to emphasize the sacred value nearby American Indians attach to the span. By having such information, visitors, it is hoped, will approach the bridge with a greater appreciation for American Indian beliefs about the site. Ranger-conducted groups will reduce some of those activities, which in the past, have been most offensive to American Indians. Furthermore, these efforts by the National Park Service will be indicative of the Service's sensitivity to American Indian religious beliefs, which traditionally are associated with places, objects, and seasons.

ARA Leisure Services, Inc., and the Glen Canyon Natural History Association will have an opportunity to better coordinate the total visitor experience. Such cooperation will guarantee the availability of interpretation for the shuttles and all commercial tours to the bridge. The mix of personal services, waysides, and printed materials offered by the

National Park Service and the Natural History Association, and the concessioner will focus visitor attention on the monument, thereby enhancing appreciation of the monument and reducing negative impacts on monument resources.

Interpretation at Rainbow Bridge will improve visitor experience by:

Providing interpretive programs and facilities that meet National Park Service standards for accuracy and quality.

Nurturing cooperative interpretive efforts involving ARA Leisure Services, Inc., the Glen Canyon Natural History Association, and the National Park Service.

Providing interpretation of all park resources: natural history, human history, and the National Park System.

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4
THEMES, GOALS, AND OBJECTIVES

THEMES

Geological Processes That Formed the Bridge

Entrenched stream meandering and conchoidal fracturing were the two major factors in forming the largest natural bridge on earth. Recognized as a world class example of such geologic phenomena, Rainbow Bridge has been protected by the Federal Government since 1910.

Rainbow Bridge: Part of the Larger Colorado Plateau Ecosystem

The monument's riparian, blackbrush, and desert scrub communities are three distinct plant zones found throughout the Colorado Plateau. In addition, its diverse populations of mammals, birds, reptiles, insects, and other animal species are representative of the Colorado Plateau.

People Have Interacted with the Bridge in Prehistoric Times

Archeological features are evidence of pre-Columbian people living in the area, with the earliest Euro-American explorers referring to the remains of a primitive structure beneath Rainbow Bridge.

People Have Interacted with the Bridge in Historic Times

Twentieth Century Navajos and San Juan Paiutes consider Rainbow Bridge a sacred place. Contrary to claims by the 1909 Discovery Party of being the first Anglos to view the bridge, several believable accounts point to pre-1909 visits by cattlemen, miners, and trappers. However, the Douglass-Cummings parties' discovery on August 14, 1909, resulted in the first widespread publicity about the bridge.

People Continue to Impact the Monument

In 1971, the waters of Lake Powell, formed behind the Glen Canyon Dam, first entered the monument. By 1980, the lake reached its full pool elevation of 3,700 feet above mean sea level, and permanently altered the monument's riparian environment. Once one of the most remote areas in the United States, Rainbow Bridge is now readily accessible via Lake Powell. However, the lake's encroachment under the bridge continues to raise concerns about damage to the natural underpinnings of the structure, noise pollution from boat traffic, and degradation to the monument's resources from increasing visitation.

GOALS

To increase visitor understanding of the geology, plants, and animals of the region.

To encourage visitor understanding of how Rainbow Bridge fits into the Colorado Plateau formation and ecosystem.

To help visitors understand that different cultures perceive resources differently, i.e., some neighboring American Indians regard Rainbow Bridge as sacred.

To help visitors understand that the monument's resources do not end at its boundaries.

To generate visitor interest in the cultures and lifestyles, from prehistoric to present times, of the people of the Rainbow Bridge region.

To stimulate visitor and local citizen understanding of external threats to monument resources.

To encourage visitor understanding of limited visitor access to Rainbow Bridge as one management device for reducing degradation of monument resources.

To foster safe, informed, minimum boat and foot impact access to monument resources.

To reduce visitor injury and hazards related to monument uses.

To help visitors understand and appreciate their role in maintaining the monument's natural and cultural resources.

To enhance the visitor's experience at Rainbow Bridge by providing a pleasant transition from a recreational activity to an environmental education experience.

To foster visitor enjoyment through awareness of available activities and services and time needed for each, both within the monument and the Glen Canyon National Recreation Area.

To prevent intentional and unintentional resource degradation.

OBJECTIVES

Objectives are used to measure achievements. As we learn more about our visitors and our capabilities, these objectives may be modified. The following list is but a partial inventory of the objectives of the monument's interpretation program. Any necessary modifications and additions should be placed in the Annual Statement for Interpretation.
Of the visitors leaving the monument:

More than half will confirm that they received adequate information for a well-informed, safe, efficient, and enjoyable visit.

More than half will be able to describe the primary resource that warrants the area's national monument designation.

More than half will be able to identify Rainbow Bridge National Monument as a separate National Park area, distinct from Glen Canyon National Recreation Area.

More than half will know that the Rainbow Bridge is sacred to neighboring American Indians.

More than half will be able to identify water erosion and fracturing as the two main factors in the formation of Rainbow Bridge.

More than half will be able to identify at least one management measure used to reduce impacts on the monument's resources.

Half will be able to identify human impacts affecting Rainbow Bridge.

Half will be able to identify at least one action they can take to prevent degradation to the Rainbow Bridge.

Half will know that prehistoric people once lived in and around the monument.

**INTERPRETIVE SERVICES**

The use of interpretation is an important part of achieving management's goal of accommodating increasing levels of visitation to Rainbow Bridge and maintaining a quality visitor experience. Three primary forms of interpretive services will be used under the plan in both phases—wayside exhibits, personal services and printed material.

**PHASE I**

**Nonpersonal Interpretation**

**Interpretive Media.** During Phase I, an entry contact station will be established in Forbidding Canyon. Here visitors will pay an entry fee and obtain information before continuing to the bridge in privately owned and rental boats. Since contact time will be much shorter at the contact stations that will be developed at several locations on Lake Powell during Phase II, nonpersonal interpretive services will have to be relied upon more heavily. Printed materials in the form of brochures, site bulletins, flyers, etc., will supply the bulk of the information offered.

The printed material will contain orientation to the monument and its Forbidding Canyon/Bridge Canyon approach, differentiate between Glen Canyon National Recreation Area and Rainbow Bridge National Monument, describe how Rainbow Bridge was formed, provide insight to Rainbow Bridge's religious significance to neighboring American Indians, alert visitors to safety concerns and the monument's flash flood warning system, and list those activities that are prohibited in the monument (diving, swimming, fishing, climbing, overnight camping, etc.).

A major thrust of the printed materials and audio programs will be the reinforcement of verbal instructions given at the contact station about the wakeless zone between the station and the bridge, other safety precautions to observe while traveling upcanyon, and basic information regarding the significance of Rainbow Bridge, to insure a quality visitor experience.

**Wayside Exhibits.** Emplacement of wayside exhibits will be prohibited at the bridge and in the canyons approaching the bridge to avoid visual intrusions on the resources and in response to Native American concerns over modern development profaning the sacredness of the site. Rather, waysides will be emplaced at the various embarkation points that will be developed around the lake during Phase II. These exhibits will serve as one of the three primary focuses—the other two being personal services and printed materials—to impart information to monument visitors. Messages to be addressed by the waysides include the following:

Safety messages including an explanation of the flash flood warning system and what the visitor should do in the event of a flood or flood warning.

An explanation of the geological processes that formed the world's largest natural bridge.

An explanation of the religious significance of the bridge to neighboring American Indians.

An explanation of the monument's ecosystems as being part of the greater Colorado Plateau, with floral and faunal examples given. Problems with exotic species of fish and plants (tamarisk) should be included. Should this latter topic prove too lengthy for one wayside, then a separate exhibit on exotics should be developed.

A discussion of the changes to the monument's riparian environment brought about by the waters of Lake Powell backing up into the monument.

A discussion of the ongoing monitoring of the bridge because of the concern that water at its base, during periods of high lake levels, may be weakening its natural underpinnings.
A list of activities prohibited in the monument—diving, swimming, fishing, climbing, overnight camping, and so forth.

The wayside exhibits should be developed from a standard design. Printed exhibits embedded in fiberglass, with anodized, extruded aluminum frames and mounts, are recommended.

**Personal Services**

Personal services interpretation for Rainbow Bridge National Monument is part of the overall interpretation program provided by Glen Canyon National Recreation Area. Interpretive services will be provided primarily in the summer season. Personal services at the Forbidding Canyon contact station, during Phase I, will consist primarily of orientation and safety messages and emergency assistance. Interpretive rangers will be on-site at Rainbow Bridge to answer visitor questions, provide assistance, perform roving, formal and informal interpretive services.

It is recommended that employment of American Indians be maximized at Rainbow Bridge in recognition of the importance of the site to local Navajos and Paiutes. These individuals should not only have the usual interpretive skills, but also have the capacity to deal with the insensitivity of some visitors to American Indians. American Indians will more accurately portray their own lifeways and their employment will support ongoing efforts by the National Park Service to maintain positive working relations with its American Indian neighbors.

**PHASE II**

**Nonpersonal Interpretation**

**Interpretive Media.** During Phase II, interpretive media will continue to be relied upon heavily. The interpretive media provided will be much the same as in Phase I, but will include books, maps and other literature sales.

**Wayside Exhibits.** In addition to those waysides called for in Phase I, additional units will be installed that include the following information:

- Locate/orient the visitor in relation to the monument and the Glen Canyon National Recreation Area. This wayside should be designed so that varying shuttle boat costs and schedules can be posted.

- In the rest rooms, explain how human wastes are removed from the site for treatment to reduce water pollution levels; and direct all boaters, campers, and hikers not to dump sewage and trash into Lake Powell or its tributaries; direct boaters and campers to disposal areas at the marinas.

- Hiking trails between Rainbow Bridge and Navajo Mountain, including the necessity for obtaining permits from the Navajo Nation to use that segment of the trail on the Navajo Reservation. A map showing trail alignment, place names, water sources, and distances should be included.

**Personal Services**

In addition to the personal services provided in Phase I, an interpreter will be on board all shuttle boats to the monument. During the shuttle boat ride, the interpreter will provide a formal interpretive program that will introduce the visitor to the monument, establish Rainbow Bridge National Monument as a separate entity from Glen Canyon National Recreation Area, describe the geologic processes that formed the bridge, describe Rainbow Bridge as sacred to neighboring American Indians, and so forth.

When the visitor disembarks from the shuttle boat, he/she should have a basic understanding of the monument. Upon arrival, another National Park Service interpreter will be roving the monument available to provide further information for the visitor. Formal interpretive programs, while not scheduled, will be available should a group express such an interest. If formal programs become a regular event, the programs will be developed to enhance the interpretive program provided on the shuttle boat. The two programs should overlap only enough to provide for continuity, and should address different themes of the monument.

**OFF-SEASON**

Both Phase I and Phase II address the six- or seven-month heavy-use season (dates to be determined by review of visitor use patterns). In the off-season, access to Rainbow Bridge will not be restricted in either Phase I or Phase II. Both private boats and tour boats will be able to directly approach the monument dock. Personal services will be limited during the short off-season. Interpretive media and wayside exhibits will still be available to provide necessary information and safety messages.

**PLANNING**

To maximize coordination of message content and delivery, personal service strategies should be outlined in annual planning sessions involving ARA Leisure Services, Inc., the Glen Canyon Natural History Association and park personnel. General summer season schedules, new program ideas and service proposals, and monitoring and evaluation procedures should derive from these planning sessions. These planning meetings should also provide a forum for identifying high priority messages on resources, events, new services, and park management concerns related to the coming season.

**TRAINING**

People are the key to successful interpretation, and the key to people successful in interpretation is training. The National Park Service, ARA Leisure Services, Inc., and the Glen Canyon Natural History Association, provide training for their employees that is geared to suit the needs of the employer and is directed toward service, safety and
resource interpretation.

In addition, it is the responsibility of the National Park Service to provide specialized interpretive training specifically designed for concession employees and specifically aimed at interpretation in the concessioner workplace. The goal is consistent, friendly and informative contacts between concession and Natural History Association employees and visitors.

Training should include monument resources, the National Park System, the concessioner’s role, the interpreter’s role, the park visitors -- interactions and interrelationships, interpretive program development, themes, goals and objectives, interpretive techniques, and so forth.

Summer seasonal training for park staff, Natural History Association staff and concessionaires should communicate the following to all employees:

- High priority messages for the summer, as identified in mid-winter planning.
- Motivational reminder that all personnel in public contact positions are, in the visitors’ minds, “speaking” for the park.
- Reiteration of park themes and goals.

This seasonal training could provide the opportunity to discuss new programs and services being offered, to consider monitoring and evaluation techniques, to receive copies of the park’s Annual Statement for Interpretation, and to participate a communication skill development exercise, designed to benefit all participants.

Initial training should be coordinated with the concessioner as soon as possible. After the initial training session, the park staff and concessioner will evaluate the training to determine when it should be repeated, what improvements can be made, and whether additional employees should attend. A mid-season training may be scheduled to address strengths and weaknesses in an attempt to constantly improve visitor services. The mid-season training could be directed at preventing ‘burnout’ and encouraging enthusiasm. Throughout the season, on-the-job interpretive training could be conducted and should be aimed at specific topics.

**MONITORING AND EVALUATION**

Park and concessioner management should discuss how monitoring and evaluation should be carried out. They should determine the frequency for evaluation, criteria for quality, roles and responsibilities. Criteria for quality should be consistent with park policy, National Park Service guidelines, and should ensure overall visitor enjoyment. Evaluations should reinforce the positive aspects of an individual’s program while working to improve the weak points.

**NEW PROGRAMS AND SERVICES**

Park staff and the concessioner should remain open to suggestions for new programs of interpretive services. Ideas should be sought from all sources. All new programs and services should be subjected to a “dry run” evaluation by park staff before they are offered to the public.
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I. INTRODUCTION

PARK PURPOSE AND SIGNIFICANCE

Rainbow Bridge was set aside as a national monument by Presidential Proclamation (President William Howard Taft) on May 30, 1910. It was established to preserve the world's largest natural bridge. In 1916, the National Park Service was created and assumed administration of Rainbow Bridge. As the world's largest natural bridge, Rainbow Bridge was nominated in 1989, by the National Park Service, as a World Heritage Site (Federal Register, Vol. 54, No. 86, May 5, 1989, pages 19469-72).

The 160-acre monument is in the heart of some of the Nation's most rugged canyon country and presents a unique blend of significant natural and cultural resources. The natural bridge is 290 feet high and has a 278-foot span. It is located in the approximate center of the 160-acre monument. The bridge is considered a sacred place by the Navajos, for whom personified rainbows have stood as guardians of the universe.

ADMINISTRATION AND MANAGEMENT

The monument is administered by Glen Canyon National Recreation Area (NRA), which forms part of the boundary at its northwest corner. It is bounded on three sides by the Navajo Reservation.

Access to the monument is limited. Boaters may approach from the Forbidding Canyon and Bridge Canyon arms of Lake Powell in the Glen Canyon NRA. Hikers can access the monument via trails originating on the Navajo Reservation and tracking over Redbud Pass and into Bridge Canyon from the landward side. The nearest road is approximately 13 miles away.

Visitation to Rainbow Bridge reached 238,307 in 1989. Virtually all visitors come by private boat or public tour boat. Very few visitors access the monument by trail from Navajo Mountain. Most of the visitation occurs between April and October. In the ten-year period from 1979 to 1989, annual visitation increased approximately 245 percent. Highest visitation year to date was 1987, with 316,065 visitors or a 326 percent increase over 1979.

Public use is concentrated on the trail, from the boat docking facilities to the bridge and on through the monument. Existing facilities include: 1,020 linear feet of floating walkway, a 500-foot courtesy dock, floating vault toilet, and a maintained trail, with an interpretive rest area.

All lands within the national monument are classified and managed as a Natural Zone, with the exception of the lands below elevation 3,711 feet, affected by the Lake Powell impoundment, which is classified and managed as a Reservoir Zone. As much as 20.4 acres of the monument may be periodically inundated by fluctuations of Lake Powell.

Bridge Creek, which flows through the monument and under Rainbow Bridge, becomes an arm of Lake Powell, creating a 50-foot depth of water under the bridge at high water.

The proclamation establishing the park and the Organic Act of 1916 establishing the National Park Service direct the basic principles and objectives for the management of park resources. The proclamation describes the natural bridge as "extraordinary" and declares that it "... is of great scientific interest as an example of eccentric stream erosion." The Organic Act states that the purpose of national parks is "... to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

PURPOSE OF THE RESOURCE MANAGEMENT PLAN

This Resource Management Plan for Rainbow Bridge National Monument describes the natural and cultural resources preserved within the park, as well as the ongoing or potential management activities for preserving those resources. A wide variety of research initiatives, baseline studies, and manipulative and protective techniques are integrated into a comprehensive resource management program.

MANAGEMENT OBJECTIVES FOR PARK RESOURCES

The resources management objectives for Rainbow Bridge are:

1) To preserve Rainbow Bridge by such means as will leave this outstanding natural resource unimpaired for the enjoyment of present and future generations.

2) To identify, determine the significance of, and protect the natural and cultural resources within the monument.

3) To communicate, coordinate, and cooperate with the Bureau of Reclamation to insure that the management of the Lake Powell impoundment is compatible, to the greatest degree possible, with the long-term preservation of Rainbow Bridge.

4) To foster and maintain a cooperative relationship for the use and protection of the national monument with the Navajo Tribe.

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II. PRESENT STATUS OF NATURAL RESOURCES

This section is an overview of the significant natural and cultural resources and gives an assessment of the general condition of these resources. The framework for the natural resources section is based on the generic resource categories from NPS-77, Natural Resources Management Guidelines.

NATURAL RESOURCES BASELINE INFORMATION

Vegetation resources have been inventoried to meet the Level 1 standard (minimum level) in the servicewide "Standards for Natural Resources Inventory and Monitoring."

Baseline information is available for air quality, water quality, and sound levels. Information on soils, minerals and rocks, wildlife, fish, amphibians, reptiles, birds, and insect species is inadequate.

NATURAL RESOURCES

Vegetation

The monument is physiographically located within the Colorado Plateau, primarily supporting desert-shrub vegetation. The plant communities are riparian (near the water), grassland, blackbrush, talus slope (sparsely vegetated shrubland growing on talus slopes), and hanging gardens (specialized wetland vegetation growing along seeplines). There is a wide diversity of plants in these communities, due to the numerous microhabitats in the monument.

Tamarisk is an exotic plant species that has invaded the monument. It has a negative impact on seeps, springs, and the hanging gardens and could impair the aesthetic view of the bridge. Despite the tamarisk, the overall condition of monument vegetation is considered good.

Animal Species

Animal life is typical of a semidesert climate. Mule deer, coyote, and gray fox range widely throughout the area and use the monument, Jackrabbits, birds, rodents, and reptiles inhabit the monument. Two endangered species, the peregrine falcon and the bald eagle, use the monument. In 1989, a pair of peregrine falcons established an aerie near the arch during their nesting season and bald eagles use the monument area in the winter. The topographic diversity and abundance of prey within and around Lake Powell attract these endangered species.

Freshwater Aquatic Resources

Fish species are extensive throughout Lake Powell and in Bridge Canyon. Among the species in the monument are crappie, largemouth bass, carp, bluegill, and striped bass. Fishing is not allowed in the monument.

The water quality of the reservoir within the monument has been monitored on occasion and found to be good (bacterial monitoring only). Bridge Creek has not been checked for water quality. Surface films from boat fuel are sometimes present on Lake Powell around the docks at Rainbow Bridge.

Geologic Resources

The monument is an outstanding example of geologic processes and is of unquestioned national significance. As an outstanding example representing a major stage of earth's evolutionary history, Rainbow Bridge was nominated for status as a World Heritage Site.

Geologic processes on view at the monument are wind and water deposition, consolidation, periods of deformation by folding, warping, and faulting, normal erosion, and accelerated erosion brought about by general uplift. The result of these processes is a river system deeply entrenched in the sedimentary rocks of the Colorado Plateau.

Rainbow Bridge was monitored for stability by the U.S. Bureau of Reclamation (BOR) from 1974 through 1984, as part of the court settlement of a lawsuit contesting Bureau actions in allowing the reservoir waters of Lake Powell to enter the monument. The purpose of the monitoring was to detect any adverse effects to the stone arch, caused by rising lake waters in the canyon beneath the arch foundation. Measurement was to detect any movement or shifting of the bridge structure.

The 1985 BOR report summarizing the ten year study indicated that no movement was detected. Since the study, more modern equipment and techniques are available and BOR continues the monitoring program, in cooperation with the NPS, using improved techniques.

The purpose of continued monitoring is to obtain a continuous record of the exact position of the arch and to detect any shifting or movement caused by the reservoir or outside influences. Monitoring will also provide baseline data on the arch, to permit evaluation of natural weathering and other processes affecting the span.

Erosion is a natural process throughout the monument, and is accelerated by wave action, lake level fluctuations, and multiple trailing. Rockfalls from high cliffs due to natural erosion pose a threat to the safety of visitors.

Soil Resources

Fine, sandy soils from the Entrada and Navajo geologic formations are most prevalent throughout the area, with caliche and bentonite deposits occasionally found near the
surface. The large number of visitors using the area immediately around Rainbow Bridge has created a network of paths or multiple trails causing erosion, soil compaction, loss of vegetative cover, and mass wasting in sandy areas.

In areas near the bridge and shoreline, where the trail is less defined, as much as a foot of the limited topsoil has been lost. Some places are worn down to the Kayenta formation bedrock, with no soil left.

**Air Resources**

Rainbow Bridge is established as a Class II Federal air quality area. The air quality of the area was monitored prior to the start-up of the Navajo Generating Station. The average visibility, described in 1974 as "excellent" (about 125 miles), is now noticeably less. NPS, in cooperation with other State and Federal Agencies and private industry, has developed an extensive ongoing monitoring plan for gaseous and particulate constituents of the atmosphere and for visibility. Research objectives include an in-depth analysis of the regional airshed and the identification of emission sources.

**Aesthetic Resources**

The preservation of the natural scene is a primary natural resource objective. The presence and continued expansion of tamarisk threatens to impair this natural scene. The growth of tamarisk along the trail from the floating walkway to the bridge obscures photo opportunities, forcing visitors to leave the path to get a clear photograph of the bridge. By leaving the path, visitors accelerate the soil compaction problem and damage the native vegetative cover.

**Integrated Pest Management**

As noted in the Vegetation and Aesthetic Resources sections, tamarisk is an exotic plant, which negatively impacts the natural scene and indirectly causes other resource damage.

**Endangered, Threatened, and Rare Species**

The peregrine falcon uses the park during nesting season and bald eagles use the park during the winter. A peregrine falcon aerie was found near the bridge during a monitoring exercise in the spring of 1989. The Navajo Mountain vole is known to occur nearby at 10,000 feet elevation. Although it is not known to inhabit the monument, a thorough inventory could prove its existence there. Monitoring for endangered, threatened, and rare species will continue.

Although there are no endangered, threatened, or rare plant species in the monument, *Primula speculicola*, (primrose family) grows in the monument. It is considered a 3(C) category by the U.S. Fish and Wildlife Service. (Category 3[C] is a category used for plants that have been determined to be too widespread, or lack sufficient threats to warrant further consideration under the Endangered Species Act.)

**Hazardous Waste**

The current heavy visitation is expected to continue, causing extensive crowding in the dock area as boats maneuver to the dock. Minor bumping accidents between boats occur routinely, with occasional incidents of extensive damage due to inexperienced boat operators. The potential for fuel spills from these incidents is high. At this time, there is no equipment or permanent staff at the monument to contain a fuel spill.

**Public Health and Safety**

The possibility of rockfalls, mentioned under Geologic Resources, is a threat to public safety throughout the monument. A rockfall originating above the visitor access trail several years ago did not injure anyone, only through good luck. The potential for property damage and serious injury or death exists.

**Sound**

The integrity of Rainbow Bridge may be affected by sound levels from the many visitors, boats, and aircraft around the monument. Because the bridge is in a narrow, steep-walled canyon, all sounds are amplified and echo throughout the area. Sound levels were monitored in the monument for a year, ending in May 1990, to establish a data base.
III. NATURAL RESOURCES MANAGEMENT PROGRAM

OVERVIEW OF CURRENT PROGRAM AND NEEDS

The stability of the Rainbow Bridge stone arch, the significant geologic feature of the monument and the monument's reason for being, is monitored annually by the Bureau of Reclamation. Early warning of any natural or man-caused threats to the integrity of the arch should be obtained through this monitoring.

Current activities emphasize protection through the presence of law enforcement and interpretive staffs and advisory notices. There is, however, insufficient staff to provide full protection and resource damage continues. Critical unmet needs include additional visitor services staff to upgrade resource protection and sufficient funding to rehabilitate damaged areas. A key aspect of the upgraded services program would be to improve interpretive services, to foster in visitors, a greater sense of value for the natural resources during the monument visit.

The other natural resources of the monument, including its vegetation, animal life, and Bridge Creek, are threatened by multiple trailing, heavy use, and vandalism resulting from the high number of visitors. These resources are part of the monument setting and its aesthetic appeal, and they must be protected. Where damage has already occurred, plants, soils, and animal habitats should be restored.

Other unmet needs include baseline resource inventory and monitoring of vegetation, soils, wildlife, and geologic hazards. The programming sheets on pages 8 through 11 and Tables 1 and 2 in the appendices provide summary information on the current program needs.
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06/15/90 | Natural | Programming Sheet 3 | Unfunded Activities | (in thousands) |
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PROJECT STATEMENT

PROJECT NUMBER: RABR-N-001

TITLE: COMPILE BASELINE NATURAL RESOURCE INVENTORY

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N20

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:
Natural resource inventory baseline information needs to be compiled for Rainbow Bridge National Monument in order to arrive at sound management decisions. That information does not presently exist for the monument except for its vegetation and geology. Resource losses may be occurring due to high visitation, off-trail hiking, boat traffic, sound levels, and soil compaction.

DESCRIPTION OF ACTION:
1) Recommended Action:

ESTABLISH A BASELINE RESOURCE INVENTORY.

Prepare a thorough level I, baseline natural resource inventory of Rainbow Bridge. Inventories should include, but not be limited to, soils, mammals, birds, reptiles, amphibians, insects, minerals, and fish as well as water and vegetation.

As a result of a through inventory, an adequate source of information related to setting "limits of acceptable change" and carrying capacity, as well as characterizing existing conditions, would exist upon which management decisions could be based. This information will also be used in interpretive programs that will enhance visitor experiences.

This will be an ongoing project which would come under the responsibility of the Resource Management Division.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

PROPOSAL

PROPOSED BUDGET:

Year 1: Source Act Type Budget($1000) FTE
NF3 RES 12.0

Year 2: Source Act Type Budget($1000) FTE

Year 3: Source Act Type Budget($1000) FTE

Year 4: Source Act Type Budget($1000) FTE

PROPOSAL DATE: 901311

PROPOSAL DATE: 901410
As a Federal Agency, the National Park Service is mandated to protect endangered species such as the bald eagle and peregrine falcon residing within Rainbow Bridge National Monument. Peregrine falcons and bald eagles, two species of key interest to the conservation community, spend portions of their life cycles within the monument. Their endangered species status signifies the need to ensure their protection.

Other monitoring and protection concerns relate to habitat needs, adequate nesting and winter roost sites, availability of forage species, etc., and protection from hunting extend beyond monument boundaries.

Upon completion of an inventory, it may be found that other listed animals or plants exist in the monument.

DESCRIPTION OF ACTION:

1) Recommended Action:

PROTECT AND MONITOR SPECIAL STATUS SPECIES.

Park staff will regularly monitor the peregrine falcon and bald eagle populations in the monument by recording locations, activities and population numbers (annually May-July). Impacts from adjacent areas will be investigated and park strategies developed to mitigate impacts. Prey species will be determined. New eyries will be searched for in the monument.

A professional monitoring program will be developed and implemented by park staff. Research on special status species and their habitat requirements will be proposed as needed.
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-003

TITLE: DEVELOP A VEGETATION MANAGEMENT PLAN

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N08

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Alien species, heavy visitation, destabilization of soils caused by multiple trailing and flash flooding, and possibly air pollution, are having noticeable impacts on the vegetative resources of Rainbow Bridge National Monument. A vegetation management plan is necessary to direct the management of these resources so continued degradation does not occur.

The micro-habitats found in the five plant communities in the monument provide for a diverse assemblage of species and plant associations. These communities are part of the aesthetic backdrop of the monument and are representative of regional biotic setting. Due to the lack of moisture, poor soils and temperature extremes, the area is generally devoid of trees except in riparian zones. There are large areas sparsely covered with blackbrush, Indian ricegrass, cacti, yucca, and other semidesert plants and grasses but generally, much of the area is bare rock, sandstone formations and drifting sand. On the higher plateaus and mesas, pinyon pine, juniper and other semi-evergreens are found. Smaller wetland communities exist at permanent seeps and alcoves.

Tamarisk is an alien plant species that has invaded the monument. Native plant species are suffering from heavy visitation, which is causing soil compaction and loss of vegetation. In other areas, sandy soils on steep slopes are destabilized by multiple trails endangering vegetation. Another concern caused by increasing visitation is that the natural character of the vegetation has been locally altered and is threatened by interruption or modification of natural processes. Air pollution -- regional and local sources (boat exhaust) -- could be affecting the native vegetation.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP A VEGETATION MANAGEMENT PLAN

An existing inventory of plant species meets the Level 1 servicewide inventory standards. A Vegetation Management Plan would include:

1) the inventory and monitoring of native plant species;
2) the restoration of disturbed sites;
3) control of exotic species;
4) protection of possible candidates to the endangered and threatened plant list;
5) the policy for natural disturbances, such as fire.

The goals of the Vegetation Management Plan are to:

- Inventory, classify and map the vegetation of the monument to provide baseline information for management.
- Monitor vegetative communities and species to assess and evaluate ecosystem processes, detect trends and provide information for their preservation and protection.
- Study the distribution and abundance of plant species and their response to past and present disturbances to provide information for their preservation and protection.
- Identify alien plant species, determine their effects on native ecosystems and natural processes, and provide for their control and removal where desirable and feasible.
- Study and evaluate the effects of disturbances and other impacts, such as air pollution, on vegetation and determine the management implications of these impacts.
- Develop a vegetational history of the monument.
- Restore plant communities to their natural character by revegetation of eroded and impacted sites where appropriate.
- Manage the vegetation populations and ecosystems to maintain the ecological diversity and health of native species populations.

Related projects include: RABR-N-002; RABR-N-005; RABR-N-007; RABR-N-009; RABR-N-011; RABR-N-012.
Project duration for the development of the plan will be one year. Components of the plan have been identified under separate project statements and their duration will vary.

Responsibility of the project will be assigned to the Branch of Natural Resources. Some consultation with Regional Resource Management personnel may be necessary.

Project will be carried out by park staff, with the assistance of the Regional Resource Management staff.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EA

EXPLANATION:

BUDGET AND FTE'S:

Year 1: Source Act Type Budget($1000) FTE
NF3 MON 6.0

Year 2: Source Act Type Budget($1000) FTE

Year 3: Source Act Type Budget($1000) FTE

Year 4: Source Act Type Budget($1000) FTE

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOPMENT OF A GEOGRAPHIC INFORMATION SYSTEM (GIS)

A GIS will be developed and include all new and existing data. To accomplish the task of creating a GIS which would be a decision-making tool for management, the park needs in place a central processing unit and screen-copy printer and plotter capable of facilitating the use of software packages such as GRASS, SAGIS and Arc-info for data input and manipulation. Types of data themes necessary and which need to be acquired would include, but are not limited to, soils, vegetation, wildlife populations, archeological sites, geology, hypsography, facilities, and trails.

Proposal Date: 90
The establishment of this GIS would ensure the proper monitoring of resources and coordination of all management programs, both now and in the future.

The project would be ongoing and new data would be acquired, "ground truthed" and added to the database as needed. The initial phase of the project would be over a two-year period and would include: acquisition of initial data themes (listed previously) for input into the system (year 1 and on an ongoing basis); acquisition of hardware and software to facilitate manipulation of data themes (year 2); establishment of a permanent, full-time position to manage the GIS (year 2).

The development and management of the GIS would be the responsibility of the Division of Resource Management.

Staffing for system management would be through the Branch of Natural Resources and require that the system operator be knowledgeable of natural resources management as well as having acquired the technical skills necessary to operate a GIS.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DH2 App. 2, 1.6

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Proposal Date: 90
Project Number: RABR-N-005
Title: Control Exotic Plants
Funding Status: Unfunded
ServiceWide Issue Codes: N05
Cultural Resource Type Code (where applicable): Package

Problem Statement:
Alien species were first documented in the monument following the high water in Lake Powell during 1983. Since 1983, the spread has continued throughout the monument below and above the high-water line. Mitigation is necessary to protect native vegetation and control wide-spread exotic establishment.

Tamarisk (Tamarix ramosissima) is an alien plant species that invaded the monument when Lake Powell entered the monument, reached its maximum level at 3,708.6 feet elevation, and receded. Tamarisk is a phreatophyte which could threaten water seeps, springs and hanging gardens by monopolizing the water source and, in effect, dry up the seeps and springs. The riparian environment of Bridge Creek and the lakeshore in Bridge Canyon would be altered and negatively impacted if tamarisk remains unchecked.

Tamarisk is a major invader of the slope above the walkway, below seeps and along small tributary canyons crossed by the trail. Total infestation is less than one acre. In 1989, the age class of the tamarisk stands was six years or less. The plant is visually prominent; it affects the aesthetic appearance of the area and obstructs views along the trail, detracting from the natural aspect of the monument.

At low water levels it may invade, establish itself and create hazards to boats when water levels rise, inundating plants that have become well established.

Thickets can also affect trail maintenance and retard native species and also become a fire hazard.

Other alien species occur within the park, but are not considered to pose a significant threat to park resources at present.

Proposal Date: 90 23

Description of Action:

1) Recommended Action:

Prepare a Tamarisk Control Action Plan
This action will include a review of tamarisk control technology and preparation of an environmental assessment. Action could include total removal of tamarisk by mechanical means, followed by a continuing control program. Action could also include habitat restoration to competitively inhibit reestablishment of tamarisk. Tamarisk control would safeguard park resources, notably the view of the natural bridge, water availability at seeps and springs and the existence of some hanging gardens.

Control Tamarisk in Accordance with the Control Action Plan
It is NPS policy to control exotic species when they threaten park resources. The effort to carry out control measures over the entire park would be manageable because of the small size of the monument (160 acres).

Monitor Tamarisk Reinvasion and Effectiveness of Control
Specific sites within the monument where tamarisk occurs, or has the potential to occur, would be monitored on a routine basis. Monitoring will address control effectiveness, detection of new invasion, and any reinvasion of tamarisk.

Monitor Other Alien Species
Alien species other than tamarisk are not considered a significant threat at present. Russian thistle (Salsola kali) is known to be present. A survey will be conducted to identify any additional species and potential threats.

Other related projects/programs include: RABR-N-003
Proposal Date: 90 24
Duration of the initial phase of the project would be three years and would include: preparation of a tamarisk control action plan (year 1); control of tamarisk (year 2 and on an ongoing basis thereafter); monitor the effectiveness of control methods in accordance with vegetation monitoring protocol (year 3 and on an ongoing basis).

Responsibility for the project would be assigned to the Branch of Natural Resources and the Maintenance Division. Project components would be delegated as follows: direct control (chemical and mechanical) - Maintenance Division; habitat restoration, monitor tamarisk reinvasion and effectiveness of control, and monitor other exotic species - Branch of Natural Resources.

Park staff would be used to accomplish projects. Technical skills required to complete project would be approved training and certification of persons applying pesticides, knowledge of proper control techniques and knowledge of vegetation of the monument and proper monitoring procedures to document effectiveness of control.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EA OTHER

EXPLANATION: Herbicide Use Approval; WASO-IPM

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Proposal Date: 90
RAIR-N-006

PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-006

TITLE: DEVELOP AN IPM PLAN

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N04 N05

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Currently, alien species are not being controlled within the monument. The spread of alien species poses a threat to native vegetation of the monument, Glen Canyon National Recreation Area and the Navajo Nation. An Integrated Pest Management (IPM) approach to controlling the spread of alien species is mandated by National Park Service Policy Guidelines.

To date, the alien plant tamarisk is the only alien species identified as a pest requiring control. Management of this species will be carried out in accord with IPM principles. To date, the monument does not have an IPM plan to address the issue of monitoring and/or needed treatments for the long-term preservation of the natural and cultural resources. Other pests which may need control in the future could include "weedy" invader species in disturbed sites and wood-rotting fungi attacking walkways.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP AN IPM PLAN

An IPM plan would be developed and implemented for the monument as needed to control pests.

The basic plan outline would follow standard IPM protocol, and any recommended pesticide treatments would be cleared through standard IPM procedures.

Other related projects include: RABR-N-005

The initial phase of the project (development of an IPM plan) would be carried out over a one-year period, with implementation of the plan as necessary on an ongoing basis.

Project responsibility would be assigned to the Branch of Natural resources with assistance from the Regional IPM Coordinator.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EA

EXPLANATION:

BUDGET AND FTE's:

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PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-007

TITLE: MONITOR RIPARIAN HABITAT

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N05 N18

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Riparian habitats represent important ecosystems from the standpoints of biological diversity and productivity. Monitoring of these habitats is necessary to provide baseline and trend information for science, resource management, interpretation, and the development of management alternatives to maintain riparian ecosystems and prevent degradation.

The base of Rainbow Bridge is Kayenta formation sandstone, a reddish brown to purplish consolidation of sands and mud laid down two hundred million years ago. Above its base, the bridge is composed of Navajo sandstone. The Kayenta is bedded, very hard and almost impervious to water. The Navajo is highly permeable and is considered a significant aquifer. Where bedding planes bearing water are exposed, as along a cliff face, the moist surface provides the medium for the growth of plants. Water penetrating to the surface of the Kayenta flows along to the margin of the overlying formation and discharges into Bridge Creek Canyon, creating surface flow supportive of riparian vegetation.

The riparian flora of the monument contains many species endemic to specialized Southwest environments. The integrity of the flora associated with riparian habitats is dependent upon the water quality and quantity in seeps and along canyon walls. This integrity can be threatened by invasion of alien species, over-collecting of plants, trampling by visitors, and by natural causes such as rockfalls, drought or fire.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP A MONITORING PROGRAM FOR RIPARIAN HABITAT

Monitoring procedures will be developed specifically for monitoring floristic components of the monument riparian community. Water quality of the monument will also be monitored on a regular basis and integrated with riparian data. These data will be used in concert to detect any deterioration that could impair or degrade the quality of the riparian habitat. Alien species monitoring will be an integral part of this project, and control efforts will be initiated in accord with IPM protocol as necessary to mitigate any potential threat to the riparian habitat.

IMPLEMENT MONITORING OF RIPARIAN HABITAT

Once developed, monitoring procedures will be carried out on a routine basis. Monitoring will address degradation of the riparian habitat and the water quality of the monument which could potentially affect the condition of the riparian resource.

The park GIS would be used to facilitate the use of these data to ensure the best possible management of the monument riparian community.

Other related projects include: RABR-N-001; RABR-N-003; RABR-N-004; RABR-N-005; RABR-N-006; RABR-N-017.

Development of a monitoring procedure is the key component in maintaining the habitat and preventing possible resource degradation (year 1). Implementation of monitoring the riparian habitat (year 2 and on an ongoing basis)

Project responsibility would be assigned to the Branch of Natural Resources.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App.2, 1.6
**PROJECT STATEMENT SHEET**

**PROJECT NUMBER:** RABR-N-007

**TITLE:** MONITOR STABILITY OF RAINBOW BRIDGE

**FUNDING STATUS:** FUNDED

**SERVICEWIDE ISSUE CODES:** N20

**CULTURAL RESOURCE TYPE CODE (where applicable):**

**PACKAGE NUMBER:**

**PROBLEM STATEMENT:**

Rainbow Bridge needs to be monitored in order to obtain a continuous record of the exact position of the arch and to detect any shifting or movement caused by the reservoir or other outside influences.

The U.S. Bureau of Reclamation has been, since 1974, monitoring the affects on Rainbow Bridge caused by the Lake Powell waters in the canyon beneath its foundation, through measurement, to detect any movement or shifting of the Bridge structure. A 1985 report summarizing ten years of study indicated that no movement could be detected. Since then, using improved techniques and instrumentation along with existing surveying and strain gauge points, continuing efforts are being made to provide baseline data on the arch to permit evaluation of man-caused and natural influences affecting the span.

Man-caused influences include the effects of raising and lowering the reservoir level in the canyon beneath the arch, illegal climbing by visitors on the arch, aircraft overflights (including military aircraft), and the vibration from sonic booms.

Natural processes and influences which could be of impact are weathering, fluctuations of moisture and temperature in the span, vibrations caused by rockfalls or spalling from cliffs in Bridge Canyon, floods in Bridge Canyon, and earthquakes in the region.

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Proposal Date: 90

31

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**PROJECT NUMBER:** RABR-N-008

**TITLE:** MONITOR STABILITY OF RAINBOW BRIDGE

**FUNDING STATUS:** FUNDED

**SERVICEWIDE ISSUE CODES:** N20

**CULTURAL RESOURCE TYPE CODE (where applicable):**

**PACKAGE NUMBER:**

**PROBLEM STATEMENT:**

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Proposal Date: 90

32
DESCRIPTION OF ACTION:

1) Recommended Action:

CONTINUATION OF MONITORING EFFORTS WITH THE BUREAU OF RECLAMATION.

The Bureau of Reclamation has installed three reflector prisms on the upstream face of the arch and five surveying points in Bridge Canyon upstream of the arch. Geologic inspections and photographic records are to continue annually, while surveys using the prisms and fixed points are conducted each February and August, taking two-to-three man crews approximately three days.

Through efficient monitoring techniques, minute shifts and movements in the rock structure of Rainbow Bridge will be detected and will also help in documenting long-term stability. A biannual record of the exact position and configuration of the Bridge will be obtained, documenting any subtle shifts to within six months of occurrence. Should a major change occur, more information will be available to help attribute a cause.

The Branch of Natural Resources will continue to work in concert with the Bureau of Reclamation on this project. This project has been funded by the Bureau of Reclamation on its own volition; there is no guarantee that the bureau will continue funding the project.

2) Alternative Actions and Impacts:

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6

Proposal Date: 90
PROJECT NUMBER: RABR-N-009

TITLE: MONITOR EROSION AND HAZARDOUS ROCKFALL AREAS

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N20

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:
Due to erosion forces and hazardous rockfalls within the monument boundaries, continued inspection of potentially hazardous areas must be ongoing.

Erosion is a natural process throughout the monument. New erosion caused by the influences of man in the monument are wave action, pool fluctuations of Lake Powell and multiple trailing.

Rockfalls due to natural or lake causes pose a threat to the safety of visitors. A rockfall originating above the visitor access trail several years ago did not injure anyone only through good luck. The potential for serious injury or death and property damage exists.

DESCRIPTION OF ACTION:
1) Recommended Action:
CONTINUE ANNUAL INSPECTIONS OF POTENTIAL HAZARD AREAS.

The National Park Service will negotiate with the U.S. Bureau of Reclamation (USBR) to conduct an annual hazard rock inspection of the monument noting potential danger areas. These areas would be regularly monitored using appropriate techniques such as crack measuring devices. If the potential danger of an imminent rockfall exists, management options are to restrict visitors from the area, reroute the visitor access routes or remove the danger.

Multiple trailing which is also one of the erosion forces acting on the monument is addressed in project statement RABR-N-011.

2) Alternative Actions and Impacts: N/A

Proposal Date: 90
PROJECT STATEMENT

PROJECT NUMBER: RABR-N-010

TITLE: SECURE WATER RIGHTS FOR THE MONUMENT

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N13

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Water rights for the monument need to be secured to maintain its natural and historical nature.

Bridge Creek flows underneath Rainbow Bridge and created the arch by cutting through the sandstone in a geological process begun approximately 60 million years ago. Bridge Creek flows into the monument from the Navajo tribal lands to the southeast. Even though Lake Powell has altered the natural flow regime of the creek, it is essential that the park secure Bridge Creek water rights to maintain the natural and historical nature of the monument.

Need to assess instream flow required to maintain natural nature of the monument before perfecting water rights.

DESCRIPTION OF ACTION:

1) Recommended Action:

QUANTIFY AND SECURE WATER RIGHTS.

Park staff will work with the Water Resources Division based in Fort Collins, Colorado, and with the Regional Solicitor's Office in Denver to develop a program to secure water rights for the monument. This will be a multi-year effort involving historical and legal research, instream flow studies and field monitoring of flows in Bridge Creek, springs and seeps.

The Branch of Natural Resources will coordinate this effort.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6

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Proposal Date: 90
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-011

TITLE: ELIMINATE MULTIPLE TRAILS

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N18

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Multiple trailinq has resulted in a loss of soil and vegetation in several areas adjacent to the only maintained trail in the monument. Resource degradation will continue unless action is taken to mitigate this problem.

The NPS maintains one trail from the boat dock and floating walkway, under the natural bridge, to the boundary of the monument. The large number of visitors using the area immediately adjacent to Rainbow Bridge has created a network of multiple or social trails, causing soil compaction, erosion, loss of vegetative cover, mass wasting in sandy areas, and aesthetic degradation. These trails disturb natural environments, disrupt natural processes and destabilize slopes which then become safety hazards due to the potential for rockslides.

DESCRIPTION OF ACTION:

1) Recommended Action:

DELINEATE A SINGLE MAINTAINED TRAIL THROUGH THE MONUMENT

The park will mitigate the effects of multiple trailinq by delineating a single maintained trail. In conjunction with the maintained trail, interpretive signs/brochures will be developed explaining the fragile nature of the resource and the need to stay on the delineated trail. Presently a 150-foot section of trail has been hardened using aggregated concrete, colored to blend with the natural surface.

DEVELOP AND IMPLEMENT A REHABILITATION MONITORING PROGRAM

Proposal Date: 90
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-012

TITLE: REHABILITATE AREAS OF SOIL COMPACTION

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N22

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Soil compaction and loss of vegetation in the monument is a problem directly related to multiple trailing caused by visitor use.

Multiple trailing has caused extensive soil compaction and loss of vegetation. Much of the original topsoil has been lost through erosion and some areas have been worn down to the Kayenta formation bedrock with no soil remaining. In areas near the boat dock and arch, the trail is less defined and as much as one foot of the limited topsoil has been lost from trailing and trampling. Native vegetation has been lost and the disturbed surface now has the potential to provide a medium for invasion by alien species.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP AND IMPLEMENT A REHABILITATION ACTION PLAN

Park staff will develop and implement a rehabilitation action plan for the monument. Actions considered in the plan will include:

1) replacing lost topsoil in areas worn to bedrock
2) revegetation with native plants
3) scarification and aeration of compacted soil to aid restoration efforts

Restoration efforts will eliminate multiple trailing and, along with interpretive efforts, help mitigate vegetative loss and soil compaction in areas selected for public exclusion.

DEVELOP AND IMPLEMENT A REHABILITATION MONITORING PROGRAM

Proposal Date: 90
**PROJECT STATEMENT SHEET**

**RABR-N-012**

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**PROJECT STATEMENT SHEET**

**RABR-N-013**

**PROJECT NUMBER:** RABR-N-013

**TITLE:** DEVELOP A HAZARDOUS SPILL PROGRAM

**FUNDING STATUS:** UNFUNDED

**SERVICEWIDE ISSUE CODES:** NIl

**CULTURAL RESOURCE TYPE CODE (where applicable):**

**PACKAGE NUMBER:**

**PROBLEM STATEMENT:**

The current heavy visitation is expected to continue and even expand causing extensive crowding in the dock area as boats maneuver to the dock. Minor bumping accidents between boats occur routinely with occasional incidents of extensive damage due to inexperienced boat operators. The potential for fuel spills from these incidents is high. At this time, there is no equipment or permanent staff at the monument to contain a fuel spill. There are no other known sources of potential release of hazardous materials.

**DESCRIPTION OF ACTION:**

1) **Recommended Action:**

A plan detailing appropriate spill containment techniques, equipment required, level of trained staff required, and cost estimates will be developed to handle any fuel spills at Rainbow Bridge. The plan will be developed in conjunction with the concessionner, ARA, Inc. Current technology will be examined to develop the best techniques for the monument dock area and Bridge Canyon.

The plan would be implemented through the acquisition of containment and cleanup materials for storage onsite and training of park staff.

2) **Alternative Actions and Impacts:**

2) Alternative Actions and Impacts: N/A

**COMPLIANCE CODE(s):** EXCL

**EXPLANATION:** NEPA compliance through RABR GMP

**COMPLIANCE CODE(s):** DOC
EXPLANATION: NEPA compliance through RABR GMP.

BUDGET AND FTE's:

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NF2 PRO 2.0 0.1

Year 2: Source Act Type Budget($1000) FTE
NF2 PRO 2.0 0.1

Year 3: Source Act Type Budget($1000) FTE
NF2 PRO 2.5 0.1

Year 4: Source Act Type Budget($1000) FTE
NF2 PRO 2.5 0.1

PROBLEM STATEMENT:
Water quality needs continued monitoring in order to provide baseline data for accurate management decisions.

Due to possible impacts from fuel spills at the boat docks and the floating vault toilets making swimming prohibited at the monument, water quality will be regularly monitored. Monitoring and testing is to be done at Glen Canyon NRA water laboratory on an intermittent basis with no evidence of degradation noted at this time. Additional monitoring of Bridge Creek will be done to establish a baseline and detect any changes.

DESCRIPTION OF ACTION:
1) Recommended Action:

CONTINUATION OF WATER QUALITY MONITORING.

Water quality will continue to be monitored. Monitoring provides baseline data to establish an early warning system. A constant monitoring program will help identify problem areas and causes, enabling NPS to prevent the degradation of the resource.

Monitoring will be coordinated and results determined by the Division of Natural Resources.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6
PROJECT STATEMENT SHEET

BUDGET AND FTE's:

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Year 3: Source | Act Type | Budget ($1000) | FTE
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NF1 | MON | 2.5 | 0.1

Year 4: Source | Act Type | Budget ($1000) | FTE
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DESCRIPTION OF ACTION:

Rainbow Bridge is located in a narrow, steep-walled canyon. Sound from visitors, low-flying aircraft and boats is amplified and echoed throughout the canyon. Current monitoring indicates that visitor activity results in the greatest auditory impact to the area. This source is present most often near the bridge itself, with sound at various levels persisting throughout the day. Monitoring is being conducted under a one-year research program designed to assess the character and magnitude of noise impacts.

Rainbow Bridge and Navajo Mountain are the focus of many scenic flights in the area. Over 6,000 visitors per year presently take these flights. No figures are presently available on the number of private aircraft that fly over Lake Powell and Rainbow Bridge to view the scenery provided by these areas but both helicopter and fixed-wing aircraft fly above Bridge Canyon to sightsee around Rainbow Bridge. Sound caused by aircraft and their presence, detracts from the tranquility of the scene and has the potential to lessen the quality of the visitor's experience. Sound from military aircraft that traverse the area are less frequent, but could raise the background noise levels at the Bridge. Sonic booms may have particularly adverse social and physical impact (vibration).

Boat sounds are loud and usually present during daytime hours, making boats a significant source of potential sound impacts.

Besides detracting from the visitor experience, sound vibrations could potentially trigger rock slides within the confines of the narrow canyon.

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Besides detracting from the visitor experience, sound vibrations could potentially trigger rock slides within the confines of the narrow canyon.

DESCRIPTION OF ACTION:

Proposal Date: 90
1) Recommended Action:

COMPLETE SOUND MONITORING STUDY

The ongoing sound monitoring will be completed in May 1990, and all data collected will be evaluated to determine if monitoring should continue and/or a specific management action is warranted. Based on the recommendations from this monitoring program, a Noise Abatement Plan may be developed to address methods of reducing visitor noise levels, recommended aircraft altitude levels, public education programs developed with Page Airport, and coordination with U.S. military flights to ensure appropriate flight routes and altitude levels. Sound monitoring in future years is likely to be needed.

During the current planning for Rainbow Bridge, the type, location and design of facilities will be evaluated for noise abatement value.

Related projects include: RABR-N-008; RABR-N-016

Project duration is one year, with follow-up monitoring on an ongoing basis, as necessary.

Project responsibility is assigned to WASO Mining and Minerals Division and the Branch of Natural Resources GLCA/RABR.

CONDUCT A STUDY OF VISITOR PERCEPTION OF SOUND LEVELS

Sound of various types and levels may or may not have a detrimental effect on visitors, depending on the perceptions and expectations. A study of the impact of sound on monument visitors is needed to assess the effect of recorded sound levels.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-016

TITLE: DEVELOP AN AIRCRAFT MANAGEMENT PLAN

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N15

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:

Private, commercial and military aircraft all share the same air space over Rainbow Bridge National Monument. Unscheduled and unregulated flights have the potential to impact passenger safety. Potentials for impacts need documentation and a management plan developed to address the issue.

Presently, both helicopter and fixed-wing aircraft fly into Bridge Canyon to sightsee around Rainbow Bridge. Unscheduled military flights also utilize the same air space during the same time as other private and commercial aircraft. All flights are unregulated as far as type and number of aircraft allowed in the area at one time.

Over 6,000 visitors on commercial flights, and an unknown number in private planes, visit the monument by air. Military flights are less frequent, but when added to the total number of flights in and around the area, the potential for in-flight accidents is very much a reality.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP AN AIRCRAFT OVERFLIGHT PLAN

Commercial and private aircraft flights are increasing over the monument. The number of high-speed, military aircraft flights is presently unknown; however, the potential for in-flight collisions will not decrease even if the unknown status-quo for military flights is maintained.

A carrying capacity study for aircraft overflights needs to be initiated in a levels of acceptable change proposal framework to address the issues of airspace crowding, degradation of the natural and aesthetic resources of the monument and the issue of safety. This study would serve as the critical component in the development of an overall aircraft management plan.

Related projects include: RABR-N-015

The project would be carried out over a two-year period and will include: carrying capacity study for aircraft overflights (year 1); development of an aircraft management plan for the monument (year 2).

Project responsibility would be assigned to the Branch of Natural Resources.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EA

EXPLANATION:

BUDGET AND FTE’s:

Year 1: Source Act Type Budget($1000) FTE
NF11 RES 15.0

Year 2: Source Act Type Budget($1000) FTE
NF11 RES 10.0

Year 3: Source Act Type Budget($1000) FTE

Year 4: Source Act Type Budget($1000) FTE

Proposal Date: 90

51 77
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-N-017

TITLE: MONITOR NATIVE AND ALIEN VEGETATION

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: N08 N05

CULTURAL RESOURCE TYPE CODE (where applicable): COMB

PACKAGE NUMBER:

PROBLEM STATEMENT:
Impacts to the native vegetation of Rainbow Bridge National Monument are presently occurring from heavy visitation and the invasion of alien flora. Air pollution, too, has the potential to impact the native flora of the monument. In order to monitor change in species composition, vitality and overall cover, a monitoring program will be implemented to address these issues.

The park GIS will be used to store and manipulate data collected in the field so that the most effective use and integration of these data can be made to facilitate sound management decisions.

DESCRIPTION OF ACTION:
1) Recommended Action:
IMPLEMENT VEGETATION MONITORING

Upon establishment of the monitoring program, field data can be collected based on the established monitoring protocol. These data can be stored in a database program and transferred directly to the GIS. Once integrated into the GIS, these data can be used in combination with other resource data layers, such as soils, to provide the most efficient use of all resource data for management purposes.

Related projects include: RABR-N-001; RABR-N-003; RABR-N-004; RABR-N-005; RABR-N-007;

Project duration is continuing and includes implementation of monitoring program and integration of database into the park GIS.

Responsible of the project will be assigned to the Proposal Date: 90

RABR-N-017

PROJECT STATEMENT SHEET

Branch of Natural Resources with assistance from the WASO GIS Division.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6

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Proposal Date: 90
Aesthetic qualities of natural areas are often overlooked during the planning process. However, visitors to natural areas often derive the most satisfaction from their visit based on what they perceive as the aesthetic qualities a given resource provides.

It is documented that aesthetic qualities are one of the most significant resources of the monument, as visual beauty is most often cited by visitors as a primary reason for their visit. Results of a 1988 survey of monument visitors showed that 94 percent listed viewing scenery as a main activity and 80 percent listed photography.

Only through adequate inventorying and monitoring procedures can management detect and mitigate damage to the natural and cultural resources of the monument to ensure that the aesthetic qualities are left unimpaired for future generations.

DESCRIPTION OF ACTION:
1) Recommended Action:
DOCUMENT EXISTING VIEWS
Establish photopoints to serve as baseline references.
INCORPORATE PROTECTION OF AESTHETIC RESOURCE INTO ONGOING MANAGEMENT
Establish aesthetics as primary objective.
2) Alternative Actions and Impacts: N/A
PROJECT NUMBER: RABR-N-019

TITLE: PROTECT AND INTERPRET RESOURCES

FUNDING STATUS: FUNDED

SERVICEWIDE ISSUE CODES: N22

CULTURAL RESOURCE TYPE CODE (where applicable):

PACKAGE NUMBER:

PROBLEM STATEMENT:
Over 250,000 visitors go to the monument annually. Boat access and docking and pedestrian activities in the monument are restricted to the narrow canyon floor. The presence of uniformed personnel is necessary to inform visitors of proper behavior and to take direct action to stop prohibited activity that impacts visitor experience or resources. Litter pick up and graffiti prevention are ongoing required activities. Present staffing is inadequate to ensure resource protection but does occur particularly during the months of June through August.

DESCRIPTION OF ACTION:

1) Recommended Action:
Litter pickup and graffiti removal will take place. Patrols by uniformed staff will result in information to visitors on purpose of the monument and proper activities. Prohibited acts that result in degradation of resources will be stopped. Present staffing level is such that all prohibited acts are not stopped.

These activities are ongoing with most coverage occurring during the period of June through August and are the responsibility of the Visitor Services and Maintenance Divisions.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 526 DM2 app.2, 1.5 and 1.11

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Proposal Date: 90
IV. PRESENT STATUS OF CULTURAL RESOURCES

CULTURAL RESOURCES BASELINE INFORMATION

The status of cultural resource documentation is indicated on the Cultural Resource Documentation Checklist located in the appendices.

CULTURAL RESOURCES

Sites

Definition: Sites are distinguishable pieces of ground; or areas upon which occurred some historic or prehistoric event; or which are significantly associated with historic or prehistoric events, persons, or cultures; or which were subjected to sustained human activity.

The Archeological Survey is about 63 percent complete. The higher 60 acres of the monument need to be surveyed. In 1985, archeologists from Northern Arizona University (Gieb...) intensively surveyed 100 acres of the monument. As a result of this survey, 8 archeological sites and 3 isolated finds were recorded in a 70-acre area of the monument. Of the eight sites recorded, six of the sites are National Register of Historic Places, in accordance with the criteria in 36 CFR 60.4.

Four of the monument sites have potentially significant rock art inscriptions, including the names of such famous figures as Zane Grey and John Wetherill. One of the sites, UT-V-13-156, is located at the east base of the bridge, where numerous inscriptions have been carved throughout the years by park visitors. Detailed recording of these inscriptions may reveal the presence of additional significant inscriptions that have not yet been recognized. Two of four sites are located in the area of potentially heavy visitor graffiti (UT-V-13-156, and UT-V-13-152).

Structures

Definition: Structures are works of humans, consciously constructed to serve some form of human activity. The structures are usually immovable by nature or design.

There are no structures in the monument. Physical remains of early historic use along the Colorado River have all been inundated by Lake Powell. Physical remains of the Rainbow Lodge, and other structures along the Rainbow Trail are outside of the monument. However, numerous early registers from the lodge are currently in possession of the park. Plaques dedicated to the "discovery" party have been placed along the trail within the monument boundary.

Objects (Museum Collections)

Definition: Objects are material things possessing functional, aesthetic, cultural, symbolic, and/or scientific value. An object is usually movable by nature or design.

Glen Canyon NRA has a small collection of historic photographs and documents pertaining to the history of Rainbow Bridge and its visitors. The Rainbow Bridge photographic collection needs to be organized and cataloged and segregated from the Glen Canyon collection. The majority of the documents have already been cataloged and approximately 20 historic documents pertaining to Rainbow Bridge are currently stored as museum objects.

The photographic collection is currently located at the Wahweap district ranger’s office and is generally in fair condition. None of the collection is stored in compliance with Special Directive 80-1, and it is expected that substantial deterioration of the photographs will be revealed when they are finally examined and their storage is upgraded. It is known that some nitrate negatives are either part of, or stored with, the Rainbow Bridge photographs. The historic documents range in condition from poor to good.

A Scope of Collections also should to be prepared to identify possible additions to the Rainbow Bridge museum collection. It is probable that the need for acquisition of historic and ethnographic documents, files, and historic photographs will be identified.

Ethnographic Resources

Definition: Ethnographic resources, in this context, are park resources that have traditional subsistence, sacred ceremonial or religious, residential, or other cultural meaning for members of contemporary park-associated ethnic groups, including Native Americans.

It is well known that Rainbow Bridge has religious significance for the Navajo people. There appears to be adequate evidence to conclude that twentieth-century Navajos and some San Juan Paiutes, influenced by the Navajos, consider Rainbow Bridge to be a sacred place. There is some evidence that veneration of Rainbow Bridge is an elaboration of a traditional Navajo attitude toward all natural arches and bridges.

The monument is occasionally used by individuals from the Navajo Tribe for religious ceremonies near the bridge. Currently, there is a great deal of visitor impact in the immediate area of the bridge itself. Visitation is high and unsupervised, resulting in a somewhat secular atmosphere.

There has been discussion between the Service and the Navajos that the monument be closed to the general public one day during the year to allow for Native American religious ceremonies. At this time, a formal request has not been made. These requests are normally granted as being in accord with the provisions of the Native American Religious Freedom Act.
V. CULTURAL RESOURCES MANAGEMENT PROGRAM

OVERVIEW OF CURRENT PROGRAM AND NEEDS

Sites

Graffiti is present in numerous locations along the visitor access trail. Identified archeological sites are in danger of being lost due to graffiti scratched upon the monument and patinated rock surfaces. There is currently no ongoing program for graffiti removal at Rainbow Bridge. The strategy for the future is for graffiti removal and cyclic maintenance. Currently, visitors are encouraged, through a law enforcement notice at the dock, to report all violations and destruction of monument resources. In light of the heavy visitation and destruction of park resources, park management is considering the establishment of a full-time ranger staff at the monument.

Most of the monument has been surveyed for archeological sites by archeologists from Northern Arizona University in 1985. They surveyed 100 acres of the 160 acres in the monument. The unsurveyed acres are primarily high in rocky areas requiring technical climbing expertise for access. The strategy for the future is to monitor and protect the eight recorded sites and to complete the survey.

Little information is available concerning historic values and administrative background for the park. The strategy for the future is to prepare a special historic study and Administrative History of the monument.

A study will also be prepared documenting the historic vernacular landscape and identifying condition changes. This will be used to guide future management actions in the monument.

Structures

There are no structures in the monument and physical remains of early historic use along the Colorado River have all been inundated by Lake Powell.

Objects (Museum Collections)

There is no ongoing program for the organization or cataloging of the photographic collection. The strategy for the future is for a Scope of Collections Statements to be developed and for the Rainbow Bridge photographic and archival collections to be cataloged and separated from the Glen Canyon collection.

Ethnographic Resources

It is well known that Rainbow Bridge has religious significance for the Navajo people, but there is no information defining the nature and extent of the bridge’s significance. Currently the heavy, unsupervised visitation results in a somewhat secular atmosphere.

The strategy for the future is to prepare an ethnographic overview and assessment of the monument, which will identify information and resource data gaps and consultation needs as well as objectives and parameters for Ethnographic Resource Study, Traditional Use Study and Ethnographic Resource Inventory.

The programming sheets on pages 63 through 65 and Tables 1 and 2 in the appendices provide summary information on the current program needs. The cultural resource documentation checklist and status summary charts in the appendices provide additional overview.
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**CULTURAL RESOURCE PROJECT STATEMENTS**

**RABR-C-001** Remove Graffiti; Cyclic Maintenance  
**RABR-C-002** Prepare A Special History Study  
**RABR-C-003** Prepare Ethnographic Studies  
**RABR-C-004** Catalog Historic Documents and Photographs  
**RABR-C-005** Prepare A Scope of Collections Statement  
**RABR-C-006** Prepare An Administrative History  
**RABR-C-007** Conduct Rock Art-Historic Inscription Inventory  
**RABR-C-008** Prepare Ethnographic Overview and Assessment  
**RABR-C-009** Preserve Cultural Landscape  
**RABR-C-010** Monitor Cultural Landscape  
**RABR-C-011** Conduct Site Inventory of Monument
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-001

TITLE: REMOVE GRAFFITI; CYCLIC MAINTENANCE

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C18 C20

CULTURAL RESOURCE TYPE CODE (where applicable): CULL

PACKAGE NUMBER:

PROBLEM STATEMENT:

Heavy and unsupervised visitor use is resulting in extensive graffiti and defacement of exposed rock surfaces. This graffiti interferes with the visual impact of the bridge and detracts from the visitor’s experience.

Graffiti is present in numerous locations along the visitor access trail, in many places scarring heavily patinated rock surfaces. Graffiti removal is difficult to do in such a way as to not extensively deface natural rock surfaces. Visitor graffiti is intermingled in several instances with historic inscriptions that have cultural and ethnographic significance. A program is needed to provide for the careful removal of graffiti using selected techniques to avoid damage to the rock surfaces, and to avoid impacting culturally significant inscriptions.

There is currently no ongoing program for graffiti removal at Rainbow Bridge. However, in 1988, a stabilization specialist conducted a training session in the proper methods for graffiti removal, and equipment and trained staff are available in-house. Documentation and monitoring methodologies currently being used for sites in Glen Canyon NRA could also be implemented at Rainbow Bridge.

Lack of uniformed rangers results in establishment of graffiti. Scheduled presence of uniformed personnel is needed to prevent graffiti as well as a passive information/education program to prevent visitors from causing graffiti.

DESCRIPTION OF ACTION:

1) Recommended Action:

DEVELOP AND IMPLEMENT A GRAFFITI REMOVAL AND PREVENTION ACTION PLAN

Park staff will develop and implement a graffiti removal and prevention action for the monument. The basic steps of the proposed activity include the following:

1. Graffiti Removal - using accepted techniques of wet and dry brushing, percussion and abrasion, and other methods, identified graffiti elements will be removed.

2. Photodocumentation - will be completed before and after graffiti removal, with notes taken on the extent and level of effort expended.

3. Develop information/education program and develop a schedule of on-site uniformed personnel.

Initial graffiti removal will restore the monument to a more pristine condition, thereby enhancing the visitor's appreciation and enjoyment.

Graffiti removal will occur during FY1.

DEVELOP AND IMPLEMENT A GRAFFITI MONITORING PROGRAM

A regular monitoring program, together with cyclic maintenance to remove new graffiti elements, will be instituted subsequent to graffiti removal. All staff assigned to this activity will be trained to utilize the baseline documentation to recognize and avoid historic elements.

Follow-up monitoring and cyclic maintenance on an on-going regular basis will prevent further unsightly graffiti accumulations before they become severe again.

Initial monitoring will take place during FY 1, within several months following graffiti removal; follow-up monitoring & cyclic maintenance will occur during FYs 2-4.

Other related projects include: RABR C 007

Project responsibility will be assigned to the Branch of Cultural Resources, Maintenance Division and Visitor Services Division.
2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): DOC NHPA
EXPLANATION: NEPA compliance addressed in GMP

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Proposal Date: 90

CURRENT PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-001

TITLE: PREPARE A SPECIAL HISTORY STUDY

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C01 C02

CULTURAL RESOURCE TYPE CODE (where applicable): ETHN

PACKAGE NUMBER:

PROBLEM STATEMENT:

Currently, little is known concerning significant aspects of the history of Rainbow Bridge. Such information would be useful in making certain management decisions. In addition, the history of exploration in and around the monument is known to be of particular interest to visitors to the monument. Potential topics include:

1. Historic use of the Colorado River in the vicinity of the monument during the late 1800s by Native American groups, miners and river-runners, specifically to address the question of who really "discovered" the bridge.

2. The construction and use of the Rainbow Lodge and Rainbow Trail, associated constructed roads leading to the Lodge, and specific sites and features along the trail.

3. The "discovery" party itself, its members, goals, and significance.

4. Visitation of the bridge since its "discovery."

5. Historic circumstances leading to its designation as a National Monument.

DESCRIPTION OF ACTION:

1) Recommended Action:

This project will be divided into three primary phases:

1. Conduct research to locate sources of information and develop plans for obtaining needed data.

2. Collect data, which may involve visiting archival
repositories, contacting authorities on local history, researching source materials, conducting interviews, and reviewing park documents and files.

3. Prepare a synthetic report suitable for use as both an administrative document and interpretive resource. Any objects added to park collections as a result of the project will be cataloged and curated.

The completion of this project will contribute to more comprehensive understanding of historic use of the monument. This information will be useful for both management and interpretive needs.

The duration of the project will be two years. FY1 will include the identification of data sources and data collection. Report preparation will be completed in FY2.

Other related projects include: RABR C 006

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6

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PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-003

TITLE: PREPARE ETHNOGRAPHIC STUDIES

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C04

CULTURAL RESOURCE TYPE CODE (where applicable): ETHN

PACKAGE NUMBER:

PROBLEM STATEMENT:

Rainbow Bridge has religious significance for the Navajo people. It may be significant to other Native American peoples as well. An holistic ethnographic study is needed to determine concerns for natural and cultural resources.

1. The nature and extent of the ethnographic significance of the bridge.
2. The role of the bridge in Native American cultures, in both modern and historic times.
3. The current needs and beliefs of Native American peoples relative to the monument that might affect management activities and concerns regarding the management of monument resources.
4. Modern patterns of access and use by contemporary Indian people.

This project can be divided into two phases: ethnographic fieldwork and report preparation.

DESCRIPTION OF ACTION:

1) Recommended Action:

An ethnographic study will be conducted to address the above concerns. The fieldwork phase will involve a background documentation (Ethnographic Overview and Assessment) review, followed by in-field interviews with Native Americans known to have occupied or used the Rainbow Bridge area for ceremonial or secular purposes. Interviews should include tribal elders who visited Rainbow Bridge in the past, when possible, as well as modern Native American visitors. The ensuing report will be suitable for both administrative and interpretive use, and might complement the Historic Use Study (RABR-C-002).

The project will take two years to complete. FY1 will involve fieldwork and data collection. Report preparation will be completed during FY2. All objects obtained as a part of the project will be cataloged and curated.

Other related projects include: RABR C 008
RABR C 009

Project responsibility will be assigned to the Branch of Cultural Resources, who will be responsible for coordinating various aspects of the project, overseeing the fieldwork, and reviewing report drafts.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL OTHER

EXPLANATION: 516 DM2 App. 2, 1.6. AIRFA consulta

BUDGET AND FTE's:

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Proposal Date: 90
**RABR-C-003**

**PROJECT STATEMENT SHEET**

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Proposal Date: 90
Glen Canyon NRA currently has a small collection of historic photographs and documents pertaining to the history of Rainbow Bridge and its early visitors. There is currently no ongoing program for the care of these collections, or for the organization or cataloging of the photographic collection.

The Rainbow Bridge photographic collection needs to be organized, cataloged, and segregated from the Glen Canyon collection and stored in a manner that prevents/retards deterioration of any collections. Most of the documents have already been cataloged but also need to be segregated from the Glen Canyon collection. An unknown number of photographs with nitrate negatives need to be copied.

DESCRIPTION OF ACTION:

1) Recommended Action:

Treatment of the photographic collection will involve the organization, identification, copying, labeling, cataloging, and storage of each item. It may be necessary to issue new catalog numbers to each photograph or document to be segregated for the Rainbow Bridge collection.

This project will be completed within one year.

Other related projects include: RABR C 005

Project responsibility will be assigned to the Branch of Cultural Resources.

2) Alternative Actions and Impacts: N/A
PROJECT NUMBER: RABR-C-005

TITLE: PREPARE A SCOPE OF COLLECTIONS STATEMENT

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C09

CULTURAL RESOURCE TYPE CODE (where applicable): OBJC

PACKAGE NUMBER:

PROBLEM STATEMENT:

A Scope of Collections needs to be prepared to establish the parameters of what would be accepted in the collections, to identify needs for possible additions to complete or round out the Rainbow Bridge museum collection, carry out consultation with Native American groups concerning collection contents, and address collection items that are not relevant to the monument and their disposition.

DESCRIPTION OF ACTION:

1) Recommended Action:

A professionally researched and written Scope of Collections will be completed by a qualified curator who will write the document. It is probable that the need for acquisition of historic ethnographic documents, files and historic photographs will be identified.

The project will be completed within one year.

Other related projects include: RABR C 004

Project responsibility will be assigned to the Branch of Cultural Resources.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 7.4 B(2)
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-006

TITLE: PREPARE AN ADMINISTRATIVE HISTORY

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C08

CULTURAL RESOURCE TYPE CODE (where applicable): PACKAGE NUMBER:

PROBLEM STATEMENT:

No single administrative document is available that summarizes and syntheses the years of NPS management at Rainbow Bridge since 1916. NPS-28 recommends an administrative history for each area. An administrative history is needed that will document the formation of the monument, an event about which little is known at the present time.

DESCRIPTION OF ACTION:

1) Recommended Action:

A professionally researched and written administrative history will be undertaken. This history should describe the establishment of the monument, management policies, designation programs, relationships, consultations and agreements with Native Americans, and development and use of facilities. The history should also address the management of the monument from its establishment in 1910 to 1916, when NPS was created and assumed management responsibilities.

The project should be completed within a one year period.

Other related projects include: RABR-C-002

Project responsibility will be assigned to the Branch of Cultural Resources, who will coordinate and oversee its completion.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 1.6

80 Proposal Date: 90

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PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-007

TITLE: CONDUCT ROCK ART-HISTORIC INSCRIPTION INVENTORY

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C02

CULTURAL RESOURCE TYPE CODE (where applicable): SITE

PACKAGE NUMBER:

PROBLEM STATEMENT:
The rock art and historic inscriptions found on the rock faces around Rainbow Bridge contain a legacy of long use of the area by prehistoric and historic visitors. The known prehistoric rock art and many of the historic inscriptions have been documented; however, a complete inventory is needed. This work will be necessary before graffiti removal on adjacent rock surfaces can be accomplished.

DESCRIPTION OF ACTION:

1) Recommended Action:
A complete inventory of prehistoric rock art and historic inscriptions around the base of the bridge will be completed. This work will include thorough documentation, including the preparation of detailed point-provenience maps of all panels containing inscriptions thought to be of historic importance. Archival-quality photodocumentation and sketches of each of the identified panels will also be completed. Panels of questionable origin or significance should be researched using historic and ethnographic information.

This project may result in important information regarding early visitors to the bridge, and will also serve as baseline data for the graffiti removal action plan.

The project will be completed within a one-year period.

Other related projects include: RABR C 001
Project responsibility will be assigned to the Branch of Cultural Resources.

2) Alternative Actions and Impacts: N/A

Proposal Date: 90

82
Title: Prepare Ethnographic Overview & Assessment

Problem Statement:
An ethnographic overview and assessment is needed to outline research issues to be addressed in a subsequent ethnographic study.

The Rainbow Bridge area has been occupied by various Native American groups for many centuries. The bridge itself has religious significance for Navajos, and the surrounding area may have been used in other ways as well. Palutes, now largely subsumed within the Navajo population, also inhabit the area. In addition, early Euro-American visitors noted a shrine at the base of the bridge that may have been of prehistoric or historic Pueblo affiliation.

One of the NPS objectives in managing the use of the bridge is allowing for visitation by boaters and hikers, in a way that is compatible with Native American concerns and needs.

Description of Action:
1) Recommended Action:
An ethnographic overview and assessment will be completed to provide direction to an ethnographic study. The work will primarily involve conducting background research on previous published documents and archival materials. A professionally written, detailed report will be prepared that summarizes past and present uses of the area by Native American groups. This information will guide fieldwork during the ethnographic study.

The project will be completed within a one-year period.

Other related projects include: RABR-C-003, RABR-C-009.

Proposal Date: 90
PROJECT STATEMENT SHEET

RABR-C-009

PROJECT NUMBER: RABR-C-009

TITLE: PRESERVE CULTURAL LANDSCAPE

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: CULT LAND REPT CULT LANDSCAPE

CULTURAL RESOURCE TYPE CODE (where applicable): CULL

PACKAGE NUMBER:

PROBLEM STATEMENT:

The cultural landscape is of a particular type called an ethnographic landscape. As it presently exists, this landscape is an important, but fragile, aspect of the monument. This landscape needs to be preserved.

The condition of the ethnographic landscape is unknown, because what constitutes the entire ethnographic landscape is yet to be determined. However, impacts known to have occurred since the establishment of the monument include the inundation of the stream below the bridge by Lake Powell, and the construction of docks and walkways. These impacts are considered severe to moderate. Identification of the landscape, detailed documentation of its present condition, and the identification of condition trends is needed to manage the landscape and protect it from further degradation.

DESCRIPTION OF ACTION:

1) Recommended Action:

A document will be prepared that describes the ethnographic landscape, as is, with the goal of preventing additional deterioration. The study should attempt to determine the appearance of the bridge landscape at selected dates in the past, through the use of archival materials (documents and photographs), interviews with earlier visitors regarding their attitudes and aesthetic perceptions of the bridge, and possibly other means. This information will be used to identify trends in condition changes over time, and will guide future management decisions in the monument.

This project will be completed within a one-year period.

Other related projects include: RABR-C-003,

Proposal Date: 90

RABR-C-009: these two projects should be completed before RABR-C-009 begins.

Project responsibility will be assigned to the Branch of Cultural Resources.

2) Alternative Actions and Impacts: N/A

COMPLIANCE CODE(s): EXCL

EXPLANATION: 516 DM2 App. 2, 7.4 B(2)

BUDGET AND FTE's:

Year 1: Source Act Type Budget($1000) FTE

CRPP RES 10.0

Year 2: Source Act Type Budget($1000) FTE

Year 3: Source Act Type Budget($1000) FTE

Year 4: Source Act Type Budget($1000) FTE

Proposal Date: 90
PROJECT STATEMENT SHEET

PROJECT NUMBER: RABR-C-010
TITLE: MONITOR CULTURAL RESOURCES
FUNDING STATUS: UNFUNDED
SERVICEWIDE ISSUE CODES: C19
CULTURAL RESOURCE TYPE CODE (where applicable): SITE
PACKAGE NUMBER:

PROBLEM STATEMENT:

Several significant archaeological sites are located in the monument. On-going high visitation is endangering these fragile sites. A regular monitoring program is needed to identify specific impacts, which may result in further management actions to protect, or mitigate impacts, if necessary for these important resources. A monitoring program would provide early warning to deter and detect ARPA violations.

Although no substantial architectural sites are located in the monument, some sites have potential for significant subsurface cultural materials. This potential is especially apparent in dry shelters within the Navajo Sandstone, where well-preserved, perishable remains may be located.

No detailed baseline information beyond initial site documentation (1985) is available for archeological sites in the monument. However, based on on-going monitoring observations in Glen Canyon NRA, the level of impacts to sites tends to be proportional to the degree of visitation. Therefore, impacts to cultural resources located near Rainbow Bridge are likely. A monitoring program is needed to provide data for making subsequent management decisions regarding the preservation of these sites.

DESCRIPTION OF ACTION:

1) Recommended Action:

An on-going monitoring program will be developed and instituted in the monument. Methodologies currently in place in Glen Canyon NRA will be applied to Rainbow Bridge as well. This work will include documenting detailed site conditions, with extensive written records, maps and archival quality photographs.

BUDGET AND FTE's:

Year 1: Source Act Type Budget($1000) FTE
CF7 MON 10.0 0.4

Year 2: Source Act Type Budget($1000) FTE
CF1 MON 4.0 0.2

Year 3: Source Act Type Budget($1000) FTE
CF1 MON 5.0 0.2

Year 4: Source Act Type Budget($1000) FTE
CF1 MON 5.0 0.2

Proposal Date: 90
PROJECT NUMBER: RABR-C-011

TITLE: CONDUCT SITE INVENTORY OF MONUMENT

FUNDING STATUS: UNFUNDED

SERVICEWIDE ISSUE CODES: C22

CULTURAL RESOURCE TYPE CODE (where applicable): SITE

PACKAGE NUMBER:

PROBLEM STATEMENT:
A previous survey of the monument covered all but 60 acres of slickrock above the canyon rim. Additional survey is needed to provide complete coverage. At low lake level, a survey should be accomplished to determine if receding water exposes unrecorded sites.

DESCRIPTION OF ACTION:

1) Recommended Action:

An intensive, systematic pedestrian survey will be conducted on the slickrock areas above the canyon rim. Located archeological and/or historic sites will be fully documented. Documentation will include the completion of IMACS site forms, sketch maps, photographs, map plots on topographic quadrangles and/or aerial photos, and other information where necessary. A professionally written descriptive report will be prepared for NPS use as a research and management-oriented document.

A National Register evaluation will be conducted, and if warranted, nominations will be prepared and submitted.

This project will be completed within a one-year period.

Related projects include: RABR C 010

Project responsibility will be assigned to the Branch of Cultural Resources.

2) Alternative Actions and Impacts: N/A

Proposal Date: 90
VI. APPENDICES

Tables 1 & 2
Cultural Resource Documentation Checklist
Cultural Resource Status Summary Charts
Archeological sites
Objects
Cultural landscapes

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**CULTURAL RESOURCE DOCUMENTATION CHECKLIST**

Place an X in the appropriate column. Leave column blank if document is not required for the park. Remember that items in the first section, PLANNING DOCUMENTS, may also apply to natural resources. See NPS-28, Chapter 2 for description of each inventory or study.

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* photographs

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204
## SUMMARY CHART FOR CULTURAL LANDSCAPES

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PURPOSE OF FLASH FLOOD MITIGATION PLAN

INTRODUCTION

National Park Service (NPS) guidelines define "flash flood" as one in which the flood waters rise so rapidly that there is insufficient time for warning and evacuation of persons threatened by the flood. NPS guidelines classify such flash-flood areas as high hazard areas and require that specific management actions be taken to reduce the flood hazard. Thus, when studies reveal that existing structures or facilities are subject to the effects of flash flooding, as they are at Rainbow Bridge, a plan of action for flood mitigation is to be prepared. The following pages contain the National Park Service's Flood Mitigation Plan for Rainbow Bridge National Monument.

BACKGROUND

Flood mitigation methods were developed within NPS guidelines for compliance with Executive Order 11988 (Floodplain Management). Executive Order 11988 was developed "in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative," (E.O. 11988; 42 F 26951). Consistent with these guidelines, the National Park Service has developed the following objectives (listed in priority order) for floodplain management at Rainbow Bridge: protect life, allow existing visitor use areas to remain open to the public wherever possible, and protect property.

NPS guidelines specify protection against the probable maximum flood (PMF) within flash-flood hazard areas. This mitigation plan defines the probable maximum floodplain and 100-year floodplain. The 100-year flood is a flood that can be expected to be equaled or exceeded on average once every one hundred years. Floods of this magnitude occur frequently enough to pose a serious threat to all facilities and people. The PMF is the largest flood that can ever be expected to occur in an area; however, these floods are rare, and their statistical probability of occurring is uncertain. Estimates for the 100- and 500-year floods can be calculated to be about 8 and 10 feet, respectively, above the existing channel bottom in this area. No PMF is recorded for the area. Existing trails are located outside the area of 100- and 500-year floods. Actual delineation of the PMF will be done at the time of plan implementation. PMF limits will be used to set signing and provide visual information for a wayside exhibit. Larger flash floods have occurred on occasion; for example, in 1974 at Eldorado Canyon on Lake Mohave (nearby in Lake Mead National Recreation Area) a flood occurred that was 7.6 times larger than the calculated 100-year flood and two-thirds of the calculated PMF.
FLOOD MITIGATION ALTERNATIVES

INTRODUCTION
During preparation of the flood mitigation plan, considerable discussion occurred on the level (100-year versus probable maximum) and type (structural versus nonstructural) of flood mitigation that should be provided for those areas subject to flash-flood hazard. The plan evaluated both structural and nonstructural flood mitigation alternatives.

STRUCTURAL MITIGATION ALTERNATIVES
Structures like dikes, levees, and channels can be designed and built to control floods. They are very expensive, but achieve the greatest level of protection for floods up to the size they were designed to protect against. Structures are susceptible to failure, and great care must go into their design and construction. The consequences of a failure can be catastrophic since they usually are not anticipated or prepared for in advance. In addition, any structural mitigation measures undertaken at Rainbow Bridge would create a major visual intrusion and interfere with the monument's natural beauty. Measures could also involve construction of structures on Navajo lands, which would need to be coordinated with the Navajo Tribe.

NONSTRUCTURAL MITIGATION ALTERNATIVES
The more traditional flood mitigation measures are structural, such as dams, dikes, levees, and channels. In addition to these structural mitigation measures are nonstructural measures that can be applied whether structural measures are used or not.

Relocation
Relocation of threatened facilities out of flood hazard areas is the most effective nonstructural strategy. It eliminates the flood hazard for people and property, but it is very expensive. The following three methods only mitigate the hazard for people in the floodplain; property remains susceptible to damage.

Information/Education
Information/education can make people aware of a flood hazard and provide them information about coping with the threat. These activities include erecting warning signs, posting notices, distributing pamphlets, presenting information at public meetings, and distributing flood hazard area maps. Education and information activities are applicable nonstructural measures at all developed areas having a flood hazard, regardless of other measures that might be considered or implemented, excepting total relocation.

Flood Warning Systems
Flood warning systems can give people notice of an impending flood so that they protect themselves, and if time permits, their property. These systems include elements that deal with provisions for early identification of an impending flood; analysis of the magnitude, severity, and potential impact of an impending flood; and dissemination of appropriate warnings to parties likely to be affected by an impending flood.

Evacuation Planning and Emergency Preparedness
Evacuation planning and emergency preparedness consists of arrangements for evacuation of endangered areas when a flood is anticipated and other emergency preparedness actions. These arrangements consist of assignments of responsibility for various actions, provision of transportation or other assistance to evacuees, traffic control, and opening and operation of shelters to provide refuge in flood-safe areas. Once an evacuation plan has been proposed for an area, all NPS employees will be trained on what to do in a flood emergency. Evacuation planning for Rainbow Bridge is influenced by two factors. First, flooding can occur very quickly; therefore, people must respond rapidly to a warning to save their lives. Second, the facilities are located such that safe refuge is close at hand, but some are difficult to reach because of steep slopes.

ALTERNATIVES CONSIDERED, BUT REJECTED
Relocation of monument dock facilities to a place other than those shown in the alternatives is not feasible. Visitors could be stopped on the floating walkway some distance from Rainbow Bridge, but the visitor experience would be greatly diminished. All land access would have to be prohibited, or to avoid flood hazard, the floating platform would have to be several hundred yards from Rainbow Bridge, practically back to the existing courtesy docks. Due to the constrained lake channel in this area, a large floating platform for visitors to congregate on at the northwest end of the walkway would not be feasible. This facility arrangement is unacceptable if a meaningful visitor experience is to be maintained.

Structural flood mitigation measures such as dams, dikes, levees, and channels were not considered. Their impact on the monument was determined to be excessive. Such structures would directly contradict and degrade the purposes for which the national monument was established.

Another option for predicting flash-flood hazard is radar. However, there is not an adequate radar system in the area to provide such precise small drainage warning. If one were installed on Navajo Mountain, it would have the added benefit of providing flash flood warning capabilities for most of Glen Canyon National Recreation Area and surrounding areas. However, the cost of installing, maintaining, and monitoring such a system makes this option prohibitive.
CONCLUSION

Effectiveness of various flood mitigation measures varies widely. If the goal of the flood mitigation measures is to protect property, only structural mitigation and relocation are effective. However, if the goal is to protect people, the nonstructural mitigation measures offer relatively inexpensive alternatives.

The nonstructural measures are usually applied together and can result in successful evacuation. However, there are often people who refuse to leave their vehicles or obey the orders or warnings to evacuate. There may be elderly or disabled people who cannot respond quickly, and there is the possibility that some people won't receive the message to evacuate. Also, there can be failures in the flood warning system. They usually rely on devices in remote locations that sense rainfall or flood water levels and transmit their information by radio communications to a computer, radio dispatcher, or warning device that is automatically activated. The sensing devices and the radio communication systems must be maintained and in working order, and the radio communication systems must continue working through an electrical storm. The probability of a warning system failure cannot be estimated, but that possibility must be considered. Therefore, even if the last three nonstructural mitigation strategies are applied together, there may still be flood victims. The goal is to greatly reduce the number of victims, and the hope is that there will be none.

RAINBOW BRIDGE FLOOD MITIGATION PLAN

INTRODUCTION

There are four components of the Flash Flood Mitigation Plan—a wayside exhibit, additional signing, evacuation and emergency preparedness procedures and a warning system.

WAYSIDE EXHIBIT

Information can be provided that would greatly reduce the flash-flood hazard to visitors. Signing would be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. Per NPS regulations related to floodplain management, the wayside would show flood hazard areas and illustrate the flood of record (if known), 100-year flood, and probable maximum flood. This would be shown with a plan-view map of the area, showing flood hazard areas, safe areas to move to in case of a flood, and a cross-section diagram of Rainbow Bridge and the canyon under it, showing the various flood levels. Text would explain the hazard and what to do in case of a flash flood.

ADDITIONAL SIGNING

Signs telling visitors in the flood hazard zones where to move in case of a flood would be added. Any section of trail on land in the flood zone should have signs posted that simply read “Climb to Safety in Case of Flood” and show a diagram of a person ascending a steep slope. On the walkway that is in the flood hazard zone, signs should read “Return to Boats in Case of Flood and Leave Area.” Signing would be sized, located, and designed to minimize intrusions upon natural, cultural, and social values.

EVACUATION AND EMERGENCY PREPAREDNESS PROCEDURES

Evacuation and emergency preparedness measures would be identified for the monument. A chain of command outlining who is responsible for what actions must be identified. Emergency supplies would be stored at Dangling Rope and Rainbow Bridge. Supplies needed, their exact locations, and any necessary support facilities would be identified.

WARNING SYSTEM

Although warning systems are expensive to maintain, the ability to give adequate warning for evacuation of the few areas affected by flash flood is important. Under the plan, a warning system that provides at least six minutes advance warning would be installed. Given this time, visitors could be expected to be evacuated to areas of safety. Visitors
would be alerted to evacuate by warning devices at the dock and appropriate signing and land trails within the monument. Signing and warning devices would be sized, located, and designed to minimize intrusions upon natural, cultural, and social values. Ranger assistance would help insure an expeditious evacuation and greater assurance of success.

**System Design**

Two gauges would be located in the middle of the Bridge Canyon/Rosebud Creek Channel, one to two miles upstream. The location of the triggering mechanism needs to be placed sufficiently upstream to provide an acceptable warning time. The exact distance and warning time required will be provided to design engineers during system design by Fort Collins Water Resources Division and safety officials. The system would be equipped with photovoltaic panels to charge batteries for a radio transmitter. All would be accessible by trail, and construction and maintenance would be restricted by horseback or foot access. Actual design for the system would be done during the advanced planning stage for plan implementation and may include modeling of docking facilities from the impact of wave action generated by flash floods at various intervals. The assessment from this modeling will be used in displays in the wayside exhibit.

The most limiting flood depth for warning of an impending flash flood may be the 100-year flood or a smaller recurrence interval event. The appropriate criteria will be set at the time of system design by Fort Collins Water Resource Division and safety officials. At a minimum, the actual depth of a 100-year flood could be used and can be reasonably estimated for this area. Using equations presented in a U.S. Geologic Survey report (Thomas and Lindskov, 1983) for estimating depth of flow gathered for distinct climatic areas of the State of Utah \( D_{100} = 17.9 \times (A_{0.143})^* (E-0.680) \), the estimated depth of flow above the bottom of the stream channel for a 100-year flood is 7.5 feet where:

\[
D_{100} = \text{100-year recurrence interval flood depth}
\]

\[
A = \text{watershed area in square miles}
\]

\[
E = \text{average watershed elevation in thousands of feet}
\]

The watershed for Bridge Creek was measured at 6,92 square miles and 5,500 feet, respectively (memo and personal conversation, Smillie, 8/89). The stream flow gauge system would transmit a signal when a certain flow level was reached. The transmitter would signal a repeater on Navajo Mountain that in turn would signal a siren/flasher system at Rainbow Bridge and at Glen Canyon NRA dispatch. The flow level would be calculated based on modeling done at the time of plan implementation. Each gauge would be activated when the water height exceeded the calculated elevation. Gauges would be attached to a power source and transmitter. The power source would probably be batteries attached to photovoltaic panels for charging.

**Coordination with the Navajo**

In all probability, placement of the stream flow gauge would be on the Navajo Reservation in both the Bridge Creek and Redbud drainages. The National Park Service will coordinate location of the stream flow gauge at the time of system design.

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**Maintenance and Testing**

In order to be fully successful, this system needs to incorporate a regular manual testing and maintenance program. This would be designed to insure a fully working system and avoid the false sense of security by staff that the monument is protected, which could come about when a system of this type is put into place. The importance of this component of the program cannot be understated. Cyclic maintenance is a necessity and should be viewed as the highest priority. Recurring costs in the form of operations and maintenance from this would be about $5,000 annually.

**COST**

The signs and wayside would cost approximately $4,500. However, if the wayside is added on a separate floating walkway structure so the walkway is wider at that location, an additional $9,000 will be required for the floating walkway section.

The stream gauge system would cost approximately $40,000 to $70,000.