

IMPAIRMENT ANALYSIS METHOD

NPS *Management Policies 2006* (NPS 2006a) require analysis of potential effects to determine whether or not actions would impair NRA resources or values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. The NRA's enabling legislation, as amended, further mandates resource protection. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, actions that would adversely affect NRA resources and values.

These laws give the National Park Service the management discretion to allow impacts to NRA resources and values when necessary and appropriate to fulfill the purposes of a park unit, so long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service this discretion, it is limited by the statutory requirement that the National Park Service must leave NRA resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of NRA resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any NRA resource or value may constitute an impairment. Impairment may result from NPS activities in managing the NRA, from visitor activities, or from activities undertaken by concessioners, contractors and others operating in the NRA. Impairment of NRA resources can also occur from activities occurring outside recreation area boundaries. An impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect on a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the recreation area
- key to the natural or cultural integrity of the recreation area or to opportunities for enjoyment of the recreation area
- identified as a goal in the NRA's general management plan or other relevant NPS planning documents

A determination on impairment is included in the "Impact Analysis" section for all impact topics relating to recreation area natural and cultural resources.

IMPACT TOPICS

The following topics of this section provide a description of the related laws, regulations and policies for each impact topic; the methodology and thresholds used in the impact analysis and a description of the predicted impacts for each alternative.

Land Use

Regulations and Policy

The enabling legislation for Glen Canyon NRA defines the purposes of the recreation area to include the following: “. . . to provide for public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto . . . and to preserve, scenic, scientific and historic features contributing to public enjoyment of the area (NPS 1979).

As part of the management planning for the recreation area that resulted in the 1979 GMP, planners defined land-use management zones within Glen Canyon NRA and specified management goals for each zone. Planning relative to activities and construction in these zones must consider the management goals for that zone.

Methodology

The impact assessment for land use focused on effects the alternatives would have on the management zones described in the 1979 GMP, including the types of activities and construction allowed in each zone compared to the types of activities and construction proposed in each alternative. The analysis was conducted by examining the limits of each zone relative to the proposed construction, expansion, or relocation in each alternative. The following definitions were used to assess the intensity of impact:

Impact Intensity	Land-Use Intensity Definition
Negligible	Land use in the form of construction of facilities and/or location or introduction of recreational opportunities in all cases conforms the land-use descriptions for the zone in which the activity is located as discussed in the 1979 GMP.
Minor	Land use in the form of construction of facilities and/or location or introduction of recreational opportunities generally conforms with the land-use descriptions for the zone in which the activity is located as discussed in the 1979 GMP. Nonconforming uses or activities can be easily mitigated to bring them into conformance.
Moderate	Land use in the form of construction of facilities and/or location or introduction of recreational opportunities generally conforms with the land-use descriptions for the zone in which the activity is located as discussed in the 1979 GMP. Nonconforming uses or activities can be mitigated to bring them into conformance; however, such mitigation is difficult and expensive and may result in substantial changes to the proposal.
Major	Land use in the form of construction of facilities and/or location or introduction of recreational opportunities does not conform with the land-use descriptions for the zone in which the activity is located as discussed in the 1979 GMP and constitutes a conflicting use. Mitigation measures cannot be implemented to change the level of conformance.

Short-term land-use impacts are those that last only during construction activities. Long-term land-use impacts would last longer than the construction period.

Alternative A (No-Action)

Impact Analysis. All existing land uses in the uplake developed areas conform to the land-use descriptions for the development zone in which the activity is located as discussed in the 1979 GMP. Because the existing uses conform to the land-use descriptions and no changes would be made under the No-Action Alternative, there would be no impacts to land use under Alternative A.

Cumulative Impacts. There would be no cumulative impacts as a result of the No-Action Alternative.

Conclusion. Because the existing uses conform to the land-use descriptions and no changes would be made under the No-Action Alternative, there would be no impacts to land use under Alternative A. Because the No-Action Alternative would not impact land use, there would be no cumulative impacts as a result of the No-Action Alternative.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, there would be no impact to land use from NPS maintenance facilities, airstrips, water-based stores, launch ramp support facilities and the river runner takeout because there would be no changes in land use from the No-Action Alternative.

All existing land uses conform to the land-use descriptions for the zone in which the activity is located as discussed in the 1979 GMP. All upgrades and expansions at Bullfrog and Halls Crossing proposed under Alternative B would constitute a continuation or expansion of existing land uses in those locations and would, therefore, conform to the 1979 GMP.

Facility upgrades that would constitute new land uses at Hite under Alternative B are the following:

- shower and laundry facilities
- land-based food service
- upgrades to SH 95 overlook
- development of the primitive campground

The 1979 GMP describes the proposed scope of development for the Hite developed zone as “Major visitor resort (marina, dry and wet boat storage, lodging, food service, campground, service station, store, RV park, employee housing).” The proposed developments at Hite are consistent with this land-use description.

Under Alternative B, all proposed expansion and development would be consistent with the land-use descriptions in the 1979 GMP; therefore, there would be no impacts to land use.

Cumulative Impacts. There would be no cumulative impacts as a result of Alternative B.

Conclusion. Under Alternative B, all proposed expansion and development would be consistent with the land-use descriptions in the 1979 GMP; therefore, there would be no impacts to land use. There would be no cumulative impacts as a result of Alternative B.

Soils and Geology

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for soils and geology:

Desired Conditions	Sources
Soil resources and processes function in as natural a condition as possible, except where special management considerations are allowable under policy.	<i>NPS Management Policies 2001</i>
Soils classified by the U.S. Department of Agriculture, Natural Resources Conservation Service, as prime or unique farmlands are retained.	Council on Environmental Quality (1980) memorandum on prime and unique farmlands
Natural geologic resources and processes function in as natural a condition as possible, except where special management considerations are allowable under policy.	<i>NPS Management Policies 2001</i>
Geologically hazardous areas would be avoided in the placement of new facilities.	<i>NPS Management Policies 2001</i>

Methodology

The impact assessment for soils and geology focused on effects the alternatives would have on geologic features and processes, including the formation and conservation of soil resources in the uplake area. Actions prescribed could affect soil resources through accelerated erosion, loss, or removal. The analysis was conducted by examining the types of soils and amount of area that would be disturbed or paved and applying knowledge of expected effects under each Alternative Based on professional judgment. The following definitions were used to assess the intensity of impact:

Impact Intensity	Soils and Geology Intensity Definition
Negligible	Impacts to soils or geologic features would not be measurable. Any effects on soil productivity or fertility would be slight, short-term and would occur in a relatively small area.
Minor	The effects on soils or geologic features would be detectable, but likely short-term. Effects on soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
Moderate	The effects on soils or geologic features would be readily apparent, long-term and would slightly change the soil or geologic characteristics over a relatively large area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	The effect on soils or geologic features would be readily apparent, long-term and would substantially change the soil or geologic characteristics over a large area in and out of the NRA. Mitigation measures to offset adverse effects would be needed, extensive and their success could not be guaranteed.

Alternative A (No-Action)

Impact Analysis. There would be no changes to existing operations or facilities under the No-Action Alternative. Geology would not be impacted because no rock excavation would occur. Soils would continue to be impacted by visitor and employee use of the uplake developed areas, largely as a result of off-road parking and visitors creating social trails. The impacts to soils would be long-term, minor and adverse.

Cumulative Impacts. Because the No-Action Alternative would not impact geology, there would be no cumulative impacts to geology from the No-Action Alternative. Most of the cumulative impact projects have the potential to impact soils including the road construction work associated with SH 24 and the Burr Trail / Notom Road and the petroleum exploration well. Soils would be temporarily disturbed and permanently regraded by the construction activities resulting in short- and long-term, minor, adverse impacts to soils. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with the No-Action Alternative, would result in long-term, minor to moderate, adverse impacts to soils.

Conclusion. There would be no impacts to geology. The impacts to soils would be long-term, minor and adverse. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with the No-Action Alternative, would result in long-term, minor, adverse impacts to soils.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. At Hite, shallow soils would require blasting bedrock to bury the proposed underground water storage tank. This would result in localized, short- and long-term, minor, adverse impacts to geology. Soils would be reworked as part of the construction activities associated with Alternative B. Up to an estimated 83.3 acres of new disturbance would occur as a result of planned construction activities (up to 38.8 acres at Bullfrog, up to 37.6 acres at Halls Crossing, up to 7.5 acres at Hite and up to 3 acres at Farley Canyon; see table 2). Impacts to soils as a result of the increased disturbance and development of new facilities or relocation of existing facilities would be long-term, minor and adverse. Up to a total of 15.4 acres would be restored (up to 4.7 acres at Bullfrog and up to 10.7 acres at Halls Crossing). Long-term, negligible, beneficial impacts to soils would occur as a result of the restoration of these areas. Overall impacts to soils from Alternative B would be long-term, minor and adverse.

Cumulative Impacts. Alternative B would result in localized, short- and long-term, minor, adverse impacts to geology. Most of the cumulative impact projects have the potential to impact geology and soils including the road construction work associated with SH 24 and the Burr Trail / Notom Road and the petroleum exploration well. Soils would be temporarily disturbed and permanently regraded and roadcuts may involve bedrock excavation resulting in short- and long-term, minor, adverse impacts to soils and geology. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with Alternative B, would result in long-term, minor, adverse impacts to soils and geology.

Conclusion. Alternative B would result in localized, short- and long-term, minor, adverse impacts to geology. Impacts to soils as a result of disturbance and development of new facilities or relocation of existing facilities would be long-term, minor and adverse. Long-term, negligible, beneficial impacts to soils would occur as a result of the restoration of areas. Overall impacts to soils from Alternative B would be long-term, minor and adverse. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with Alternative B, would result in long-term, minor, adverse impacts to soils and geology.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Paleontology

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for paleontology:

Desired Conditions	Sources
The National Park Service will study and manage paleontological resources in their paleontological context (that is, in terms of the geologic data associated with a particular fossil that provides information about the ancient environment).	NPS Management Policies 2001
Superintendents will establish programs to inventory paleontological resources and systematically monitor for newly exposed fossils, especially in areas of rapid erosion. Scientifically important resources will be protected by collection or by onsite protection and stabilization.	NPS Management Policies 2001
The National Park Service will take appropriate action to prevent damage to and unauthorized collection of, fossils.	NPS Management Policies 2001
All NPS construction projects in areas with potential paleontological resources must be preceded by a preconstruction surface assessment prior to disturbance. For any occurrences noted, or when the site may yield paleontological resources, the site will be avoided, or the resources will, if necessary, be collected and properly cared for prior to initiation of construction activity. Areas with potential paleontological resources must also be monitored during construction.	NPS Management Policies 2001

Methodology

Information on paleontological resources was compiled from recreation area records, scientific publications and consultation with recognized experts. The information gathered was compared with the locations of proposed developments and other actions. The impact analysis was based on the knowledge

and best professional judgment of planners, biologists, paleontologists, data from recreation area records and studies of similar actions and impacts when applicable. The planning team qualitatively evaluated the impact intensity and duration for paleontological resources based on human development and use and natural processes.

Impact Intensity	Paleontology Intensity Definition
Negligible	There would be no measurable impact to or loss of fossils because (1) the activity would occur in a geologic layer not known to contain extensive fossils and the volume of bedrock disturbance would be negligible, or (2) the activity would occur in a fossil-rich geologic layer, but the volume of bedrock disturbed would be nearly indiscernible. Monitoring would not be likely to detect fossils and the loss of fossils and/or associated contextual information would be minimal.
Minor	A few fossils may be lost due to collecting or there would be a low probability of impact due to a ground-disturbing activity because (1) the activity would occur in a geologic layer not known to contain extensive fossils and the volume of bedrock disturbance would be negligible, or (2) the activity would occur in a fossil-rich geologic layer, but the volume of bedrock disturbed would be nearly indiscernible. Monitoring would be likely to detect fossils and the loss of fossils and/or associated contextual information would be minimal.
Moderate	A number of fossils may be lost due to collecting, or a moderate probability of impact due to a ground-disturbing activity because (1) the activity would occur in a geologic layer not known to contain extensive fossils and the volume of bedrock disturbance would be high, or (2) the activity would occur in a fossil-rich area and the volume of bedrock disturbance would be low. Most fossils uncovered would likely be found by monitoring, but some fossils and/or associated contextual information may be lost.
Major	Many fossils may be lost due to collecting or a high probability of impact due to a ground-disturbing activity because the activity would occur in a fossil-rich geologic layer and the volume of bedrock disturbance would be sizeable. Even with monitoring, many fossils and/or associated contextual information would likely be lost.

Any impacts to paleontological resources would be considered long-term.

Alternative A (No-Action)

Impact Analysis. There would be no changes to existing operations or facilities under the No-Action Alternative. Therefore, there would be no impacts to paleontology.

Cumulative Impacts. Because there would be no impacts under the No-Action Alternative, there would be no cumulative impacts in association with the No-Action Alternative.

Conclusion. There would be no impacts to paleontology under the No-Action Alternative. Because there would be no impacts under the No-Action Alternative, there would be no cumulative impacts in association with the No-Action Alternative.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. At Hite, shallow soils would require blasting bedrock to bury the proposed underground water storage tank. This would result in localized, long-term, negligible to minor, adverse impacts to paleontology, assuming the bedrock being excavated is rich in fossils. At Farley Canyon, surface grading would occur; this would result in localized, long-term, negligible adverse impacts to paleontology if projects impacts fossil bearing rocks.

Cumulative Impacts. Alternative B would result in localized, long-term, negligible to minor, adverse impacts to paleontology. Most of the cumulative impact projects have the potential to impact paleontology including road construction work associated with SH 24 and the Burr Trail / Notom Road and the petroleum exploration well. Roadcuts may involve bedrock excavation resulting in short- and long-term, negligible to minor, adverse impacts to paleontology. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with Alternative B, would result in long-term, negligible to minor, adverse impacts to paleontology.

Conclusion. Alternative B would result in localized, long-term, negligible to minor, adverse impacts to paleontology. Overall cumulative impacts from past, present and reasonably foreseeable future projects, in combination with Alternative B, would result in long-term, negligible to minor, adverse impacts to paleontology.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Air Quality

Laws, Regulations and Policy

Air pollution sources within national parks must comply with all federal, state and local regulations. The Clean Air Act established NAAQS to preserve and protect air quality in national parks, national wilderness areas, national monuments, national seashores and other areas of special national or regional natural, recreational, scenic, or historic value (42 USC 7401 *et seq.*). The Clean Air Act provisions designate clean air classifications. Class I areas are afforded the greatest degree of air quality protection and include international parks, national wilderness areas, national memorial parks in excess of 5,000 acres and national parks in excess of 6,000 acres that were in existence as of August 7, 1977, when the Clean Air Act was amended. Glen Canyon NRA is designated a class II air quality area, which allows moderate air quality deterioration under the Clean Air Act. However, the Glen Canyon NRA does not possess the authority to address issues of air quality improvements when air pollution originates outside its boundaries.

Section 4.7 of NPS *Management Policies 2001* directs park service units to perpetuate air quality that will preserve natural and cultural resources, sustain visitor enjoyment and human health and preserve scenic landscapes. To accomplish these goals, park units are directed to comply with all federal, state and local air quality regulations and permitting requirements. Additionally, NPS *Management Policies 2001* state that the National Park Service would assume an aggressive role in promoting and pursuing measures to protect air-quality-related values from adverse impacts of air pollution. Vegetation, visibility, water

quality, wildlife, historic and prehistoric structures and objects, cultural landscapes and most other elements of park unit environments are sensitive to air pollution and are referred to as “air-quality-related values.” When existing or potential air pollution impacts on NRA resources are disputed, the National Park Service would err on the side of protecting air quality and related values for future generations.

The Organic Act and NPS *Management Policies 2001* apply equally to all NPS-managed areas, regardless of Clean Air Act designation. Therefore, the National Park Service will protect resources at both class I and class II designations. Furthermore, the NPS Organic Act and NPS *Management Policies 2001* provide additional protection from that afforded by the Clean Air Act alone because the National Park Service has documented that specific park unit air-quality-related values can be adversely affected at levels below the NAAQS or by pollutants for which no NAAQS exist.

Impact Indicators, Criteria and Methodology

Analysis focused on impacts to air-quality-related values and human health (e.g., visibility, odor) from airborne pollutants related to construction activities implementing the proposed improvements. The following impact thresholds were established in order to clarify the relative changes in air quality under various management alternatives when compared to baseline conditions.

Impact Intensity	Air Quality Intensity Definition
Negligible	There is no odor of exhaust and no visible emissions. Dust from construction activities can be controlled by mitigation. Construction of new facilities would not result in noticeable emissions or deteriorate air quality. Ambient air quality concentrations would not be anticipated to exceed the allowable Clean Air Act class II standards.
Minor	There is a slight odor of exhaust and emissions are visible during brief periods of time. Dust from dirt roads is visible during brief periods. Dust from construction activities is visible only during work hours and can be easily mitigated. Construction of new facilities would not result in noticeable emissions or deteriorate air quality. Ambient air quality concentrations would not be anticipated to exceed the allowable Clean Air Act class II standards.
Moderate	Gasoline fumes and exhaust are easily detectable in high-use areas. Emissions are visible during periods of high use. Dust from dirt roads or from construction activities is visible over a large area and for extended periods of time. Construction of new facilities could result in emissions, but would not deteriorate air quality. Mitigation is possible, but is only partially effective. Ambient air quality concentrations would not be anticipated to exceed the allowable Clean Air Act class II standards.
Major	Exhaust and gasoline fumes are easily detectable for extended periods of time over large areas. Dust from dirt roads and construction activities is visible for an extended amount of time and mitigation is unable to alleviate impacts. Construction of new facilities would result in emissions that could deteriorate air quality. Ambient air quality concentrations equal or occasionally exceed allowable Clean Air Act class II standards.

Air quality impacts would be considered short-term if impacts last during construction and is no longer than one year. They would be considered long-term if impacts last beyond construction and are longer than one year.

Alternative A (No-Action)

Impact Analysis. Existing developments and activities at the uplake developed areas result in detectable fumes in developed areas. Vehicles driving on dirt roads at lower lake levels result in visible dust. Under Alternative A (No-Action Alternative) there are existing long-term, minor, adverse impacts to air quality.

Cumulative Impacts. Road and highway improvements and the proposed petroleum exploration well would both involve increased emissions from equipment operation and increased dust in the atmosphere. However, on a regional basis, adverse impacts to air quality would be short-term and negligible. Overall cumulative impacts to air quality, including the impacts from Alternative B, would be short-term, negligible to minor and adverse. These impacts, in conjunction with the impacts of Alternative A (No-Action Alternative), would result in long-term, minor, adverse impacts to air quality.

Conclusion. Under Alternative A (No-Action Alternative), there are existing short and long-term, minor, adverse impacts to air quality. Cumulative impacts, in conjunction with the impacts of Alternative A (No-Action Alternative), would result in long-term, minor, adverse impacts to air quality.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. In general, construction of expanded facilities proposed under Alternative B would result in a short-term increase in dust emissions due to ground clearing operations, construction vehicle movement and demolition of existing structures. Dust generation would be mitigated through limiting the disturbed areas and use of water sprinkling for dust suppression. Air emissions could occur as a result of construction vehicle emissions or the use of construction materials such as asphalt. Ambient air quality concentrations would not be expected to exceed the allowable Clean Air Act class II standards. The short-term impacts as a result of construction activities would be minor and adverse. However, the use of supplemental power systems with solar or fuel cell technology would result in decreases in air emissions. Long-term impacts would occur as a result of the changes proposed under Alternative B. Employee and concessioner housing, visitor accommodations and camping facilities would be expanded under Alternative B, resulting in increased emissions as a result of vehicles accessing and using these expanded facilities and heating for the expanded units. The same increases would occur as a result of expansion of the Anasazi Restaurant. New parking areas and roads developed to access the lake at lower water levels would not be paved and dust emissions could occur from these areas under Alternative B. Overall, long-term impacts to air quality would be minor to moderate and adverse.

Cumulative Impacts. Road and highway improvements and the proposed petroleum exploration well would both involve increased emissions from equipment operation and increased dust in the atmosphere. However, on a regional basis, the adverse impacts to air quality would be short-term and negligible. Overall cumulative impacts to air quality, including the impacts from Alternative B, would be short-term, negligible to minor and adverse. Because the other past, present and reasonably foreseeable future projects have no long-term impacts, there would be no long-term cumulative impacts.

Conclusion. Impacts to air quality under Alternative B would be short-term, minor and adverse and long-term, minor to moderate and adverse. Overall cumulative impacts to air quality, including the impacts from Alternative B, would be short-term, negligible to minor and adverse. Because the other past, present and reasonably foreseeable future projects have no long-term impacts, there would be no long-term cumulative impacts.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Water Resources

Regulation and Policy

NPS *Management Policies 2001* (sec. 4.6.3) states that the National Park Service will “take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state and local laws and regulations”. The Clean Water Act and supporting criteria and standards promulgated by the EPA, the Utah Department of Environmental Protection and the Arizona Department of Environmental Quality are applicable at Glen Canyon NRA. These standards protect water quality, human health, health of the aquatic ecosystem and recreational use.

The primary means of protecting water quality under the Clean Water Act is the establishment, implementation and enforcement of water quality standards. Generally, the federal government has delegated the development of standards to individual states, subject to EPA approval. Water quality standards consist of three components: (1) the designated beneficial uses of a water body such as aquatic life, cold water fishery, or body contact recreation (i.e., swimming or wading); (2) the numeric or narrative criteria that define the limits of physical, chemical and biological characteristics of water that are sufficient to protect the beneficial uses; and (3) an antidegradation provision to protect existing uses and quality of water.

Water quality criteria developed to protect specific uses are updated periodically by the EPA. New and revised criteria are published in the *Federal Register* and summarized periodically in *Quality Criteria for Water* (EPA 1986). *Quality Criteria for Water*, also known as “the Gold Book,” recommends criteria for a state's water quality standards. The criteria are almost always adopted by states as a portion of their standards and they represent the “minimum” level of protection afforded to water bodies of a state.

The State of Utah antidegradation policy establishes a plan to maintain and improve water quality, but also allows some reduction in water quality to support vital economic activities. Lake Powell is not afforded any special protection under this policy. Water quality standards are achieved by controlling pollutants allowed in point source discharges into receiving waters through section 402 of the Clean Water Act; state pollutant discharge elimination system permits; implementation of BMPs for nonpoint sources of pollution; and implementation of section 303d of the Clean Water Act, total maximum daily loads, on water bodies that have chronic and persistent violations of water quality standards. The objective of a total maximum daily load is to allocate allowable pollutant loads among different point and nonpoint sources of pollution.

Maximum contaminant levels for drinking water are developed under the Safe Drinking Water Act. The EPA periodically updates these national primary drinking water regulations; states have primary enforcement responsibility. New and revised standards are published in the *Federal Register*. These standards are applicable to finished drinking water that has undergone treatment processes.

Other considerations in assessing the magnitude of water quality impacts are the effects on those resources dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas and wetlands may all be affected by changes in water quality from direct and indirect sources.

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for water quality:

Desired Conditions	Sources
Water quality will be perpetuated as integral components of national recreation area aquatic and terrestrial ecosystems.	Clean Water Act Executive Order 11514 <i>NPS Management Policies 2001</i>
The quality of national recreation area surface water and groundwater resources will be determined. Whenever possible, the pollution of waters by human activities occurring within and outside of the national recreation area will be avoided.	Clean Water Act Executive Order 12088 <i>NPS Management Policies 2001</i>
Drinking water supplies are protected from naturally occurring and human-made contaminants.	Safe Drinking Water Act, PL 93-523, modified by PL 99-339 and PL 104-182.

Methodology

The best available information was used to analyze impacts to water quality. Notably, water quality impacts are affected by dilution and the volume of water in Lake Powell is approximately 27 million acre-feet at full pool. Impacts can be evaluated based on the potential for dilution lakewide and in coves where use is concentrated. Section 304(a)(1) of the Clean Water Act requires the EPA to develop and publish criteria for water quality that accurately reflects the latest scientific knowledge. Water quality criteria developed under section 304(a) are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. If no criteria are listed for a pollutant, the EPA does not have any nationally recommended water quality criteria.

The following impact thresholds were established in order to differentiate the relative changes in water quality under various management alternatives when compared to baseline conditions:

Impact Intensity	Water Quality Intensity Definition
Negligible	Chemical or physical changes to water quality would not be detectable, would be well below water quality standards or criteria. Both quality and flows would be within historical ambient and variability standards or desired water quality conditions.

Impact Intensity	Water Quality Intensity Definition
Minor	Chemical or physical changes to water quality would be detectable, but water quality parameters would be well below water quality standards or criteria. Both quality and flows would be within the range of ambient standards, but measurable changes from historical norms would occur. State water quality antidegradation policy would not be violated.
Moderate	Chemical or physical changes to water quality or flows would be readily apparent, but water quality parameters would be at or below all water quality standards for the designated use. Water quality or flows would be outside the range of ambient standards. Mitigation would probably be necessary to offset adverse effects and would likely be successful. State water quality antidegradation policy would not be violated.
Major	Chemical or physical changes to water quality or flows would be readily apparent and some water quality parameters would periodically be exceeded. Flows would be outside the range of ambient conditions and could include a complete loss of water in some areas or flooding in other areas. Extensive mitigation would be needed to offset adverse effects and its success would not be assured. State water quality antidegradation policy may be violated.

Actions under the various alternatives were evaluated based on current conditions and proposed changes to the current conditions. Impacts were assessed based on professional judgment and past experience with similar projects.

Water resources / water quality impacts would be considered short-term if impacts last during construction or initial operations only and for no longer than one year. Impacts to water quality are long-term if the impacts last beyond construction or initial operations and duration is more than one year.

Alternative A (No-Action)

Impact Analysis. All land-based facilities and associated areas at Bullfrog, Halls Crossing and Hite are managed to minimize stormwater impacts to the lake and to minimize impacts from leaking fuels, hydraulic fluids and solvents. Management of human waste in the area is addressed through use of land-based comfort stations and vault toilets above the ordinary high water level and portable micro-flush toilets and porta-potties below the ordinary high water level. There is also a requirement for appropriate disposal for all human waste while on the lake.

Watercraft use in the Bullfrog area would result in long-term minor increases in hydrocarbon emissions into Lake Powell. Implementation of the Lake Powell Clean Water Program is well established at Halls Crossing and Bullfrog and has resulted in long-term beneficial impacts to water quality from proper management of human waste. Water quality in Lake Powell meets all applicable standards.

Overall water quality in the developed areas is adequately controlled through the existing facilities and programs and meets safe drinking water standards. As a result, the No-Action Alternative would continue to result in long-term, negligible, adverse impacts to water quality.

Cumulative Impacts. Past, present and reasonably foreseeable future projects with the potential to impact water quality or water resources include the construction projects associated with road and highway improvements, the proposed petroleum exploration well and potential development in areas surrounding Glen Canyon NRA. The construction projects anticipated in road and highway improvements could affect water quality through the release of sediment into drainages. It is assumed that these projects would be carried out using BMPs for control of erosion and sediment transport and that

impacts to water quality would be negligible to minor and adverse. Use of the Colorado River through Canyonlands National Park and into the upper reaches of Lake Powell would be affected by the river management plan; however, because the plan is in the preliminary planning stages, impacts to water quality cannot be analyzed. Short-term construction-related impacts to water quality, along with long-term impacts as a result of development in areas surrounding Glen Canyon NRA, could result in adverse impacts to water quality; however, such impacts would be expected to be mitigated to some extent by BMPs and by the need to comply with federal, state and local regulations governing protection of water quality. Impacts from development in the surrounding area would be expected to be short and long-term, negligible and adverse. Overall cumulative impacts, including the No-Action Alternative, would be short-term, negligible to minor and adverse and long-term, negligible and adverse.

Conclusion. Overall water quality in the developed areas is adequately controlled through existing facilities and programs. The No-Action Alternative would continue to result in long-term, negligible, adverse impacts to water quality. Overall cumulative impacts, including the No-Action Alternative, would be short-term, negligible to minor and adverse and long-term, negligible and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Alternative B would result in temporary surface impacts in areas of construction at all three marinas.

Sediment accumulation would be expected to be negligible during construction. A stormwater general permit under the Utah Pollutant Discharge Elimination System would be required prior to initiation of construction. The permit would require development and implementation of a stormwater pollution prevention plan. The plan would outline specific BMPs that would be implemented to reduce any potential pollutants in stormwater runoff. The BMPs would include, but not be limited to, the minimization and isolation of disturbance areas and placement of temporary erosion and sediment control measures (such as sand bags, silt fences, or equivalent control methods). The permit would be maintained until permanent erosion controls are in place. Existing disturbances totaling 4.7 acres at Bullfrog and 10.7 acres at Halls Crossing would be reclaimed to native vegetation. Erosion of soil into lake waters would be controlled through the implementation of BMPs and the construction of impermeable surfaces or vegetation restoration. Therefore, these impacts would be short-term, negligible and adverse.

Long-term, minor, adverse impacts to surface water quality would occur from continued recreational uses, including potential leaks and spills of boat fuels and continued use of watercraft. No violations of water quality standards would be expected.

Cumulative Impacts. Past, present and reasonably foreseeable future projects with the potential to impact water quality or water resources include construction projects associated with road and highway improvements, the proposed petroleum exploration well and potential development in areas surrounding Glen Canyon NRA. The construction projects anticipated in the road and highway improvements could affect water quality through the release of sediment into drainages. It is assumed that these projects would be carried out using BMPs for the control of erosion and sediment transport and that impacts to water quality would be negligible to minor and adverse. Use of the Colorado River through Canyonlands

and into the upper reaches of Lake Powell would be affected by the new river management plan; however, because the plan is in the preliminary planning stages, impacts to water quality cannot be analyzed. Short-term construction-related impacts to water quality, along with long-term impacts as a result of development in areas surrounding Glen Canyon NRA, could result in adverse impacts to water quality; however, such impacts would be mitigated to some extent by BMPs and compliance with federal, state and local regulations governing protection of water quality. Impacts from development in the surrounding area would be expected to be short and long-term, negligible and adverse. Overall cumulative impacts, including those from Alternative B, would be short-term, negligible and adverse and long-term, minor and adverse.

Conclusion. Alternative B would result in short-term, negligible, adverse impacts on water quality from runoff during construction. Long-term, minor, adverse impacts on surface water quality would occur from continued recreational uses, including potential leaks and spills of boat fuels and continued use of watercraft. No violations of water quality standards would be expected. Overall cumulative impacts, including those of Alternative B, would be short-term, negligible and adverse and long-term, minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Waters of the United States, Including Wetlands

Regulation and Policy

Current regulation, law and policies require the following conditions be achieved with respect to waters of the United States, including wetlands:

Desired Conditions	Sources
Section 404 of the Clean Water Act established the federal program that regulates activities in the nation's wetlands. Specifically, section 404 of the Clean Water Act established a program to regulate discharge of dredged and fill material into waters of the United States, including wetlands. Responsibility for the program is shared by the USACE and the EPA.	Clean Water Act, Section 404
Each agency shall provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.	Executive Order 11990 (<i>Protection of Wetlands</i>)

Desired Conditions	Sources
<p>The National Park Service adopts a goal of "no net loss of wetlands." In addition, the National Park Service will strive to achieve a longer-term goal of net gain of wetlands. NPS units will conduct parkwide wetlands inventories (or will obtain such inventories from appropriate sources such as the <i>National Wetlands Inventory</i>) to help assure proper planning with respect to management and protection of wetlands resources. For proposed new development or other new activities, plans, or programs that are either located in or otherwise have the potential for direct or indirect adverse impacts on wetlands, the National Park Service will employ a sequence of:</p> <ul style="list-style-type: none"> – avoiding adverse wetlands impacts to the extent practicable – minimizing impacts that could not be avoided – compensating for remaining unavoidable adverse wetlands impacts via restoration of degraded wetlands <p>Actions proposed by the National Park Service that have the potential for adverse impacts on wetlands will be addressed in an environmental assessment or an environmental impact statement.</p>	<p>NPS Procedural Manual 77-1: <i>Wetland Protection</i></p>

Methodology

The planning team based the impact analysis and the conclusions for possible impacts to waters of the United States and wetlands on the mapped navigable waters in the recreation area and on onsite inspections of known and potential jurisdictional wetlands within the recreation area. Conclusions and possible impacts were also based on review of existing literature and studies, information provided by experts in the National Park Service and other agencies and Glen Canyon NRA staff insights and professional judgment.

The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Waters of the United States and Wetlands Intensity Definition
Negligible	Impacts from activities covered under the USACE 404 permit for Lake Powell (waters of the United States) and/or wetlands functions and values that would be below or at the lower levels of detectable change.
Minor	The effects from impacts from activities covered under the USACE 404 permit for Lake Powell (water of the United States) and/or on wetlands that would be detectable and relatively small in terms of area and the nature of the change. The action would temporarily affect a limited area of Lake Powell (waters of the United States) and/or affect a limited number of individual plant or wildlife species within the wetlands. No mitigation would be needed.
Moderate	The effects from activities covered under the USACE 404 permit for Lake Powell (waters of the United States) and/or on wetlands that would be readily apparent over a relatively small area, but the impact could be mitigated by a NEPA compliance review, correction measures and possible changes to allowable activities under the 404 permit and/or restoration of previously degraded wetlands. The action would have a measurable effect on Lake Powell (waters of the United States) and/or on plant or wildlife species

Impact Intensity	Waters of the United States and Wetlands Intensity Definition
	within the wetlands, but required water quality standards and limits set forth in the 404 permit and/or all wetland species would remain indefinitely viable. The impacts could be mitigated by modification of proposed facilities that affect Lake Powell (waters of the United States) and/or wetlands.
Major	The effects to Lake Powell (waters of the United States) an/or wetlands would be readily apparent over a relatively large area. The action would have measurable consequences for Lake Powell (waters of the United States) and/or the wetlands area that could not be mitigated. Water quality standards would be compromised and activities would be in violation of the 404 permit. Wetlands structures and/or function would be altered. The impact could not be mitigated by modification of proposed facilities.

Impacts to Lake Powell (waters of the United States) would be considered short-term per the permit limits and allowable uses set forth in the current USACE 404 permit and any potential long-term impacts would require new NEPA compliance and consultation and changes to the permit. Wetlands impacts would be considered short-term if the wetlands recover in less than three years and long-term if the recovery takes longer than three years.

Alternative A (No-Action)

Impact Analysis. There would be no changes to existing conditions under the No-Action Alternative And, therefore, no impacts to Lake Powell (waters of the United States) and/or any wetlands.

Cumulative Impacts. Because there are no impacts to Lake Powell (waters of the United States) and/or any wetlands from the No-Action Alternative, there would be no cumulative impacts as a result of the No-Action Alternative.

Conclusion. There would be no changes to existing conditions under the No-Action Alternative And therefore no impacts to Lake Powell (waters of the United States) and/or any wetlands. Because there are no impacts to Lake Powell (waters of the United States) and/or any wetlands, there would be no cumulative impacts as a result of the No-Action Alternative. There would be no impairment to recreation area wetlands resources as a result of implementation of this alternative.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Proposed facilities fall within limits of the existing USACE 404 permit or require an update to change the maximum number of allowable floating facilities such as increased number of buoys, upgrades to fuel and courtesy docks and pumpouts. The types of water-based activities or facilities do not change from Alternative A. New construction or expansion of marina facilities is expected to have minor, short- and long-term impacts and will be managed through the 404 permit. Wetlands in the uplake areas at lower lake elevations have not been mapped. However, the new construction in the uplake developed areas is not expected to impact areas where wetlands could be present, except potentially for primitive camping located along the Colorado River during low water

conditions at Hite and the relocation of launch and ferry ramps and associated access and parking at all uplake developed areas during low water conditions. Facilities would be located to avoid wetlands to the extent possible. Should any wetlands be unavoidable during relocation of facilities at lower water levels, mitigation measures would be implemented. Impacts to wetlands under Alternative B would be short and long-term, negligible to minor and adverse.

Cumulative Impacts. Other past, present, or reasonably foreseeable future projects with the potential to impact Lake Powell (waters of the United States) and/or any wetlands would include road improvements and the Canyonlands River Management Plan. Other road improvements and the Canyonlands River Management Plan would likely be designed to limit impacts to water quality and wetlands through mitigation measures that would include construction controls and operational measures to prevent pollution discharge into Lake Powell (waters of the United States) and/or the avoidance of wetlands. Impacts from other projects, in combination with those from Alternative B, would be short and long-term, negligible and adverse.

Conclusion. Impacts to Lake Powell (waters of the United States) and/or any wetlands under Alternative B would be expected to be short and long-term, minor and adverse. Impacts from other projects, in combination with Alternative B, would be short and long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Floodplains

Regulation and Policy

Current regulations, laws and policies require the following conditions be achieved with respect to floodplains:

Desired Conditions	Sources
Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare and to restore and preserve the natural and beneficial values served by floodplains.	Executive Order 11988 (<i>Floodplain Management</i>)
Floodplain values will be preserved and potentially hazardous conditions associated with flooding will be minimized.	Procedural Manual 77-2, National Park Service, <i>Floodplain Management</i>

Methodology

The planning team based the impact analysis and the conclusions for possible impacts to floodplains on the onsite inspections of known and potential impacts to floodplains. Conclusions and possible impacts

were also based on review of existing literature and studies, information provided by experts in the National Park Service and other agencies and Glen Canyon NRA staff insights and professional judgment.

The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Floodplains Intensity Definition
Negligible	There would be no change in the ability of a floodplain to convey floodwaters, or its values and functions. Projects would not contribute to flood flows.
Minor	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local although the changes would be minimally measurable. Projects would not contribute to the flood. No mitigation would be needed for floodplain impacts.
Moderate	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local. Projects could contribute to the flood. The impact could be mitigated by modification of proposed facilities in the floodplain.
Major	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and widespread. Projects would contribute to the flood. The impact could not be mitigated by modification of proposed facilities.

Floodplain impacts would be considered short-term if they last only during the life of construction. Floodplain impacts would be considered long-term if floodplain impacts would be measurable during and after project construction.

Alternative A (No-Action)

Impact Analysis. Under the No-Action Alternative, there would be no impacts to floodplains because no new construction or expansion of existing operations would occur.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact floodplains include road improvements and the Canyonlands River Management Plan. Other road improvements and the Canyonlands River Management Plan would likely be designed to limit impacts to floodplains through mitigation measures that could include redesign to avoid floodplains or to minimize the changes to the floodplain as a result of construction activities. Impacts from other projects would be short and long-term, negligible to minor and adverse; however, since the No-Action Alternative would have no impact on floodplains there would be no cumulative impacts as a result of the No-Action Alternative.

Conclusion. Under the No-Action Alternative, there would be no impacts to floodplains as no new construction or expansion of existing operations would occur. Impacts from other projects would be short and long-term, negligible to minor and adverse; however, because the No-Action Alternative would have no impact on floodplains there would be no cumulative impacts as a result of the No-Action Alternative.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, the new construction in the uplake developed areas would not be expected to impact floodplains, except potentially for the primitive camping located along the Colorado River during low water conditions at Hite and the relocation of the river runner takeout, launch and ferry ramps and associated access and parking at all uplake developed areas during low water conditions. Permanent facilities would be located to avoid floodplains to the extent possible or, if not possible, impacts to floodplain functions and flood flow capacity would be minimized. As a result, impacts to floodplains under Alternative B would be short and long-term, negligible and adverse.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact floodplains include road improvements and the Canyonlands River Management Plan. Other road improvements and the Canyonlands River Management Plan would likely be designed to limit impacts to floodplains through mitigation measures that could include redesign to avoid floodplains or changes to minimize effects to floodplains. Impacts from other projects would be short and long-term, negligible to minor and adverse. Overall cumulative impacts, including those of Alternative B, would be short and long-term, negligible to minor and adverse.

Conclusion. Impacts to floodplains under Alternative B would be expected to be short and long-term, negligible and adverse. Overall cumulative impacts, including those of Alternative B, would be short and long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Vegetation

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA:

Desired Conditions	Sources
Populations of native plant species function in as natural a condition as possible, except where special management considerations are warranted.	<i>NPS Management Policies 2001</i>
Native species populations that have been severely reduced in or extirpated from Glen Canyon NRA are restored where feasible and sustainable.	<i>NPS Management Policies 2001</i>
Invasive species are reduced in numbers and area, or are eradicated from natural areas of Glen Canyon NRA. Such action is undertaken wherever such species threaten native vegetation or public health, or when control is prudent and feasible.	<i>NPS Management Policies 2001</i>
Federal and state-listed endangered or threatened species and	Endangered Species Act and equivalent

Desired Conditions	Sources
their habitats are protected and sustained.	state protective legislation National Environmental Policy Act <i>NPS Management Policies 2001</i>

Methodology

The following thresholds were used in interpreting the level of impact on vegetation in the uplake areas:

Impact Intensity	Vegetation Intensity Definition
Negligible	Individual native plants occasionally may be affected, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur.
Minor	Impacts on native plants are measurable or perceptible and localized within a relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover.
Moderate	Impacts on native plants would cause a change in the plant community (e.g., abundance, distribution, quantity, or quality); however, the impact would remain localized.
Major	Impacts on native plant communities would be substantial, highly noticeable and long-term and include a sizable portion of the affected community type in and out of the NRA. Mitigation measures required to offset adverse effects would be extensive and their success would not be guaranteed.

Duration of vegetation impacts is considered short-term if the vegetation recovers in less than three years and long-term if vegetation takes longer than three years to recover.

Alternative A (No-Action)

Impact Analysis Under the No-Action Alternative, there would be no changes to existing facilities at the uplake marinas and there would be no impacts to existing plant communities.

Within the developed areas, facilities and infrastructure would require future maintenance and possibly replacement with age. Maintenance would result in long-term, negligible, adverse, impacts to landscape vegetation and possibly to small remnant patches of semidesert grassland and shrubland.

The existing facilities would serve larger numbers of visitors as recreational use increases with time. As a result, plant communities adjacent to structures would receive increased social impacts, including trail development, soil compaction, increased erosion, trash accumulation, pet scat and damage to existing plants. In areas supporting nonnative herbaceous and shrub flora, such as in the low water zone, the impact would be long-term, negligible and adverse. Localized areas of native plant communities that may include newly established riparian trees and shrubs, wetlands and semidesert grasslands and shrublands would incur long-term, negligible to minor, adverse impacts.

The increased number of visitors may introduce nonnative species. Introduction of nonnative plant species would result in long-term, minor to moderate, adverse impacts to plant communities, potentially requiring localized control/eradication efforts.

Cumulative Impacts. Past, present and reasonably foreseeable future projects that could impact vegetation include improvements to Burr Trail within Capitol Reef National Park, improvements to SH 24, the proposed petroleum exploration well and development in the surrounding area. The BLM Resource Management Plan would likely contain management information for vegetation; however, this plan is in the preliminary planning stages and impacts cannot be analyzed. Road improvements could result in realignment or road widening, disturbing vegetation along the new road corridor in both the short and long-term. Some disturbance would be related to the construction; once construction is completed, the vegetation would be reestablished. Some vegetation in corridor realignment or widening areas would be permanently removed. Development to provide additional visitor services in surrounding areas outside Glen Canyon NRA would result in long-term disturbance to vegetation. Cumulative impacts from other projects, in association with the No-Action Alternative, would be short and long-term, minor to moderate and adverse.

Conclusion. Overall impacts to vegetation of the uplake developed areas under the No-Action Alternative would be long-term, minor to moderate and adverse, resulting from facility and infrastructure maintenance, increased visitation and introduction of nonnative plant species. Cumulative impacts from other projects, in association with the No-Action Alternative, would be short and long-term, minor to moderate and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis Under Alternative B, there would be 86.9 acres of new disturbance on which development would completely remove and cover regionally common semidesert grassland and shrubland. There would also be disturbance to vegetation from primitive camping and campground improvements at Hite. The new construction and associated disturbance of vegetation would result in long-term, moderate, adverse impacts to vegetation in the uplake developed areas.

At Bullfrog 4.7 acres and 10.7 acres at Halls Crossing would be restored with plants native to the disturbed areas. Reclamation of these sites would result in a long-term, negligible, beneficial impact.

Within the developed areas, facilities and infrastructure would require maintenance and possibly replacement with age. Maintenance within the developed areas would result in long-term, negligible, adverse impacts to landscape vegetation and possibly to small remnant patches of regionally common semidesert grassland and shrubland.

New and existing facilities would accommodate larger numbers of visitors, as recreational use increases with time and impacts would occur as described under Alternative A (No-Action Alternative). The increased number of visitors may introduce nonnative plant species. Introduction of nonnative plant species would result in long-term, minor to moderate, adverse, impacts to plant communities, potentially requiring localized control/eradication efforts.

Cumulative Impacts. Past, present and reasonably foreseeable future projects that could result in impacts to vegetation include improvements to Burr Trail within Capitol Reef National Park,

improvements to SH 24 and development in the surrounding area. The road improvements could result in realignment or road widening, disturbing vegetation along the new road corridor in both the short and long-term. Some disturbance would be related to the construction; once construction is completed, the vegetation would become reestablished. Some vegetation in corridor realignment or widening areas would be permanently removed. Development in surrounding areas outside Glen Canyon NRA to provide additional visitor services would result in long-term disturbance to vegetation. Cumulative impacts from other projects, in association with those of Alternative B, would be short and long-term, moderate and adverse.

Conclusion. Overall impacts to vegetation of the uplake developed areas under Alternative B would be long-term, moderate and adverse, resulting from facility and infrastructure construction, more intense development of primitive campsites and long-term, negligible and beneficial due to restoration of previously disturbed plant communities. Cumulative impacts from other projects, in association with Alternative B, would be short and long-term, moderate and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Wildlife

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for wildlife:

Desired Conditions	Sources
Populations of native animal species function in as natural a condition as possible, except where special management considerations are warranted.	<i>NPS Management Policies 2001</i>
Native species populations that have been severely reduced in or extirpated from Glen Canyon NRA are restored where feasible and sustainable.	<i>NPS Management Policies 2001</i>
Invasive species are reduced in numbers and area, or are eliminated from the natural areas of Glen Canyon NRA. Such action is undertaken wherever such species threaten the native wildlife or public health, or when control is prudent and feasible.	<i>NPS Management Policies 2001</i>
Federal and state-listed threatened or endangered species and their habitats are protected and sustained. Endangered Species Act and equivalent state protective legislation.	National Environmental Policy Act <i>NPS Management Policies 2001</i>

Methodology

Information was gathered from literature and from recreation area, state and federal wildlife specialists to determine whether any of the alternatives could potentially disrupt the natural behavior of wildlife species in Bullfrog, Halls Crossing, or Hite. The following criteria were used in interpreting the level of impact on wildlife:

Impact Intensity	Wildlife Intensity Definition
Negligible	Wildlife and habitats would not be affected or the effects would be at or below the level of detection and the changes would be so slight that they would not be of any measurable or perceptible consequence to the wildlife species population.
Minor	Effects on wildlife and habitats would be detectable, although the effects would be small and of little consequence to the overall species population. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Effects on wildlife and habitats would be readily detectable, with consequences on the overall population. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Effects on wildlife and habitats would be obvious and would have substantial consequences to wildlife populations in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The duration of wildlife impacts is considered short-term if the recovery is less than one year and long-term if the recovery is longer than one year.

Alternative A (No-Action)

Impact Analysis. Under the No-Action Alternative, existing impacts to wildlife would continue to occur as a result of the high level of human activity in the developed areas and the associated noise. Wildlife habitat would be impacted by trampling of native plant species, by social trailing, or parking in undesignated areas. Wildlife would continue to either become accustomed to human activity or relocate outside of the developed areas. Existing impacts to wildlife in the developed areas would continue and would be long-term, minor and adverse.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact wildlife include the road and highway improvement projects, the proposed petroleum exploration well and potential development in surrounding areas. Wildlife would be temporarily displaced during the construction projects and there could be limited potential for some wildlife to be injured or killed by construction equipment. The highway-related construction projects would not result in increased human activity after construction is completed; impacts would be short-term, minor and adverse. The petroleum exploration well and the potential for development in surrounding areas would result in long-term, minor, adverse impacts to wildlife. Overall cumulative impacts, including the No-Action Alternative, would be long-term, minor and adverse.

Conclusion. Existing impacts to wildlife in the developed areas are long-term, minor and adverse. Overall cumulative impacts, including the No-Action Alternative, would be long-term, minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Wildlife species are currently being impacted as a result of human activity and disturbance in the uplake developed areas. As discussed under Alternative A (No-Action Alternative), these impacts currently are long-term, minor and adverse. Under Alternative B, facilities would be constructed, expanded and relocated resulting in increased noise and human activity during construction. During construction, larger wildlife would likely avoid the construction zones. Some small animals such as rodents may be killed or forced to relocate to areas outside the construction zones. Population size and structure for the affected species would not be permanently impacted. In the long-term, completion of construction and vegetation restoration would allow some return of wildlife species; however, overall habitat would be reduced due to expansion of facilities. Impacts to wildlife species and habitat would be short and long-term, minor and adverse.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact wildlife include the road and highway improvement projects and potential development in surrounding areas. Wildlife would be temporarily displaced during the construction projects and there could be limited potential for some wildlife to be injured or killed by construction equipment. The highway-related construction projects would not result in increased human activity after construction is completed. Impacts would be short-term, minor and adverse. The potential for development in surrounding areas would result in long-term, minor, adverse impacts to wildlife. Overall cumulative impacts, including Alternative B, would be short and long-term, minor and adverse.

Conclusion. Impacts to wildlife species and habitat under Alternative B would be short and long-term, minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Threatened and Endangered Species and Species of Concern/ Designated Critical Habitat

Regulation and Policy

Desired Conditions	Sources
Federally listed and state-listed threatened and endangered species and their habitats would be sustained.	Endangered Species Act NPS <i>Management Policies 2001</i> Executive Order 13112 (<i>Invasive Species</i>)
Native species populations that have been severely	Endangered Species Act

Desired Conditions	Sources
reduced or extirpated from the recreation area would be restored where feasible and sustainable.	NPS <i>Management Policies 2001</i> Executive Order 13112 (<i>Invasive Species</i>)
The management of populations of nonnative plant and animal species, up to and including eradication, would be undertaken wherever such species threaten recreation area resources or public health and when control is prudent and feasible.	Endangered Species Act NPS <i>Management Policies 2001</i> Executive Order 13112 (<i>Invasive Species</i>)

The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Threatened and Endangered Species and Species of Concern/ Critical Habitat Intensity Definition
Negligible	The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a USFWS "no effect" or "may affect, not likely to adversely affect" determination.
Minor	The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable, but small and localized and of little consequence. Mitigation measures, if needed to offset the adverse effects, would be simple and successful. This impact intensity equates to a USFWS "may affect, not likely to adversely affect" determination.
Moderate	Impacts on federally listed threatened and endangered species, as well as federal and state species of special concern and their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. This impact intensity equates to a USFWS "may affect, likely to adversely affect" determination.
Major	The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special-status species, critical habitat, or the natural processes sustaining them would be detectable, both in and out of the recreation area. Loss of habitat might affect the viability of at least some special-status species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. This impact intensity equates to a USFWS "may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species" determination.

Special-status species impacts for wildlife are considered short-term if the species recovers in less than one year and long-term if it takes longer than one year for the species to recover. Special-status species impacts for vegetation are considered short-term if the vegetative species recovers in less than three years and long-term if the vegetative species takes longer than three years.

Alternative A (No-Action)

Impact Analysis. Existing impacts to threatened or endangered species, designated critical habitat and State of Utah species of concern related to noise and human activity would continue. Species sensitive to noise and human activity would continue to avoid the developed areas. Additional construction is not proposed under the No-Action Alternative so additional loss of habitat would not occur. Relocation of the river runner takeout from the Hite launch ramp to a temporary location along the Colorado River would continue to impact threatened and endangered fish species through activity in areas likely to be

critical habitat for both adult and young fish. Impacts from the No-Action Alternative would be long-term, localized, minor and adverse.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact threatened and endangered species or critical habitat include the road and highway improvements, the proposed petroleum exploration well, the Canyonlands River Management Plan, the BLM Resource Management Plan and development in surrounding areas. Both the Canyonlands River Management Plan and the BLM Resource Management Plan are in the early stages of development and cannot be fully analyzed for cumulative effects; however, it should be recognized that these projects would likely have impacts, both beneficial and adverse, on threatened or endangered species. The road and highway improvements, the petroleum exploration well and development in surrounding areas would result in short-term impacts from construction activities associated with these projects. Some of the road improvements might require drainage crossing that could include small areas of riparian habitat. The work involving road improvement at drainage crossings could result in additional sediment loads to the lake; however, such sediment loading would be controlled through appropriate mitigation measures during construction activity. As such, it is not believed that the cumulative projects would have an impact on threatened or endangered fish species. Bald eagles are likely to avoid disturbed areas. The presence of heavy equipment, additional noise related to construction equipment and disturbance of previously undisturbed areas would result in short-term, negligible, adverse impacts to threatened and endangered species and critical habitat.

Over the long-term, construction activities would cease; however, road and highway improvements could result in increased traffic and human activity. The exploration well would result in increased human activity and equipment noise. Continued development in surrounding areas would result in permanent disturbance of new areas as well as increased noise and human activity. The long-term impacts would be negligible and adverse.

Overall cumulative impacts, including the impacts of Alternative A (No-Action Alternative), would be long-term, negligible to minor and adverse.

Conclusion. Impacts from the No-Action Alternative would be long-term, localized, minor and adverse. Overall cumulative impacts, including the No-Action Alternative, would be long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, the project work would increase the accommodation of visitors in the uplake developed areas, likely resulting in a general increase in human activity and noise. Construction activities would result in short-term, minor, adverse impacts to threatened and endangered species, designated critical habitat and State of Utah species of concern because of the use of heavy equipment, noise and the potential for increased sediment loads to reach lake waters. However, much of the proposed construction in the developed areas would occur in areas already heavily disturbed and

where human activity is already concentrated. There would be long-term, minor, adverse impacts to threatened and endangered species, designated critical habitat and State of Utah species of concern. The activities proposed under Alternative B that would potentially occur outside the current developed area or would occur in areas most likely to impact threatened or endangered species, designated critical habitat and State of Utah species of concern would include the development of shoreline camping along the Colorado River at Hite during low water levels and the relocation of launch and ferry ramps at Bullfrog and Halls Crossing, as needed, when water levels drop. These activities would occur in areas not previously disturbed and the primitive shoreline camping at Hite is likely to occur in a riparian area that is suitable habitat for southwestern willow flycatcher. Mitigation for potential minor impacts to southwestern willow flycatcher would include timing the construction work outside of breeding season. Camping would also be restricted in the low water shoreline camping area at Hite during breeding season. Also under Alternative B, 4.7 acres at Bullfrog and 10.7 acres at Halls Crossing would be restored to semidesert grassland and shrubland providing habitat for some listed species and a negligible to minor beneficial impact that would offset some adverse impacts resulting from proposed development. Overall, the impacts to threatened and endangered species, species of concern, or their critical habitat would be short and long-term, minor and adverse.

The Utah State listed species of special concern considered in this DCP/EA include the burrowing owl, common chuckwalla, glossy snake, fringed myotis, Townsend's big-eared bat and the big free-tailed bat. Burrowing owls are known to nest adjacent to the airstrip that serves Bullfrog. The airstrip is not included within the analysis area for this DCP, so this species is not likely to be adversely affected by Alternative B. The three bat species inhabit caves, mines and buildings. Alternative B would result in upgrading and relocation of some buildings in the developed areas that could currently contain bats. To mitigate for any impacts to bat species, all buildings that would be impacted would be surveyed for bats prior to initiating demolition/construction and any bats found would be relocated.

The common chuckwalla are predominantly found near cliffs, boulders, or rocky slopes where they use rocks as basking sites and rock crevices for shelter. Habitat of this type may be disturbed with this alternative. Impacts to this species from Alternative B would be short and long-term, minor and adverse. Similarly, the glossy snake may occupy barren desert open ground in sand or rocky areas, some of which may potentially be disturbed by Alternative B. Impacts to this species from Alternative B would be short and long-term, minor and adverse. Mitigation for these two reptiles would consist of surveys for species' presence prior to disturbance and potential collection and movement of individuals to prevent direct impacts.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact threatened and endangered species or critical habitat include the road and highway improvements, the proposed petroleum exploration well, the Canyonlands River Management Plan, the BLM Resource Management Plan and development in surrounding areas. Both the Canyonlands River Management Plan and the BLM Resource Management Plan are in the early stages of development and cannot be fully analyzed for cumulative effects; however, it should be recognized that these projects would likely have impacts, both beneficial and adverse, on threatened or endangered species. The road and highway improvements, the petroleum exploration well, work under the 404 permit and development in surrounding areas would result in short-term impacts as a result of construction activities associated with these projects. Some of the road improvements might require drainage crossing that could include small areas of riparian habitat. The work at road improvement drainage crossings could result in additional sediment loads to the lake; however, such sediment loading would be controlled through appropriate mitigation measures during construction activity. As such, it is not believed that the cumulative projects would have an impact on threatened or endangered fish species. Bald eagles are likely to avoid disturbed areas. The presence of heavy equipment, additional noise related to construction

equipment and disturbance of previously undisturbed areas would result in short-term, negligible, adverse impacts to threatened or endangered species and species of concern.

Over the long-term, construction activities would cease; however, the road and highway improvements could result in increased traffic and human activity. The exploration well would result in increased human activity and equipment noise. Continued development in surrounding areas would result in permanent disturbance of new areas as well as increased noise and human activity. The long-term impacts would be negligible and adverse.

Overall cumulative impacts, including Alternative B, would be short and long-term, minor and adverse.

Conclusion. The determination of effect for Alternative B on both the southwestern willow flycatcher (listed endangered) and the bald eagle (listed threatened) is “may affect, not likely to adversely affect.” This equates to minor adverse impacts. Alternative B will have “no effect” on the following listed species: bonytail, California condor, Colorado pikeminnow, humpback chub, Jones cycladenia, Mexican spotted owl, razorback sucker, or the yellow-billed cuckoo. This equates to negligible impacts.

Overall cumulative impacts, including impacts of Alternative B, would be short and long-term, minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area’s general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Visual Resources

Regulation and Policy

Desired Conditions	Sources
Protect the landscape character and quality according to the guidelines of the existing visual management class III designation.	Glen Canyon NRA <i>General Management Plan</i> , 1979

Methodology

It is within the context of the existing visual management class III designation that the following definitions apply. For further explanation, see the discussion of visual contrast and the accompanying matrix indicating compatibility with the various visual management designations.

Impact Intensity	Visual Resources Intensity Definition
Negligible	Changes to visual quality, while visible, are not at a level that would be readily evident to the casual viewer.
Minor	Changes to visual quality would be readily evident to the casual viewer and perceived as

	adverse.
Moderate	Changes to visual quality would be highly negative and compete for dominance with the natural features present.
Major	Changes to visual quality would be seen as dominating adverse elements in the landscape.

Alternative A (No-Action)

Impact Analysis. Under Alternative A, all existing facilities would remain in their current location and would only receive routine maintenance and minor repairs. The boat maintenance and repair facility at Bullfrog is located in the Village Center and at Halls Crossing at the secured storage area, northeast of the launch ramp. Both of these facilities detract visually from the surroundings because they are located in visitor use areas. At Bullfrog and Halls Crossing, employee trailer housing units in their existing location adversely impact the visual resources of the area because of the dated appearance of trailer units and because at Bullfrog, the housing is located in proximity to the visitor use areas. Taken together, the existing adverse impact to visual resources is long-term and minor.

Cumulative Impacts. Construction activities associated with road and highway improvements would result in short-term, minor, adverse impacts to visual resources from construction activity, equipment and dust plumes that would detract from the quality of the visual resources of the area during the period of construction. Over the long-term, these construction projects would not change the overall visual landscape and therefore would not result in long-term visual impacts. The No-Action Alternative would result in long-term, minor, adverse impacts to visual resources. As a result of the No-Action Alternative, cumulative impacts to visual resources would be short and long-term, minor and adverse.

Conclusion. Existing impacts to visual resources from facilities that visually detract from busy visitor use areas are long-term, minor and adverse. Cumulative impacts to visual resources would be short and long-term, minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, facilities and associated infrastructure would be upgraded, expanded and improved at the uplake developed areas. Numerous uplake facilities would be expanded and upgraded, potentially resulting in long-term adverse impacts to visual resources.

These additions would be somewhat evident to a visitor, but consistent with the developed setting at the uplake developed areas. In general, consistent use of low-profile structures and architectural themes and colors designed to blend with the surrounding landscape and existing facilities would reduce any potential long-term adverse impacts of expanded development to a negligible level. Proposed stacked storage units in the secured storage areas and houseboat storage and repair facilities would be tall and would have a visual presence. However, these facilities would be located out of the primary viewshed and would be designed to blend into the landscape using natural colors. Expansion of the secured storage areas in both

locations would be visually screened as well, further mitigating any adverse impacts to visual resources. Actual construction would tend to be more disruptive of visual resources than the final product. For all proposed improvements, actual construction work would have short-term, negligible to minor, adverse impacts on visual resources as equipment and activity would be either visible from main visitor access points or actually located within visitor use areas.

Beneficial impacts to visual resources could be realized through the relocation of facilities and services proposed under Alternative B. Relocation of concessioner housing to the NPS residential area and elimination of concessioner employee trailer housing units would beneficially impact visual resources by permitting the existing location to be reclaimed and by consolidation of like uses in one location. Relocation of the concessioner boat maintenance and repair and property maintenance facilities at Bullfrog would move this operation area away from the Village Center and would include visual screening of the facility from the rest of the developed area. Relocation of concessioner boat maintenance and repair and property maintenance facilities to the old airstrip at Halls Crossing would make the facility less visible from all points in the Halls Crossing area.

Short-term, negligible to minor, adverse impacts on visual resources would result from construction activities. Overall long-term impacts under this alternative would be minor and beneficial due to the positive effects of relocating certain facilities outside visitor viewsapes and reclaiming previously developed areas.

Cumulative Impacts. Activities associated with road and highway improvements would result in short-term, minor, adverse impacts to visual resources from construction activity, equipment and dust plumes that would detract from the quality of the visual resources of the area during the period of construction. Over the long-term, these construction projects would not change the overall visual landscape and therefore would not result in long-term visual impacts. The cumulative projects, in combination with Alternative B, would result in short-term, minor, adverse impacts to visual resources and long-term, minor, beneficial impacts.

Conclusion. Short-term, negligible to minor, adverse impacts on visual resources would result from construction activities. Overall long-term impacts under this alternative would be minor and beneficial due to the positive effects of relocating certain facilities outside visitor viewsapes and reclaiming previously developed areas. The cumulative projects, in combination with impacts of Alternative B, would result in short-term, minor, adverse impacts to visual resources and long-term, minor, beneficial impacts.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Soundscapes

Regulations and Policy

Desired Conditions	Sources
The agency is required to preserve, to the greatest extent possible, the natural soundscapes of recreation areas. Natural soundscapes exist in the absence of human-caused sound. The natural soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The superintendent is to identify what levels of human-caused sound can be accepted within the management purposes of the NRA.	<i>NPS Management Policies 2006</i>
Director's Order – 47 defines appropriate and inappropriate sound. The overall goal of NPS units is the protection, maintenance, or restoration of the natural soundscape resource. However, it does state that some sound-producing activities, including recreational activities, may be appropriate if they are included in the recreation area's purpose as defined by its enabling legislation.	<i>Directors Order – 47: Soundscape Preservation and Noise Management</i>
The enabling legislation for Glen Canyon NRA states that the purpose of the recreation area is "to provide for public outdoor recreation use and enjoyment... and to preserve scenic, scientific and historic features contributing to public enjoyment of the area."	<i>86 Statute 1311 (Glen Canyon NRA establishing legislation)</i>
Operating a vessel in or upon inland waters so as to exceed a sound level of 82 decibels measured at a distance of 82 feet (25 meters) from the vessel is prohibited. These standards are difficult to enforce, as they require estimation of distances in addition to monitoring sound.	Laws for noise abatement of motorized vessels are regulated by the National Park Service within Glen Canyon NRA and other units of the national park system (36 CFR Part 3.7)

Methodology

Impact intensity thresholds for soundscapes are as follows:

Impact Intensity	Soundscapes Intensity Definition
Negligible	In the recreation and resource utilization (RRU) zone and development zone (designated in the Glen Canyon NRA GMP), sound levels rarely exceed levels specified in 36 CFR 3.7. Within the RRU and development zones, low level human-caused sound would occur 50% or less of the time during daylight hours. Human-caused sound is rare between the hours of 10:00 p.m. and 6:00 a.m.
Minor	In the RRU and development zones, sound levels occasionally exceed levels specified in 36 CFR 3.7. During the busiest days, the RRU and development zones may experience human-caused sound at moderate levels for a substantial portion of each hour during daylight hours. Human-caused sound is infrequently noticeable between the hours of 10:00 p.m. and 6:00 a.m.

Impact Intensity	Soundscapes Intensity Definition
Moderate	In the RRU and development zones, human-caused sound is present in a majority of the area during most of the daylight hours. When present, sound levels can be high compared to the natural soundscape much of the time. Sound levels occasionally exceed 36 CFR 3.7 levels. During the busiest days, a majority of the RRU and development zones may experience human-caused sound at moderate to high levels compared to the natural soundscape for a majority of daylight hours. Human-caused sound is occasionally noticeable between the hours of 10:00 p.m. and 6:00 a.m.
Major	In the RRU and development zones, human-caused sound is present in most of the areas during most of the daylight hours. When present, sound levels can be high compared to the natural soundscape most of the time. Sound levels exceed 36 CFR 3.7 levels more than rarely. During the busiest days, most of the RRU and development zones may experience human-caused sound at moderate-to-high levels compared to the natural soundscape for most of each hour during daylight hours. Human-caused sound is often noticeable between the hours of 10:00 p.m. and 6:00 a.m.

Construction-related impacts to soundscapes would be considered short-term, while human-caused noise as a result of recreational activities would be considered long-term.

Alternative A (No-Action)

Impact Analysis. Current human-generated sounds in the uplake developed areas include automobile traffic, watercraft, visitors and campers. Under the No-Action Alternative, the routine sounds typically associated with the uplake developed areas would not change. In addition, there would be no substantial construction activities. Public perception of noise on the lake does not indicate existing problems. Nearly 50% of respondents to the 2005 visitor survey indicated that the level of noise on the lake was no problem. Impacts would vary seasonally and would be long-term, localized and adverse and range from negligible to minor depending on the season of activity.

Cumulative Impacts. Road and highway improvements would increase the transportation and operation of equipment and construction activity in the area, which would impact the soundscape. Such increases would only be during the period of construction and would be short-term, localized, minor to moderate and adverse. There would be no overall cumulative impacts as a result of construction activities under Alternative A (No-Action Alternative) as there would be no substantial construction under Alternative A (No-Action Alternative).

Conclusion. Impacts would vary seasonally and would be long-term, localized and adverse and range from negligible to minor depending on the season of activity. There would be no overall cumulative impacts as a result of construction activities under Alternative A as there would be no substantial construction under Alternative A (No-Action Alternative).

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, impacts to soundscapes from NPS maintenance facilities, airstrips, water-based stores, launch ramp support facilities and the river runner takeout would be the same as Alternative A because there would be no changes from the No-Action Alternative.

Numerous facilities and associated infrastructure would be upgraded, expanded and improved at the uplake developed areas under Alternative B. Construction-generated sound would include construction equipment, vehicles and building activities. At Hite, short-term, moderate, adverse impacts to

soundscapes would result from blasting needed to bury the new 100,000-gallon underground potable water storage tank. Actual construction associated with the proposed development and expansion would result in localized short-term, moderate, adverse impacts to soundscapes through the increased activity and equipment operation during the construction period.

To reduce potential impacts on soundscapes, all construction vehicles and equipment would be equipped with properly operating and maintained mufflers. In addition, noise-generating construction activities would be limited to daylight hours to minimize the potential impacts on overnight visitors of the uplake marina areas. Implementation of these measures would reduce potential construction impacts from moderate to minor in many cases.

Expansion of and additional construction of buildings would add some low-level noise to the sound environment over the long-term from their operating systems; however, that noise would only be expected to produce a negligible adverse impact to the natural soundscape.

Expansion of visitor accommodations in the form of campsites, family rental units and lodge space has the potential to increase impacts to the natural soundscape as a result of increased visitation at the developed areas. Visitor noise would vary seasonally and would only be expected to result in minor increases over the existing noise levels during the busy summer months.

Increased boat motor noise resulting from increased boater activity on Lake Powell and increased generator use in campgrounds resulting from campground expansion would increase the level and frequency of human-caused noise over current levels during daylight hours. Human-caused noise between the hours of 10:00 p.m. and 6:00 a.m. could potentially increase in conjunction with increased nighttime launches; however, nighttime generator use would be restricted in the campground. These effects would result in long-term, minor to moderate, adverse impacts on natural soundscapes.

The short-term impacts to soundscapes from construction activities as a result of implementation of Alternative B would be negligible to moderate and adverse. The long-term impacts to soundscapes as a result of human-caused sound from the implementation of Alternative B would vary seasonally and be negligible to moderate and adverse.

Cumulative Impacts. Road and highway improvements would increase the transportation and operation of equipment and construction activity in the area, which would impact the soundscape. Such increases would only occur during the period of construction and would be short-term, minor to moderate and adverse. The overall cumulative impacts, including impacts of Alternative B, would vary seasonally and with construction activities and would be short-term, minor to moderate and adverse.

Conclusion. The short-term impacts to soundscapes from construction activities as a result of implementation of Alternative B would be negligible to moderate and adverse. The long-term impacts to soundscapes as a result of human-caused sound from the implementation of Alternative B would vary seasonally and be negligible to moderate and adverse. The overall cumulative impacts, including impacts of Alternative B, would vary seasonally and with construction activities and would be short-term, minor to moderate and adverse.

Archeological Resources

Regulation and Policy

Current laws and policy direct NPS management strategies related to archeological resources. Pertinent legislation and associated responsibilities include the following:

Desired Conditions	Sources
The National Park Service has a responsibility to preserve, unimpaired, the natural and cultural resources and values of the national park system for the enjoyment, education and inspiration of this and future generations.	The NPS Organic Act
The protection of prehistoric, historic and scientific features is required on federal lands, with penalties for unauthorized destruction or appropriation of antiquities.	The Antiquities Act of 1906
Section 106 of the act requires that federal agencies with direct or indirect jurisdiction over undertakings take into account the effects such undertakings may have upon properties listed on, or eligible for listing on, the NRHP. Section 110 requires that programs be established to identify, evaluate and nominate properties to the NRHP.	The National Historic Preservation Act of 1966
The federal government has a responsibility to American Indians to protect and preserve access to sites, use and possession of sacred objects and the freedom to worship through ceremonial and traditional rites on federal land.	American Indian Religious Freedom Act
The federal government has a responsibility to secure, for the present and future benefit of the American people, the protection of archeological resources and sites that are on public lands. The act requires federal permits for excavations, the development of plans for archeological survey on public land and systems for reporting violations; provides for confidentiality of site locations, preservation and custody of excavated materials, records and data; and encourages cooperation with other parties in the protection of archeological resources.	Archeological Resources Protection Act
The federal government has the responsibility to accommodate access to and ceremonial use of, Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites on public land.	Executive Order 13007 (<i>Sacred Indian Sites</i>)
It is the policy of the National Park Service to protect cultural resources and carefully consider the effects that NPS actions may have on them. Specific guidance for the management of NPS cultural resources is provided in Director's Order – 28: <i>Cultural Resource Management</i> and the accompanying <i>Cultural Resources Management Guideline</i> .	NPS <i>Management Policies 2006</i>

Desired Conditions	Sources
The act addresses the rights of lineal descendants of American Indian tribes and Native Hawaiian organizations to certain American Indian human remains, funerary objects, sacred objects and objects of cultural patrimony with which they are affiliated. NAGPRA legislation protects American Indian graves on federal and tribal lands, recognizes tribal authority over treatment of unmarked graves and prohibits the commercial selling of deceased American Indians. It also requires an inventory and repatriation of human remains held by the federal government and institutions that receive federal funding. NAGPRA further requires these same institutions to return inappropriately acquired sacred objects and other important communally owned property to American Indians	<i>Native American Graves Protection and Repatriation Act</i>

Methodology

Certain important research questions about human history can only be answered by the actual physical material of archeological resources. Archeological resources have the potential to answer, in whole or in part, such research questions. A cultural site(s) can be eligible to be listed on the NRHP if the site(s) has yielded, or may be likely to yield, information important in prehistory or history. A cultural site(s) can be nominated to the NRHP in one of three historic contexts or levels of significance: local, state, or national (see *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation*) (NPS 2002c).

In accordance with the Advisory Council on Historic Preservation regulations implementing National Historic Preservation Act, Section 106, impacts to cultural resources were identified and evaluated by

- determining each area of potential effect
- identifying cultural resources present in the area of potential effect that are either listed or eligible to be listed on the NRHP
- applying the criteria of effect to cultural resources listed or eligible to be listed on the NRHP
- considering ways to avoid, minimize, or mitigate adverse effects

Under Advisory Council regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected cultural resources. An *adverse effect* occurs when an action (or undertaking) may alter, directly or indirectly, any of the characteristics of a cultural site that qualify the site for inclusion in the NRHP in a manner that would diminish the integrity of the site's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. A determination of *no adverse effect* indicates that while there is an effect, it does not diminish in any way the characteristics of the resource that qualify it for inclusion in the NRHP. Council on Environmental Quality regulations and NPS *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order – 12) also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (for example, from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Archeological resources

are nonrenewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) on NRHP-eligible or -listed cultural resources only and is based on the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Potential impacts to cultural resources are described in terms of type (beneficial or adverse), context (site-specific, local, or even regional), duration (short-term or long-term) and intensity (negligible, minor, moderate, or major), which is consistent with the regulations of the Council on Environmental Quality, which implement NEPA (42 USC 4321 *et seq.*). These impact analyses are also intended to comply with Sections 106 and 110 of the National Historic Preservation Act.

For purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based on the potential of the site(s) to yield information important in prehistory or history, as well as the probable historic context of the affected site(s):

Impact Intensity		Archeological Resources Intensity Definition
Negligible		The impact is at the lowest level of detection or barely measurable, with no perceptible consequences, either adverse or beneficial, to the archeological resources. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .
Minor	Adverse Impact	The impact would affect archeological site(s) with the potential to yield information important in prehistory or history. For purposes of Section 106, the determination of effect would be <i>adverse effect</i> .
	Beneficial Impact	A site would be preserved in its natural state. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .
Moderate	Adverse Impact	The impact would affect an archeological site with the potential to yield information important in prehistory or history. For purposes of Section 106, the determination of effect would be <i>adverse effect</i> .
	Beneficial Impact	The site would be stabilized. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .
Major	Adverse Impact	The impact would affect an archeological site with the potential to yield important information about human history or prehistory. For purposes of Section 106, the determination of effect would be <i>adverse effect</i> .
	Beneficial Impact	Active intervention would be taken to preserve the site. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .

Adverse impacts on virtually all archeological features would be long-term effects because archeological resources are nonrenewable.

Alternative A (No-Action)

Impact Analysis. Current effects to archeological resources would continue under the No-Action Alternative. Visitor use in areas of cultural sensitivity results in inadvertent trampling of sites and moving of resources. Glen Canyon NRA contains a wealth of cultural sites and although much of the developed areas have been disturbed, there are areas where cultural resources could occur below the surface. Site-specific impacts from visitor activities are long-term and adverse and range from negligible to minor.

Glen Canyon NRA operations affect cultural sites in various ways. Maintenance operations for roadways, development of overflow parking and relocating or extending waterlines or sewer lines can all cause impacts to cultural resources. Adverse impacts from maintenance operations are long-term, localized, negligible to minor and adverse.

Cumulative Impacts. Other projects with the potential to impact archeological resources include construction projects associated with road and highway improvements, development of the petroleum exploration well and potential development in surrounding areas. Any work on federal lands or with federal assistance would include a cultural resource survey and associated mitigation, if necessary, to ensure that cultural resources are protected and adverse impacts to cultural resources are negligible. Work on private lands (as long as there is no federal funding or permitting involved) would not undergo a survey or mitigation and could impact cultural resources. However, because most of the cumulative projects are on public lands, the impacts to cultural resources would be long-term, negligible and adverse. The overall cumulative impacts, including the impacts of Alternative A (No-Action Alternative), would be long-term, negligible to minor and adverse.

Conclusion. Localized impacts to archeological resource from visitor use and recreation area operations would be long-term adverse and range from negligible to minor. The overall cumulative impacts, including the impacts from Alternative A (No-Action Alternative), would be long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. Existing impacts to archeological resources as discussed under the No-Action Alternative would remain. Potential additional impacts would be associated with ground-disturbing activities. Up to 83.9 acres may be disturbed under this alternative. However, the area has been surveyed for archeological resources and site density is low. NRHP-eligible sites would be avoided to the greatest extent possible. It is not expected that any known sites would be affected. If disturbance of an eligible site is unavoidable, NRA staff would mitigate adverse effects through documentation and other means deemed appropriate in consultation with the SHPO.

If it is determined that ground disturbance would occur in a previously unsurveyed area, an archeological clearance survey would be completed and development plans would be modified to avoid or minimize impacts to archeological resources. Therefore, impacts from Alternative B would be long-term, localized, negligible to minor and adverse, depending on the activity and site.

Cumulative Impacts. Other projects with the potential to impact archeological resources include construction projects associated with road and highway improvements, development of the petroleum exploration well and potential development in surrounding areas. Any work on federal lands or with federal assistance would include a cultural resource survey and associated mitigation, if necessary, to ensure that cultural resources are protected and adverse impacts to cultural resources are negligible. Work on private lands (as long as there is no federal funding or permitting involved) would not undergo a survey or mitigation and could impact cultural resources. However, because most of the cumulative projects are on public lands, the impacts to cultural resources would be long-term, negligible and adverse. The overall cumulative impacts, including impacts of Alternative B, would be long-term, negligible to minor and adverse.

Conclusion. Archeological resource impacts under Alternative B would be long-term, negligible to minor and adverse. The overall cumulative impacts, including Alternative B, would be long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Section 106 Summary. Under 36 CFR 800, *Protection of Historic and Cultural Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association.

After applying Advisory Council on Historic Preservation criteria of adverse effect (36 CFR 800.5), the National Park Service determined that the activities proposed in Alternative B would have *no adverse effect* to cultural resources.

Ethnographic Resources

Regulation and Policy

Ethnographic resources relate to cultural content and context of cultural resources. They involve the identity and heritage of contemporary peoples or groups. As defined by the National Park Service, an ethnographic resource is a site, structure, object, landscape, or natural resource feature that has been assigned a traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it. Some specific places of traditional cultural use may be eligible for inclusion in the NRHP if they meet national register criteria for traditional cultural properties.

The same regulations and policy as described above for cultural resources would also apply to ethnographic resources.

Methodology

Impact intensity thresholds for ethnographic resources are as follows:

Impact Intensity		Ethnographic Resources Intensity Definition
Negligible		Impact is barely perceptible and would alter neither resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of beliefs and practices. There would be no change to a group's body of beliefs and practices. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>no adverse effect</i> .
Minor	Adverse Impact	Impact is slight but noticeable. It does not appreciably alter resource conditions, such as traditional access or site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>no adverse effect</i> .
	Beneficial Impact	Impact allows traditional access and/or accommodates a group's traditional practices or beliefs. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>no adverse effect</i> .
Moderate	Adverse Impact	Impact is apparent and alters resource conditions. Interference occurs with traditional access, site preservation, or the relationship between the resource and the affiliated group's beliefs and practices, even though the group's beliefs and practices would survive. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>adverse effect</i> .
	Beneficial Impact	A group's beliefs and practices and/or traditional access are facilitated. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>no adverse effect</i> .
Major	Adverse Impact	Impact alters resource conditions. Traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices are blocked or greatly affected, to the extent that the survival of a group's beliefs and/or practices would be jeopardized. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>adverse effect</i> .
	Beneficial Impact	A group's beliefs or practices are encouraged and/or accommodated. For purposes of Section 106, the determination of effect on ethnographic resources would be <i>no adverse effect</i> .

Impacts on ethnographic resources would be long-term because ethnographic resources are nonrenewable.

Alternative A (No-Action)

Impact Analysis. Current effects to ethnographic resources would continue under the No-Action Alternative. Visitor use in areas of ethnographic resources results in inadvertent trampling of sites and moving of resources. Glen Canyon NRA contains a number of ethnographic resources and although much of the developed areas have been disturbed, there are areas where ethnographic resources could continue to be present. Impacts from visitor activities are site-specific, long-term, negligible to minor and adverse.

Impacts from recreation area operations, such as minor trail realignments and the installation of vault toilets, constitute a localized, long-term, minor, adverse impact to ethnographic resources.

Cumulative Impacts. Other projects with the potential to impact ethnographic resources include construction projects associated with road and highway improvements, development of the petroleum exploration well and potential development in surrounding areas. Any work on federal lands or with federal assistance would include an evaluation of impacts to ethnographic resources and associated mitigation, if necessary and would ensure that adverse impacts to ethnographic resources are negligible. Work on private lands would not undergo an evaluation or mitigation and could impact ethnographic resources. However, because most of the cumulative projects are on public lands, impacts to

ethnographic resources would be long-term, negligible and adverse. The overall cumulative impacts, including those of the No-Action Alternative, would be long-term, negligible to minor and adverse.

Conclusion. Ethnographic resource impacts related to visitor use would be long-term, negligible to minor and adverse in the developed areas. Impacts from recreation area operations would have long-term, minor, adverse impacts. Cumulative impacts to ethnographic resources would be long-term, negligible to minor and adverse, depending on the scope, type and location of the activity.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Alternative B (Preferred Alternative)

Impact Analysis. In general, impacts to ethnographic resources would be the same as under the No-Action Alternative. Visitor use in areas of ethnographic resources results in trampling of sites and moving of resources. Glen Canyon NRA contains a number of ethnographic resources and although much of the developed areas have been disturbed, there are areas where ethnographic resources could be present. Site-specific impacts from visitor activities are long-term, negligible to minor and adverse. Impacts from recreation area operations, such as minor trail realignments and the installation of vault toilets, constitute a long-term, minor, localized, adverse impact to ethnographic resources.

Because the entire Halls Crossing area is considered a traditional cultural property, any activities in this area would have the potential to adversely affect ethnographic resources. The Halls Crossing area is already highly developed and any specific future development would be planned in consultation with the SHPO and any interested stakeholding tribes. Therefore any major adverse impacts would be mitigated. With mitigation, impacts under Alternative B would be resource-specific, long-term, negligible to minor and adverse.

Cumulative Impacts. The overall cumulative impacts, including impacts of Alternative B, would be the same as for Alternative A (No-Action Alternative): long-term, negligible to minor and adverse.

Conclusion. With mitigation, adverse impacts under Alternative B would be resource-specific long-term and negligible to minor. The overall cumulative impacts, including impacts of Alternative B, would be long-term, negligible to minor and adverse.

Impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the established legislation or proclamation of Glen Canyon NRA; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the recreation area's general management plan or other relevant NPS planning documents, there would be no impairment of recreation area resources or values.

Section 106 Summary. Under 36 CFR 800, *Protection of Historic and Cultural Properties*, an adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP, e.g., diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association.

After applying Advisory Council on Historic Preservation criteria of adverse effect (36 CFR 800.5), the National Park Service determined that the activities proposed in the Alternative B would have *no adverse effect* to ethnographic resources.

Visitor Use and Experience

Regulation and Policy

It is the management policy of the National Park Service to provide for enjoyment of recreation area resources and values by the people of the United States as part of the fundamental purpose of all park units. The National Park Service is committed to providing appropriate high-quality opportunities for visitors to enjoy Glen Canyon NRA, consistent with current policies and laws. The following conditions may be achieved in Glen Canyon NRA for visitor use and experience:

Desired Conditions	Sources
Visitors have opportunities to enjoy the recreation area in ways that leave resources unimpaired for future generations.	NPS Organic Act. NPS <i>Management Policies 2006</i>
Visitors understand and appreciate Glen Canyon NRA values and resources and have the information necessary to adapt to the area's environment.	NPS <i>Management Policies 2006</i>
Recreational uses are promoted and regulated. Basic visitor needs are met in keeping with the national recreation area purposes.	NPS Organic Act Title 36 CFR NPS <i>Management Policies 2006</i>
To the extent feasible, facilities, programs and services in the national recreation area are accessible to and usable by all people, including those with disabilities.	Americans with Disabilities Act Architectural Barriers Act Rehabilitation Act NPS <i>Management Policies 2006</i>
Visitors who use federal facilities and services for outdoor recreation may pay a greater share of the cost of providing those opportunities than the population as a whole.	NPS <i>Management Policies 2006</i> Recreational Fee Demonstration Program (U.S. Department of the Interior et al. 1998)
Glen Canyon NRA has identified implementation commitments for visitor carrying capacities for all areas of the unit.	1978 National Parks and Recreation Act (PL 95-625) NPS <i>Management Policies 2006</i>

Methodology

Impact thresholds are listed as follows:

Impact Intensity	Intensity Definition
Negligible	The visitor would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. Some of the visitors would be aware of the effects associated with the alternative, but the effects would be slight and not noticeable by most visitors.
Moderate	Changes in visitor use and/or experience would be readily apparent to most of the

	visitors. Visitors would be aware of the effects associated with the Alternative And might express an opinion about the changes.
Major	Changes in visitor use and/or experience would be readily apparent to all of visitors, severely adverse or exceptionally beneficial. Visitors would be aware of the effects associated with the Alternative And would likely express a strong opinion about the changes.

Impacts to visitor use and experience are considered short-term if the effects last only as long as the construction period. Impacts are considered long-term if the effects last longer than the construction period.

Alternative A (No-Action)

Impact Analysis. Over time, the aging and dated appearance of the visitor accommodations, specifically the family rental trailer units at Bullfrog and Halls Crossing, would begin to affect visitor use and experience. These units are older units showing signs of age at this point in time and potential maintenance and quality-of-life issues would continue to increase as the units grow older. The aging family rental units would no longer be a desirable place to stay and visitors would be left with no other choice for accommodations at Halls Crossing and Hite. The impacts to visitor use and experience from these aging accommodations would be long-term, negligible to minor and adverse.

The No-Action Alternative does not contemplate any increases in facilities as a result of an increase in the number of visitors and associated demand for visitor services at the uplake developed areas. Although visitation has remained relatively constant or shown a slight decrease during the recent years of the drought, for the 20 years prior to that time visitation steadily increased. Visitation would be expected to show slight increases as the water level returns to nearer full pool. With no changes to visitor services or facilities under the No-Action Alternative, there would be long-term, minor, adverse impacts to visitor use and experience.

Existing capacity of the uplake launch ramps and marina facilities exceeds the carrying capacity at:

- Halls Crossing, at lake elevations of 3,550, 3,600 and 3,700 feet
- Bullfrog and Halls Crossing combined, at lake elevation 3,700 feet

At a lake elevation of 3,700 feet, the capacity of the launch ramps and marina facilities at Halls Crossing currently exceeds carrying capacity by approximately 85 launches per day. Combined, the Bullfrog and Halls Crossing facilities exceed carrying capacity by approximately 60 launches per day. While existing use of the launch ramps is not known, it is generally believed to be below full capacity. Therefore, actual use may be equal to carrying capacity or exceed carrying capacity by less than 60 to 80 launches per day.

The primary limiting factor at all lake elevations in all zones is recreational quality. At some lake elevations in certain zones physical capacity is the limiting factor, but those instances are clear exceptions.

Because a large majority of respondents to the 2005 Visitor Survey indicated that litter on the shoreline and finding a beach campsite is a moderate or serious problem, future use near or above carrying capacity without additional mitigation could result in continuation of existing long-term moderate adverse impacts on visitors using the shoreline.

Overall, impacts to visitor use and experience from the No-Action Alternative would be long-term, minor to moderate and adverse and would be a result of the lack of increases in visitor services as visitor numbers increase, the aging of visitor accommodations, limited availability of shoreline campsites and shoreline litter.

Cumulative Impacts. Road and highway improvements would have a short-term adverse impact on visitor use and experience on visitors traveling the roads to reach the uplake district developed areas due to traffic delays and long-term beneficial impacts by improving the routes visitors travel. Development in surrounding areas would have a beneficial impact on visitor use and experience by providing visitor services, in addition to the limited services available within the recreation area. Cumulative impacts, including the impacts of Alternative A (No-Action Alternative), would be short-term, negligible to minor and adverse and long-term, negligible and beneficial as a result of some of the planned improvements.

Conclusion. Overall impacts to visitor use and experience from the No-Action Alternative would be long-term, minor to moderate and adverse. Cumulative impacts, including the No-Action Alternative would be overall short-term, negligible to minor and adverse and long-term, negligible and beneficial.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, numerous facilities and associated infrastructure would be upgraded, expanded and improved at the uplake developed areas resulting in various impacts to visitor use and experience. Facility upgrades and expansions would improve the overall visitor use and experience by providing additional and improved opportunities for visitors to use facilities at the uplake areas and by allowing more visitors to make use of specific facilities.

Some facilities would be more heavily used by visitors than other facilities. For example, visitors would be more likely to make use of upgraded and expanded stores and food service, whereas fewer visitors would make use of day-use facilities because most visitors are overnight visitors who would have similar amenities to the day-use areas either on the water or in their designated campground or overnight accommodation. Water-based improvements would be more heavily used by visitors in a boat or other watercraft. However, the range of expanded and improved services is designed to accommodate both water-based and land-based visitors. At Hite, expanded visitor services, including shower and laundry facilities, an expanded store and food service, would be directed toward not only visitors with boats, but also river runners and backcountry visitors.

Some facilities at the uplake areas would also be relocated to improve traffic circulation and the viewscape for visitors and provide for a sharing of amenities and activities. The relocation of the Bullfrog RV park away from the seasonal housing units and the relocation of the concessioner housing units away from the family rental units would provide a separation of employees and visitors and improve the viewscape from each of the visitor facilities. The relocation of the shower and laundry facilities at Bullfrog would provide a more centrally located facility for visitors who want to use the shower and laundry facilities and a more convenient location for visitors who use the campground. Access to these facilities would be easier with less traffic congestion and more available parking. The laundry location would be less convenient than the existing location for those visitors using the family rental units. Relocation of the concessioner maintenance facilities from the Village Center at Bullfrog would improve traffic circulation and provide for a better separation of visitors and employees. Visitors would be less likely to experience conflicts or delays as a result of deliveries or moving of equipment. The relocation would open up space at the Village Center to add visitor services in that location and would improve the aesthetics of the Village Center. Relocation of the concessioner maintenance and repair facility and the

secured storage at Halls Crossing would improve traffic circulation and move these facilities from the main access to the marina facilities. Again visitors would be less likely to experience conflicts with deliveries and the overall viewscape for visitors would be improved.

New facilities proposed under Alternative B, such as designated low water shoreline camping at Hite and new land-based food service at all developed areas would provide new opportunities to visitors and improve the visitor experience. Increases to buoy and secured storage facilities would offer onsite services to visitors who are currently on waiting lists. Expansion and/or addition of retail facilities and food service would offer greater variety and expand the services that are available to visitors, enhancing visitor use and experience.

Respondents to the 2005 visitor survey clearly indicated support for increasing facilities and services on the shoreline and improving public access to the lake. Respondents generally supported expansion of marina facilities, although not as strongly as the support indicated for increased facilities and services on the shoreline. Overall, increased development of facilities both on and off the water would be well-received and would result in long-term, minor to moderate, beneficial impacts.

In the short-term, there would be inconveniences that would occur as a result of construction activities and traffic associated with each expansion, relocation, or new construction activity. The impacts from construction activities would be negligible to minor and adverse depending on the facility location and the methods used for construction. Construction-related impacts would cease upon completion of the construction activity.

The potential exists that increases in camp sites, lodge rooms and family rental units could increase the number of boats using the launch ramp. While the exact volume of existing launches is not known, it is believed that the maximum capacity of the launch ramp is not fully utilized. The capacity of the launch facilities to launch boats would be expected to accommodate additional boats resulting from expanded accommodations and facilities. Visitor experience could be adversely impacted by increased congestion and delays in launching/ retrieving should boaters not take advantage of less busy times at the launch facilities. Mitigation in the form of increased use of management strategies to provide information on the status of congestion at the ramp, availability of 24-hour launching and encouraging launching during off-peak hours would reduce long-term adverse impacts to a negligible level.

With the addition of 55 buoy field moorings and development of the rental boat fleet to 580 boats, the combined capacity to launch boats at the Bullfrog and Halls Crossing Marinas would exceed carrying capacity at lake elevation 3,700 by 157 launches per day.

Recreational quality was evaluated as a limiting factor in the supplemental calculations to the 1987 CCS and found it to be a primary limiting factor for all zones at differing lake elevations. However, the 2005 Visitor Survey respondents indicated overwhelmingly that recreational quality (seeing, hearing and/or recreating in close proximity to others) is not an issue for them. While increased numbers of boats and visitors may impact visitor experience, that impact is mitigated by the fact that survey respondents indicated a high level of acceptance for changes in experience in order to continue to have unrestricted access to Lake Powell. Therefore, no adverse impacts to visitor use and experience would be expected as a result of increased facilities and accommodations and full use of existing launch capability that could facilitate increased visitation, use and numbers of boats on Lake Powell.

Physical capacity (number of shoreline campsites) is identified in the supplemental calculations to the CCS as the limiting factor in zone 7 at lake elevations 3,700 and 3,600; and in zone 10 at lake elevation 3,550. The CCS assumed 100 feet of shoreline with a slope of 25% or less would be required for each shoreline campsite. Should the launch ramps be used at their full capacity and marina facilities be

expanded as proposed under Alternative B, the number of boaters seeking shoreline campsites in some zones could exceed the availability of sites in some zones. This could force boaters who want to shoreline camp to camp closer than 100 feet away from the adjacent campsites. Because visitor survey respondents indicated that recreational quality is not an issue for them, closer proximity camping would only result in long-term, negligible to minor, adverse impacts on visitor use and experience.

Closer proximity shoreline camping (campers electing to camp closer than 100 feet apart) could result in increased shoreline impacts, such as increased incidence of trash and fire rings. Because shoreline litter is perceived as a moderate to serious problem, increased impacts resulting from closer proximity shoreline camping could further contribute to adverse impacts to visitor use and experience. As a mitigation measure the recreation area would expand the existing Trash Tracker program as well as ongoing visitor education efforts that provide trash bags to encourage “pack it in/pack it out.”

Boaters who cannot find shoreline campsites in their preferred location/zone may redistribute to other zones in order to shoreline boat camp. Because Visitor Survey respondents indicated that finding shoreline campsites is a moderate to serious problem, choosing to relocate to another zone in order to find shoreline camp sites may adversely impact boaters experience in the long-term because they are unable to shoreline camp in their preferred location. Mitigation in the form of increased use of management tools to provide information that would direct boaters seeking shoreline campsites to less-used areas would reduce adverse impacts.

Supplementing power systems with solar and/or fuel-cell technology as appropriate would have a long-term minor beneficial impact on visitor use and experience, as the National Park Service is considered a leader in sustainable practices. The use of solar and/or fuel-cell technology at the recreation area would be actively promoted by Glen Canyon NRA.

Short- and long-term adverse impacts to visitor use and experience from construction and increased use of Lake Powell affecting shoreline camping and litter would be negligible to minor.

Mitigation measures implemented in the 1990s to address human waste impacts on water quality at Lake Powell were highly successful, so much so that water quality is no longer a limiting factor in calculating carrying capacity. It is expected that implementation of mitigation measures to address issues with shoreline camping and litter would be equally successful. However, should proactive visitor contacts redirecting visitors to less-used shoreline campsite and less-busy launch times prove inadequate mitigation of potential adverse impacts to visitor use and experience, the recreation area could implement permit systems to more effectively manage launching, shoreline campsite occupancy and length-of-stay in heavily impacted zones.

In summary, most visitors would make use of one or more of the improvements or expansions and would be positively impacted by the relocations. Because many visitors to Glen Canyon NRA are repeat visitors, they would generally be aware of changes and react in a favorable manner. With mitigation, adverse impacts associated with increased use would only slightly offset beneficial impacts. The overall impacts to visitor use and experience as a result of Alternative B would be short-term, minor and adverse and long-term, minor and beneficial.

Cumulative Impacts. Road and highway improvements would have a short-term adverse impact on visitor use and experience on visitors traveling the roads to reach the uplake areas due to traffic delays and long-term beneficial impacts by improving the routes visitors travel. Development in surrounding areas would have a beneficial impact on visitor use and experience by providing visitor services, in addition to the limited services available within the recreation area. Cumulative impacts, including

impacts of Alternative B, would be short-term, minor and adverse and long-term, minor to moderate and beneficial.

Conclusion. Short-term impacts to visitor use and experience as a result of activities associated with expansion, relocation or construction of facilities at the uplake areas would be minor and adverse. Long-term impacts to visitor use and experience would be minor and beneficial. Cumulative impacts, including impacts of Alternative B would be short-term, minor and adverse and long-term, minor to moderate and beneficial.

Socioeconomic Environment

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for socioeconomics:

Desired Conditions	Sources
Public participation in planning and decision-making ensures that the National Park Service fully understands and considers the public's interests in Glen Canyon NRA, which is part of their national heritage, cultural traditions and community surroundings. The service actively seeks out and consults with existing and potential visitors, neighbors, people with traditional cultural ties to national recreation area lands, scientists and scholars, concessioner, cooperating associations, gateway communities, other partners and government agencies.	<i>NPS Management Policies 2006</i>
The service works cooperatively with others to improve the condition of Glen Canyon NRA to enhance public service; and to integrate the national recreation area into sustainable ecological, cultural and socioeconomic systems.	<i>NPS Management Policies 2006</i>
In the spirit of partnership, the service seeks opportunities for cooperative management agreements with state or local agencies that will allow for more effective and efficient management of Glen Canyon NRA.	<i>NPS Management Policies 2006</i> National Parks Omnibus Management Act of 1998, Section 802
Possible conflicts between alternatives and land-use plans, policies or controls for the area concerned (including those of local and state governments and Indian tribes) and the extent to which the national recreation area will reconcile the conflict are identified in environmental documents.	National Environmental Policy Act

Methodology

In evaluating the impacts on socioeconomic resources, commercial operations within Glen Canyon NRA, in adjacent communities and in the region were considered. Impacts on socioeconomic resources for each Alternative Are included in the consequences section.

Impact Intensity	Socioeconomic Intensity Definition
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Impact Intensity	Socioeconomic Intensity Definition
Negligible	No effects would occur or the effects on socioeconomic conditions would be below or at the level of detection. The effect would be slight and no long-term effects on socioeconomic conditions would occur.
Minor	The effects to socioeconomic conditions would be detectable. Any adverse or beneficial effects would be small. If mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	The effects on socioeconomic conditions would be readily apparent and likely long-term. Any adverse or beneficial effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be expensive, but would likely be successful.
Major	The effects on socioeconomic conditions would be readily apparent, long-term and would cause substantial adverse or beneficial changes to socioeconomic conditions in the region. If mitigation measures were required to offset potential adverse effects, they would be expensive and their success could not be guaranteed.

Socioeconomic effects would be short-term if the effects last one year or less and long-term if effects last longer than one year.

Alternative A (No-Action)

Impact Analysis. Alternative A would allow current uses to continue. As noted under “Visitor Use and Experience,” the No-Action Alternative does not contemplate an increase in facilities to accommodate growth in visitor use at NRA uplake areas.

Visitation did not increase during the recent six years of drought, but visitation did grow steadily for 20 years prior to that time. Visitation would be expected to increase again as the water level returns to nearer full pool.

However, assuming no change to services or facilities under Alternative A, there would potentially be long-term minor adverse socioeconomic impacts to visitor use from two sources: (1) the quality of the overnight visitor experience at Halls Crossing and Hite would potentially decline from the aging of visitor accommodations and other facilities and (2) future drought conditions would potentially impact visitor use if changes to launch and water-based facilities are not made to accommodate low water levels. Either or both of these impacts would potentially shift the future growth trend of visitor use at the NRA to lower than the trend that could be projected from the past under normal water levels.

Impacts to visitor use would spill over to commercial operations within the NRA and in gateway communities. Commercial operations would experience the impact under Alternative A as less-than-expected business growth in the long-term. Impacts to business receipts and employment and to personal income would be long-term, minor and adverse.

Impacts to business activity and personal income under Alternative A would lead to proportionate impacts to local government revenues that are derived from sales taxes and from property (or “privilege”) taxes. Revenue losses would adversely impact the fiscal condition of local government, schools and other taxing jurisdictions. Though service providers may see lower variable costs as well as lower revenues, overhanging fixed costs would potentially create long-term minor adverse impacts. Fiscal impacts would affect the local government’s ability to maintain tax-supported service capacity and quality in the long-term.

Under Alternative A, impacts to the economy and local government fiscal conditions in towns near the uplake developed areas and associated counties would be negligible to minor, long-term and adverse. With no additional investment in facilities under Alternative A, more impact to visitor use is likely to occur over time as family rental units age and show maintenance and livability issues. Where effects to visitor use are greatest, impacts to the economy and to local government fiscal conditions would be long-term, minor and adverse.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact socioeconomics include the road and highway improvement projects, the proposed petroleum exploration well and the potential for additional development in surrounding areas. The road improvement projects would result in short-term beneficial negligible impacts as a result of the potential jobs and spending during the road construction. In the long-term, road improvements would provide negligible beneficial impacts in improving access to the uplake developed areas and surrounding communities. The proposed petroleum exploration well would provide negligible socioeconomic benefits as a result of the drilling activities. Potential development in surrounding areas would provide minor socioeconomic benefits. The overall cumulative socioeconomic impacts would be short-term, negligible, beneficial and long-term, negligible to minor and beneficial. In combination with Alternative A, the cumulative impacts would be long-term, minor and adverse as a result of the lack of future investment in recreation area facilities and long-term, negligible to minor and beneficial as a result of the potential for development in the surrounding areas.

Conclusion. Under Alternative A, impacts to the economy and local government fiscal conditions in towns near the uplake developed areas and associated counties would be negligible to minor, long-term and adverse. Where effects to visitor use are greatest, impacts to the economy and to local government fiscal conditions would be long-term, minor and adverse. In combination with Alternative A, the cumulative impacts would be long-term, minor and adverse as a result of the lack of future investment in recreation area facilities and long-term, negligible to minor and beneficial as a result of the potential for development in the surrounding areas.

Alternative B (Preferred Alternative)

Impact Analysis. Alternative B would allow facility upgrades, expansion and improvements up to and including those included in the existing DCPs for the uplake areas. Projects that could be undertaken under Alternative B would potentially employ local construction labor and lead to local purchases of materials and services during the short-term construction period.

In general, Alternative B would improve the overall visitor experience at the uplake areas and allow more visitors to make use of specific uplake facilities. Projects under Alternative B are intended to accommodate anticipated growth in visitor use that is consistent with the growth trends of the past, given normal water levels. In addition, changes to launch ramps and water-based facilities would facilitate access to the water even when a drought occurs like that of recent years.

It is assumed that construction under Alternative B would occur as budgets allow, that the individual projects would be relatively small and that employment and spending would likely be split between local and nonlocal sources. The economic impact of construction under Alternative B would be generally beneficial. However, economic impacts would be cyclical as projects begin and end and would be minor and short-term for each project because of their scope and economic leakage.

Alternative B would likely prevent deterioration of the visitor experience and loss of visitor use over time and facilitate normal visitation in the future even at low water levels like those from 1999 to 2004. Under Alternative B, commercial operations in the NRA and communities nearby would gradually return to expected levels of business activity as suggested by the trend in visitor growth in the past at normal water levels. Expansions to concession facilities would be made as they are determined to be economically feasible. Occupancy information for various commercial services provided by the concessioner indicates that most services were 90 percent or more occupied during the peak visitor season even during years of drought and decreased visitation. This would seem to indicate that expansion of service levels would be warranted and economically viable with increased visitation.

Increasing the size of facilities and variety of services offered by concession operations in the recreation area would improve the profitability of concession contracts and perhaps increase the competitiveness for the contracts in the future. Increased competition for concession contracts could in turn result in increased franchise fees paid to the recreation area, which would increase future investment in infrastructure.

Alternative B would benefit businesses and the local economy by avoiding lost jobs, earnings and public revenues and by gradually restoring normal levels of activity and expectations for growth. The benefits of this part of Alternative B to concessioners and to visitor-related business and public revenue would be beneficial, minor to moderate and long-term.

Cumulative Impacts. Other past, present and reasonably foreseeable future projects with the potential to impact socioeconomics include the road and highway improvement projects and the potential for additional development in surrounding areas. The road improvement projects would result in short-term beneficial negligible impacts as a result of the potential jobs and spending during the road construction. In the long-term, road improvements would provide negligible beneficial impacts in improving access to the uplake developed areas and surrounding communities. Potential development in surrounding areas would provide minor socioeconomic benefits. The overall cumulative socioeconomic impacts would be short-term, negligible and beneficial and long-term, negligible to minor and beneficial. In combination with Alternative B, the cumulative impacts would be short-term, negligible to minor and beneficial and long-term, minor to moderate and beneficial as a result of the potential for development in the surrounding areas.

Conclusion. Impacts to socioeconomics from the construction projects planned as part of Alternative B would be short-term, minor and beneficial. The benefits of Alternative B to concessioners and to visitor-related business and public revenue would be beneficial, minor to moderate and long-term. In combination with Alternative B, the cumulative impacts would be short-term negligible to minor and beneficial and long-term minor to moderate and beneficial as a result of the potential for development in the surrounding areas.

Park Operations

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for recreation area operations:

Desired Conditions	Sources
Utilities within the national recreation area will be as unobtrusive as possible and will have the least possible resource impact.	<i>NPS Management Policies 2006</i>
The National Park Service will use municipal or other utility systems outside of the national recreation area whenever economically and environmentally practicable.	<i>NPS Management Policies 2006</i>
The National Park Service will use the least polluting power supply options, either through onsite generation or through power purchases, where appropriate, available and cost effective; or where such purchases help meet federal or state emissions goals or alternative energy goals.	<i>NPS Management Policies 2006</i>

Methodology

Impact thresholds are as follows:

Impact Intensity	Recreation Area Operations Intensity Definition
Negligible	NRA operations would not be affected or the effect would be at or below the lower levels of detection and would not have an appreciable effect on recreation area operations.
Minor	The effect would be detectable, but would be of a magnitude that would not have an appreciable effect on recreation area operations. If mitigation were needed to offset adverse effects, it would be relatively simple and likely successful.
Moderate	The effects would be readily apparent and would result in a substantial change in recreation area operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and likely would be successful.
Major	The effects would be readily apparent and would result in a substantial change in recreation area operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive and their success could not be

Impact Intensity	Recreation Area Operations Intensity Definition
	guaranteed.

Impacts to recreation area operations would be short-term if the effects last only for the duration of the construction activities and long-term if the effects last longer than the duration of the construction activities.

This park operations section analyzes impacts to the existing infrastructure and associated management requirements against the totality of park operations, both NPS and concessioner. What entity actually manages this infrastructure in the future is a function of available funding.

Alternative A (No-Action)

Impact Analysis. Under the No-Action Alternative, the current Bullfrog, Halls Crossing and Hite facilities are adequately served by the water supply and sewage treatment facilities.

Over time, aging employee housing and visitor accommodations would affect recreation area operations as these units become increasingly difficult to maintain and require a greater investment of resources, which reduces resources available for other priorities. In addition, the quality, type and quantity of housing available may impact the recreation area and concessioner's ability to recruit and retain high-quality employees. Maintaining current levels of housing and visitor accommodations would have a long-term minor adverse impact on recreation area operations.

Although recreation area operations are expected to remain constant, an increase in recreation area visitation is expected when water levels return to near full pool. Additional demands would occur on recreation area and concessioner staff to handle the increased visitation.

Overall impacts to recreation area operations from Alternative A would be long-term, minor and adverse from meeting the ongoing maintenance needs of aging facilities and the increased demands as a result of increased visitation.

Cumulative Impacts. The proposed oil exploration well would result in a short- and long-term adverse impact to operations as the drilling operation would require ongoing monitoring by NRA staff to ensure the exploration is not damaging recreation area resources and is in compliance with operating permits. Development in surrounding areas could increase the number of incidental business permits for businesses based outside the recreation area and operating inside the recreation area, resulting in long-term increased management and oversight requirements as well as potentially negatively impacting concessioner operations. All of these past, present and reasonably foreseeable future projects would result in short-term, negligible to minor, adverse impacts and long-term minor adverse impacts to recreation area operations. Cumulative impacts, including impacts of Alternative A (No-Action Alternative), would result in long-term minor adverse impacts to recreation area operations.

Conclusion. Overall impacts to recreation area operations from Alternative A (No-Action Alternative) would be long-term, minor and adverse from meeting the ongoing maintenance needs of aging facilities and the increased demands as a result of increased visitation. Cumulative impacts would result in long-term minor adverse impacts to recreation area operations.

Alternative B (Preferred Alternative)

Impact Analysis. Construction of additional facilities under Alternative B would have a long-term minor adverse impact on recreation area operations because they are additions to the existing inventory of facilities that would accordingly increase operational requirements as well as future maintenance and repairs. Actual construction work for each of these projects would have short-term, minor to moderate, adverse impacts on recreation area operations through increased levels of activity and equipment in the vicinity of other recreation area operations as well as the need for NRA staff for oversight. Beneficial impacts to recreation area operations from facility expansion not specifically discussed would be negligible or would have no impact.

Upgrading existing facilities such as employee housing and visitor accommodations would directly and indirectly impact NRA operations by replacing aged units with new units that require less maintenance and repair work. Construction of additional housing would provide housing that is essential for employees working in the remote uplake locations. Updated housing units could contribute to the NPS' and concessioners' ability to attract and retain quality employees, which would result in more efficient and cost-effective operations. This would result in long-term minor beneficial impacts to NRA operations.

Expansion of facilities may result in utility systems being inadequate to supply the development. Water and wastewater systems may require expansion as well, which would add to the operations and maintenance demands.

Under Alternative B, power systems may be supplemented with solar and/or fuel-cell technology as appropriate. This potential use of "green" technology could result in negligible increases in maintenance and repair requirements of the system by using somewhat unproven technology and ultimately would increase the complexity of the system. Some negligible cost benefits would be realized through use of these technologies. The beneficial and adverse impacts of the technology would offset each other.

In summary, short-term, negligible to minor, adverse impacts would occur to recreation area operations from construction activities; long-term minor adverse impacts would result from increased operational demands from facility expansion; and long-term minor beneficial impacts to recreation area operations would result from reduced maintenance and repair requirements for upgraded facilities and perhaps retention of quality staff.

Cumulative Impacts. The proposed oil exploration well would result in a short- and long-term adverse impact to NRA operations as the drilling operation would require ongoing monitoring by NRA staff to ensure the exploration is not damaging NRA resources and is in compliance with operating permits. Development in surrounding areas could increase the number of incidental business permits for businesses based outside the NRA and operating inside the NRA, resulting in long-term increased management and oversight requirements as well as potentially negatively impacting concessioner operations. All of these past, present and reasonably foreseeable future projects would result in short-term, negligible to minor, adverse impacts and long-term minor adverse impacts to recreation area operations. Cumulative impacts, including Alternative B, would result in short- and long-term, minor and adverse impacts to recreation area operations.

Conclusion. Overall, short-term, negligible to minor, adverse impacts would occur to recreation area operations from construction activities; long-term, minor and adverse impacts would result from increased operational demands from facility expansion; and long-term minor beneficial impacts to

recreation area operations would result from reduced maintenance and repair requirements for upgraded facilities. Cumulative impacts, including impacts of Alternative A (No-Action Alternative), would result in short- and long-term, minor, adverse impacts to NRA operations.

Public Health and Safety

Regulation and Policy

Desired Conditions	Sources
A safe and healthful environment is provided for visitors and employees.	NPS <i>Management Policies 2006</i>
Toxic and flammable chemicals are stored, used and disposed of properly so that accidental releases are prevented and the severity of releases that do occur is minimized. The national recreation area will have an oil and chemical spill response management plan.	Resource Conservation and Recovery Act NPS <i>Management Policies 2006</i>

Impacts on public health and safety were assessed by gathering information on public use at Bullfrog, Halls Crossing and Hite from NPS staff and by using professional judgment and were based on experience with similar projects. The following definitions were used in the assessment of impacts on public safety at Bullfrog, Halls Crossing and Hite:

Impact Intensity	Public Health and Safety Intensity Definition
Negligible	Health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on visitor or employee health and safety.
Minor	The effect would be detectable, but would not have an appreciable effect on health and safety. If mitigation were needed, it would be relatively simple and would likely be successful.
Moderate	The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a local scale. Mitigation measures would probably be necessary and would likely be successful.
Major	The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a regional scale. Extensive mitigation measures would be needed and their success would not be guaranteed.

The effects to safety are considered short-term if the effects last for the period of construction and long-term if the effects last beyond the period of construction.

Alternative A (No-Action)

Impact Analysis. Because no changes would occur to existing facilities at the uplake developed areas under the No-Action Alternative, there would be no impacts to health and safety.

Cumulative Impacts. Because there would be no impacts to health and safety under the No-Action Alternative, there would be no contribution to cumulative impacts.

Conclusion. Because no changes would occur to existing facilities at the uplake developed areas under the No-Action Alternative, there would be no impacts to health and safety. Because there would be no new impacts to health and safety under the No-Action Alternative, there would be no contribution to cumulative impacts.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B, some facilities would be expanded, receive upgrades, or be relocated which could adversely affect worker health and safety in the short-term during construction. However, proper use of personal protective equipment and use of BMPs would reduce these adverse impacts to a negligible level. Expansion and/or upgrading of facilities and amenities would generally have no impact on public health and safety, with a few minor exceptions.

- Upgrades to utility systems, which include water and sewer systems, would ensure that facility expansion would not over-tax the water and sewer systems and risk exposing the public to raw sewage or compromise the potable water supply, resulting in long-term, negligible to minor, beneficial impacts.
- Improvements to roads and parking areas to accommodate added or relocated facilities would insure safe access for visitors in vehicles as well as pedestrians, resulting in long-term, negligible to minor, beneficial impacts.

In addition, the relocation of concessioner maintenance facilities away from the Village Center at Bullfrog would minimize the potential for health and safety issues as a result of visitors wandering into maintenance work areas or being exposed to chemicals resulting in long-term, negligible to minor, beneficial impacts.

The supplemental calculations to the CCS did not indicate that safety is a limiting factor in any zones at any lake elevations. Should monitoring of Lake Powell indicate that safety is becoming problematic, the entirety of a zone could be designated as wakeless (meaning that boats would be required to operate at low speeds so as not to create a wake). Boats moving at slower speeds require much less time and space to avoid collision, therefore a wakeless requirement would allow a greater number of boats to operate safely in the zone.

Cumulative Impacts. Road and highway improvements would have a short-term adverse impact on health and safety for visitors traveling the roads to reach the uplake district developed areas due to hazards associated with road work and long-term beneficial impacts by maintaining or improving the safety of routes visitors travel. Overall cumulative impacts, including those of Alternative B, would be short-term, negligible to minor and adverse and long-term, minor and beneficial.

Conclusion. Impacts to health and safety under Alternative B would be short-term, negligible and adverse and long-term negligible to minor and beneficial. Overall cumulative impacts, including impacts of Alternative B, would result in short-term, negligible to minor, adverse and long-term minor beneficial impacts to health and safety.

Transportation

Regulation and Policy

Current laws and policies require that the following conditions be achieved in Glen Canyon NRA for public health and safety, including transportation:

Desired conditions	Sources
A safe and healthful environment is provided for visitors and employees.	NPS <i>Management Policies 2006</i>
Toxic and flammable chemicals are stored, used and disposed of properly so that accidental releases are prevented and the severity of releases that do occur is minimized. The national recreation area will have an oil and chemical spill response management plan.	Resource Conservation and Recovery Act NPS <i>Management Policies 2006</i>

Methodology

The following definitions of intensity were used for the analysis of impacts on transportation and traffic:

Impact Intensity	Transportation Intensity Definition
Negligible	Impacts would not include measurable or perceptible changes in transportation routes or traffic volumes.
Minor	Changes to traffic volumes would be anticipated to be less than 25%, with only slight changes to transportation routes (e.g., paving or realignment). New or improved roads and traffic devices consistent with expected traffic would be implemented to mitigate traffic volume increases in excess of 25%.
Moderate	Changes to traffic volumes would be anticipated to be between 26% and 75% and changes to transportation routes would include new roads and traffic devices to partially mitigate for additional traffic.
Major	Changes to traffic volumes would be anticipated to be greater than 75% and changes to transportation routes would include substantial new roads (greater than 50% increase to total road length over current conditions); new roads and traffic devices would not adequately mitigate for increased traffic volumes.

Alternative A (No-Action)

Impact Analysis. Because no changes would be made under the No-Action Alternative there would be no impacts to transportation under the No-Action Alternative.

Cumulative Impacts. Because the No-Action Alternative would not impact transportation, there would be no cumulative impacts as a result of the No-Action Alternative.

Conclusion. Because no changes would be made under the No-Action Alternative, there would be no impacts to transportation under Alternative A. Because the No-Action Alternative would not impact transportation, there would be no cumulative impacts as a result of the No-Action Alternative.

Alternative B (Preferred Alternative)

Impact Analysis. Under Alternative B no changes would be made to NPS maintenance facilities, airstrips, water-based stores, launch ramp support facilities and the river runner takeout.

Expansion of some facilities in the recreation area would increase accommodation and amenities for existing visitors and add additional facilities for increased visitor numbers. Actual construction work for expansion of the expanded facilities would have a short-term, minor to moderate, adverse impact on transportation as equipment and activity would, in some cases, be located in the visitor use and recreation area operational areas that already experience heavy traffic and can be congested. In the long-term, impacts from increased visitors as a result of increased facilities would result in negligible adverse impacts to transportation.

Facility relocation proposed under Alternative B would have beneficial impacts on transportation through improved traffic circulation and separation of maintenance facilities from high visitor use areas. These improvements would result in a long-term minor beneficial impact to transportation as traffic flow through the developed areas and access would be improved and conflicts with deliveries and other operational vehicles and congestion would be reduced. Actual construction of relocated facilities and a road to the relocated secured storage / property maintenance area at Halls Crossing would have short-term minor adverse impacts to transportation.

Construction of an unimproved road to primitive shoreline camping at Hite would result in short-term minor adverse impacts due to the actual construction activity. Long-term minor beneficial impacts would result from a direct access route for visitors accessing the primitive shoreline camping area, preventing travel overland to reach shoreline camping.

The overall impacts to transportation from Alternative B would be short-term, minor and adverse resulting from increased traffic and congestion during construction periods and long-term, minor and beneficial resulting from consolidation of like activities, centrally locating facilities to reduce traffic and improved circulation patterns.

Cumulative Impacts. Road and highway improvements and the proposed petroleum exploration well would result in minor adverse impacts from short-term increases in truck and heavy equipment operation and traffic within and/or in the vicinity of the uplake developed areas. Road and highway improvements would have long-term negligible beneficial impacts by improving the travel routes. The overall cumulative projects, including Alternative B, would result in short-term minor adverse impacts and long-term minor beneficial impacts to transportation.

Conclusion. The overall impacts to transportation from Alternative B would be short-term minor and adverse resulting from increased traffic and congestion during construction periods; and long-term, minor and beneficial resulting from consolidation of like activities, centrally locating facilities to reduce traffic and improved circulation patterns. The overall cumulative impact from projects, including impacts of Alternative B, would result in short-term minor adverse impacts and long-term minor beneficial impacts to transportation.