

# ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the proposed project. Topics analyzed in this chapter include paleontological resources, visitor use and experience, and park operations. Direct, indirect, and cumulative effects, as well as impairment are analyzed for each resource topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for each resource at the beginning of each resource section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
  - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
  - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
  - *Direct*: An effect that is caused by an action and occurs in the same time and place.
  - *Indirect*: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact will occur. Are the effects site-specific, local, regional, or even broader?
- **Duration** describes the length of time an effect will occur, either short-term or long-term:
  - *Short-term* impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.
  - *Long-term* impacts last beyond the construction period, and the resources may not resume their pre-construction conditions for a longer period of time following construction.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each impact topic analyzed in this Environmental Assessment / Assessment of Effect.

## Cumulative Effects

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

Cumulative impacts were determined by combining the impacts of the Preferred Alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at Glen Canyon National Recreation Area and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the GCNRA's boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis, listed from past to future:

- **Construction and operation of the Glen Canyon Dam, completed in 1963:** The hydroelectric power plant and dam was built to generate electricity and store water.
- **The creation and management of Lake Powell, 1977:** The lake took 14 years to fill once construction of the dam was completed. The lake holds approximately 27,000,000 acre-feet of water when full.
- **The creation of the City of Page during dam construction, 1964:** The City of Page began as a “housing camp” in 1957 during construction of the dam as a place for the people working on the dam to live. After the dam was completed, the “Government Camp” was incorporated and given its current name.
- Construction and operation of the marina at Wahweap.
- Construction and operation of the marina at Dangling Rope.
- Navajo Generating Station Water Intake Project.
- Removal of buried hazardous waste in the northern portion of the Chains Recreation Area.
- Potential future construction and operation of an additional pipeline from the City of Page to the LeChee Chapter, Navajo Nation to provide additional water supply capacity. This pipeline would be placed in a trench directly next to the existing pipeline to LeChee.
- Future construction and operation of a new radio repeater and tower on Navajo Mountain.
- The potential construction and operation of a new broadband and telephone repeater facility near the marina at Dangling Rope.
- The potential construction of a new water intake near Wahweap to serve the City of St. George, Utah.

## Topography, Geology, and Soils

### Intensity Level Definitions

Glen Canyon National Recreation Area was established to preserve and protect its natural resources for the benefit and enjoyment of the public. The methodology used for assessing impacts to visitor use and experience is based on how a new pumping station in the Chains area would affect the visitor, particularly with regards to the visitors’ enjoyment of this area. The thresholds for this impact assessment are as follows:

<b>Beneficial:</b>	Effects result in an improvement to the resource.
<b>Adverse:</b>	Effects result in an undesirable change of the resource.
<b>Negligible:</b>	Changes to the topography of the analysis area would not be noticeable. The geologic stability of the analysis area would not be compromised by digging or foundation construction activities. Although some clearing, grubbing and grading may take place, the soils in the analysis area would remain essentially intact with no long-term erosion potential.
<b>Minor:</b>	Changes to the topography of the analysis area would be noticeable up close, but not from a distance of over one mile. The geologic stability of the analysis area would remain sound; however, digging and foundation construction activities may be extensive and require some engineered reinforcements. Less than one acre of soils would be temporarily disturbed, but not to the extent that standard best management practices would not be capable of preventing erosion until the soils in the analysis area are fully stabilized. Native soils would be retained.
<b>Moderate:</b>	Changes to the topography of the analysis area would be noticeable from a distance of over one mile, but not from a distance of five miles or more. The geologic stability of the

analysis area would remain sound; however, construction activities would require extensive engineered reinforcements to maintain that stability. Over one acre, but less than five acres, of soils would be disturbed. Best management practices and other mitigation measures would be able to restore the existing condition in the long-term.

**Major:** Changes to the topography of the analysis area would be noticeable from a distance of over five miles. The geologic stability of the analysis area would entirely dependent upon engineered reinforcements. Over five acres of soils would be disturbed or removed. Although best management practices and other mitigation measures would be employed and erosion would be controlled, there would be an extensive, permanent loss of native soils.

**Local:** Within one quarter-mile of the proposed project site.

**Regional:** Within 100 miles of the proposed project site.

**Widespread:** Within 1,000 miles of the proposed project site.

**Duration:** Short-term – Recovers in less than one year.

Long-term – Takes more than one year to recover.

### **Effects of Alternative A (No Action Alternative)**

The No Action Alternative would result in no effects to the topography, geology, or soils in either the Chains Recreation Area or along the proposed path of the conveyance pipeline.

*Cumulative Effects:* The No Action Alternative would result in no additional effects to the topography or geology in either the Chains Recreation Area, along the proposed path of the conveyance pipeline, or along the path of the additional pipeline to LeChee. These areas have already been substantially altered by past human activities associated with the construction of the dam and development of the existing water supply infrastructure. There may be a potential minor, local, short-term effect to soils in the northern portion of the Chains area from future activities associated with the removal of buried hazardous waste.

*Conclusion:* The No Action Alternative would result in no additional effects to topography, geology, or soils because no construction activities would be conducted. As such, this alternative would not contribute to any cumulative disturbance of topography, geology, or soils, when considered with other past, present, and reasonably foreseeable future actions. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Glen Canyon National Recreation Area; (2) key to the natural or cultural integrity of the recreation area; or (3) identified as a goal in the GCNRA's general management plan or other relevant National Park Service planning documents, there would be no impairment of the recreation area's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

### **Effects of Alternative B (Preferred Alternative)**

There would be a minor, local, long-term effect to topography as a result of cliff face scaling, if it is determined that such scaling is necessary to ensure the stability of the cliff wall. Also, clearing and leveling, and the addition of a pumping station building would have similar effects. There would be a negligible effect to the geology of the Chains area. Surface joint analysis and the results of a test borehole indicate that there are no joints in the Navajo sandstone that extend into the area where drilling would occur; thus, drilling operations would not be expected to result in block failure. Additional evaluation during the design phase would be required by the GCNRA to confirm this. The steel casings and grout within the intake shafts would be expected to reinforce the surrounding rock so that the boreholes would not result in any potential overall weakening of the cliff wall. Soil disturbance would be linear along the path of the proposed conveyance pipeline route as a result of trenching. The length of this disturbance would be approximately two miles. Approximately one quarter to one third of an acre of

soils would be disturbed by construction of the new pumping station and entrenchment of the conveyance pipeline. This disturbance would be minor, local, and short-term in areas that have already been disturbed several times in the past.

*Cumulative Effects:* Any construction activities have the potential to affect topography, geology, and soils. The construction of the lake and dam likely had an adverse effect on these resources as a result of cliff scaling, road and dam building, and other development in the area before it became the Glen Canyon National Recreation Area. Projects such as road improvements, exotic vegetation management, other building construction, and fencing have had or could have an adverse effect on these resources because of the inconvenience of construction noise, dust, and possible off-limit areas. Ultimately, however, these actions would have or have had a beneficial effect on visitor use and experience because of long-term improvements to the human health and safety aspects of the GCNRA; the visual and natural environment; interpretive opportunities; and functionality of the GCNRA. Under this alternative, effects to topography, geology and soils in the Chains Recreation Area and along the conveyance pipeline corridor would be minor and similar to past activities the results of which are readily visible to the casual observer; therefore, cumulatively, topography, geology, and soils would not be expected to appreciably change when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The Preferred Alternative would result in negligible to minor adverse effects to these resources. The preparation and adherence to a Stormwater Pollution Prevention Plan and Best Management Practices during construction, additional evaluation of the geological stability of the Chains Recreation Area during the design phase, and the implementation of a landscaping plan for site restoration would be expected to prevent greater adverse effects from occurring as a result of the Preferred Alternative. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Glen Canyon National Recreation Area; (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 National Park Service planning documents, there would be no impairment of the recreation area's resources or values. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

## Visitor Use and Experience

### Intensity Level Definitions

Glen Canyon National Recreation Area was established to preserve and protect its natural resources for the benefit and enjoyment of the public. The methodology used for assessing impacts to visitor use and experience is based on how a new pumping station in the Chains area would affect the visitor, particularly with regards to the visitors' enjoyment of this area. The thresholds for this impact assessment are as follows:

- |                    |   |
|--------------------|---|
| <b>Negligible:</b> | Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.          |
| <b>Minor:</b>      | Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.                   |
| <b>Moderate:</b>   | Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative, and would likely be able to express an opinion about the changes.                   |
| <b>Major:</b>      | Changes in visitor use and/or experience would be readily apparent and have substantial long-term consequences. The visitor would be aware of the effects associated with the alternative, and would likely express a strong opinion about the changes. |

## **Effects of Alternative A (No Action Alternative)**

The No Action Alternative would not measurably alter the visitor use and experience because the Chains Recreation Area would remain unchanged. In particular, access to and use of this area would not change, and visitors would continue to use it for recreational purposes as they currently do. In addition, the visual resources of the area would remain unchanged because no new pumping station would be constructed and no cliff face scaling or reinforcement would be necessary.

*Cumulative Effects:* Any construction activities have the potential to affect visitor use and experience. The construction of the lake and dam likely had an adverse effect on the visitor experience as a result of noise, dust, and unavailability to view some of the primary attractions in the area before it became the Glen Canyon National Recreation Area. Projects such as road improvements, exotic vegetation management, building construction, and fencing have had or could have an adverse effect on visitor use and experience because of the inconvenience of construction noise, dust, and possible off-limit areas. Ultimately, however, these actions would have or have had a beneficial effect on visitor use and experience because of long-term improvements to the human health and safety aspects of the GCNRA; the visual and natural environment; interpretive opportunities; and functionality of the GCNRA. Under this alternative, visitor functions in the project area are not expected to change; therefore, cumulatively, visitor use and experience would not appreciably change when considered with other past, present, and reasonably foreseeable future actions.

*Conclusion:* The No Action Alternative would result in primarily negligible effects to visitor use and experience because the features and visitor functions in the project area would not change. Cumulatively, this alternative would have a negligible effect on visitor use and experience when considered with other past, present, and reasonably foreseeable future actions.

## **Effects of Alternative B (Preferred Alternative)**

There would be minor, local, short- and long-term adverse effects to visitor use and experience. The proposed pumping plant and intakes are compatible with previous and nearby land use activities and the RRU zone designation in the Chains area. During construction, at least one lane of the access road would be kept open to allow public access to portions of the Chains area beyond the proposed project area. A temporary chain-link security fence would be placed around stored materials and equipment during construction for public safety and to protect the materials and equipment from theft and vandalism. There would be a permanent, minor effect on land use in the Chains area from the conversion of current parking space to a fenced pumping plant; however, recreational visitors would still be able to walk around or drive past the pumping plant to access the cliff edge to view the lake and dam. The parking area near the restroom facility would be unaffected, unless the northern part is used for temporary excess material and equipment storage.

During construction, areas enclosed by security fence would be inaccessible by the public. The Chains area may be closed or access may remain open and at least one lane of the access road kept open past the pumping plant site. If area is kept open, a flagman would be used to control traffic around the construction site. In either case, these effects to recreation would be temporary. Closure of the area would result in a minor effect while keeping it open would result in a negligible effect. After construction of the pumping plant is complete, the permanently fenced area would be reduced to an area of approximately one-half acre. The effect of this enclosure in the Chains area would be permanent, but negligible.

The proposed conveyance pipeline that would be used to connect the new pumping station to the existing pipeline that supplies the City's water treatment plant would cross US 89 within the GCNRA. Techniques for boring beneath US 89 could be used to avoid closure of this entrance during installation of the conveyance pipeline. The effects to visitor use and experience from boring beneath the roadway to emplace the conveyance pipeline would be temporary and negligible.

The effects of construction activities on the visual quality of the area would be moderate, but temporary. Upon completion of construction, the proposed location of the pumping plant away from the edge of the cliff would reduce its visibility from the lake during periods when the lake level is close to normal.

Whenever the lake level is low, like it presently is, the pumping plant would be difficult, if not impossible to see from the lake. Visitors to the Chains area would see the pumping plant as they pass by it on the access road. Scaling and engineered reinforcements along the cliff face could result in minor, local, long-term effects to the visual quality of the site as viewed from the lake. The coated fence and the building's architectural design and color would allow them to blend in with the setting, as viewed from a distance. The intent of the area's Class III visual management objectives would be met. The effects to the visual quality of the area, following construction, would be permanent and negligible.

*Cumulative Effects:* As described under Alternative A, any construction activities have the potential to affect visitor use and experience. The construction of the dam likely had an adverse effect on the visitor experience as a result of noise, dust, and unavailability to view some of the primary attractions in what later became and is now the GCNRA. Projects such as road improvements, exotic vegetation management, building construction, and fencing have had or could have an adverse effect on visitor use and experience because of the inconvenience of construction noise, dust, and possible off-limit areas. Ultimately, however, these actions would have or have had a beneficial effect on visitor use and experience because of long-term improvements to the human health and safety aspects of the recreation area; the visual and natural environment; interpretive opportunities; and functionality of the GCNRA. Considering these past, present, and reasonably foreseeable future actions, the minor adverse effects of constructing the new pumping station would have a negligible, local, long-term cumulative effect to the overall visitor use and experience at the recreation area.

*Conclusion:* Under the Preferred Alternative, the enhancement of the trail network and the additional space created in the visitor center would have a minor to moderate beneficial effect on visitor use and experience. Construction disturbances (noise, dust, limited areas) and the dismantling of the yurt structures would have a minor, temporary adverse effect to visitor use and experience. The visual changes to the area from construction of a new building would have a negligible, local, long-term adverse effect on visitor experience because the changes would be similar to other changes that have occurred to the area in the past. Cumulatively, this alternative would have a negligible adverse effect to visitor use and experience because ultimately this project combined with other past, present, and reasonably foreseeable future actions would blend right in with the existing surroundings.

# CONSULTATION AND COORDINATION

## External Scoping

External (public) scoping was conducted to inform various agencies, organizations, and the public about the proposal to construct a water pumping station and conveyance pipeline at Glen Canyon National Recreation Area and to generate input on the preparation of this Environmental Assessment. This effort was initiated with the distribution of a scoping letter which was bulk-mailed to all the residents of Page, Arizona and members of the LeChee Chapter of the Navajo Nation that have Post Office boxes in Page or were Chapter leaders at the time scoping was conducted. In addition, the scoping letter was sent to local news organizations, and it was posted on the GCNRA's internet website. With this press release, the public was given 30 days to comment on the project beginning December 31, 2004. During this period, two comments were received via email (see appendix). A public meeting was held in Page on January 6, 2005. A second public meeting was held in LeChee with officials and members of the LeChee Chapter on January 19, 2005.

In addition to the aforementioned public entities, the following agencies and Native American tribes were sent scoping information or were contacted for information regarding the project:

### Congressional Members

The Honorable Representative Jim Matheson  
The Honorable Representative Rick Renzi  
The Honorable Senator Robert F. Bennett  
The Honorable Senator Orrin G. Hatch

### Federal Agencies

U.S. Department of the Interior – Canyonlands National Park  
U.S. Department of the Interior – Capitol Reef National Park  
U.S. Department of the Interior – Bureau of Land Management, Escalante Resource Area  
U.S. Department of the Interior – Grand Canyon National Park  
U.S. Department of the Interior – Grand Staircase Escalante National Park  
U.S. Department of Agriculture – United States Forest Service, Hans Flat Ranger Station  
U.S. Department of the Interior – Bureau of Land Management, Henry Mountain Resource Area  
U.S. Department of the Interior – National Park Service  
U.S. Department of the Interior – National Park Service, Southern Arizona Group  
U.S. Department of the Interior – Bureau of Land Management, San Juan Resource Area  
U.S. Department of the Interior – Bureau of Reclamation  
U.S. Department of the Interior – Bureau of Land Management, Vermillion Resource Area  
U.S. Department of the Interior – Fish and Wildlife Service  
U.S. Environmental Protection Agency – Region VIII

### State Agencies

Arizona Department of Environmental Quality  
Arizona Game and Fish  
Arizona State Historic Preservation Office  
Arizona Strip Field Office  
Utah Department of Wildlife Resources  
Utah Division of Water Quality  
Utah Division of Wildlife Resources  
Utah Governor's Office  
Utah School and Institutional Trust Lands Administration

Utah State Historic Preservation Office  
Utah State Parks – Lake Powell

Affiliated Native American Groups

Kaibab Paiute Tribe  
Navajo Nation  
Navajo Nation – Inscription House Chapter  
Navajo Nation – LeChee Chapter  
Navajo Nation – Navajo Mountain Chapter  
Navajo Nation – Oljato Chapter  
Navajo Nation – Shonto Chapter  
San Juan Southern Paiute Tribe  
Southern Ute Indian Tribe  
The Hopi Tribe  
Ute Mountain Ute  
White Mesa Ute Council

Counties

Coconino County Board of Supervisors  
Garfield County Commissioners  
Kane County Commission  
San Juan County Commission

Cities

City of Big Water Mayor and Council  
City of Page Mayor and Council

Private Organizations, Businesses, and Individuals

Foundation for North American Wild Sheep  
Jeff Johnson & Co.  
Kanab Cattle Co.  
Lake Powell Resorts and Marinas  
National Parks & Conservation Association  
National Wildlife Federation  
Navajo Generating Station  
Page – Lake Powell Chamber of Commerce  
Southern Utah Wilderness Alliance

## **Internal Scoping**

Internal scoping was conducted by an interdisciplinary team of professionals from Glen Canyon National Recreation Area. Interdisciplinary team members met on November 8, 2004 to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. The results of the November 2004 meeting are documented in this Environmental Assessment.

## **Environmental Assessment Review and List of Recipients**

The Environmental Assessment will be released for public review in November 2008. To inform the public of the availability of the Environmental Assessment, the National Park Service will publish and distribute a letter or press release to various agencies, tribes, and members of the public on Glen Canyon's mailing list, as well as place an ad in the local newspaper. Copies of the EA will be provided to



interested individuals, upon request. Copies of the document will also be available for review at the GCNRA's visitor center and on the internet at <http://parkplanning.nps.gov>.

The Environmental Assessment is subject to a 15-day public comment period ending November 15, 2008. During this time, the public is encouraged to submit their written comments to the National Park Service address provided at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the Environmental Assessment, as needed.

## List of Preparers

This list presents the individuals who contributed to the technical content of this EA. Some of the individuals below prepared specific sections in accordance with their technical qualifications. Other technical experts provided input to sections within their respective disciplines through in-depth review and data verification. Still others provided overall technical or management reviews. The document was produced by C Squared Environmental Consulting, LLC, in Rowe, New Mexico.

### Consultants (provided information)

- Ms. Barbara Wilson, National Park Service
- Ms. Chris Kincaid, National Park Service
- Mr. John Spence, National Park Service
- Mr. Mark Anderson, National Park Service
- Mr. Chris Turk, National Park Service
- Mr. Stan Powers, Bureau of Reclamation
- Mr. Bo Thomas, Page City Manager
- Mr. Fred Ladman, Page Public Works Superintendent
- Mr. Bill Plummer, Water Resources Consultant

### Preparer (developed EA content)

- Mr. Devin Kennemore, C Squared Environmental Consulting, LLC

# REFERENCES

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[http://www.azgfd.gov/w\\_c/edits/documents/wshednew\\_002.pdf](http://www.azgfd.gov/w_c/edits/documents/wshednew_002.pdf)

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**BOR, 2007.** *Lake Powell Reservoir-Side Pumping Plant Site, Geology Report*, Bureau of Reclamation, Phoenix Area Office, Glendale, AZ, 85306

**Brown, David E., 1994.** *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

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<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=619d63687e4183f12aa226e63fddcabb;rgn=div5;view=text;node=40%3A16.0.1.1.1;idno=40;cc=ecfr#40:16.0.1.1.1.2.1.240>

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## **APPENDIX**



United States Department of the Interior  
FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE  
2369 WEST ORTON CIRCLE, SUITE 50  
WEST VALLEY CITY, UTAH 84119

In Reply Refer To

FWS/R6

ES/UT

05-0415

March 3, 2005

Devin Kennemore  
C Squared Environmental Consulting, LLC  
P.O. Box 231  
Rowe, New Mexico 87562

RE: Proposed Page-LeChee Water Supply Project

Dear Mr. Kennemore:

The U.S. Fish and Wildlife Service (Service) has received your letter of February 1, 2004, regarding the proposed construction of a new lakeside intake, pumping facility, and pipeline from Lake Powell. The purpose of the project is to supply water to the City of Page, Arizona, and the LeChee Chapter of the Navajo Nation. An environmental assessment will be prepared to analyze potential impacts from this project. We are providing the following comments for your consideration.

As the project area lies within the State of Arizona, we recommend that you coordinate with the Service's Arizona Field Office regarding consultation under section 7 of the Endangered Species Act. We also recommend that you work with the Utah Division of Wildlife Resources regarding potential impacts the project might have on Lake Powell's sport fish population.

Invasive weeds will have greater potential to invade with soil disturbance. Therefore, we recommend surveys for invasive plants, and use of best management practices to minimize the potential for introduction of non-natives. We recommend the use of native seed for any revegetation activities.

We appreciate the opportunity to provide these comments. If you need further assistance, please contact Betsy Herrmann, Ecologist, at the letterhead address or (801) 975-3330, extension 139.

Sincerely,

Henry R. Maddux  
Utah Field Supervisor

cc: UDWR – Cedar City  
FWS – Arizona Field Office



## United States Department of the Interior

U.S. Fish and Wildlife Service

Arizona Ecological Services Field Office

2321 West Royal Palm Road, Suite 103

Phoenix, Arizona 85021-4951

Telephone: (602) 242-0210 Fax: (602) 242-2513



In Reply Refer to:

AESO/SE

02-21-05-I-0304

March 17, 2005

Mr. Devin Kennemore, President  
C<sup>2</sup> Environmental Consulting, LLC  
P. O. Box 231  
Rowe, New Mexico 87562

Subject: Page-LeChee Water Supply Project

Dear Mr. Kennemore:

Thank you for your correspondence of February 1, 2005, requesting our comments on the subject action, which involves construction of a pumping facility, consisting of a lakeside intake and pumping plant on the canyon rim above Lake Powell and a pipeline about 1-½ miles in length. There are three alternative sites for the facility, all in relatively the same area, about ¼ mile north of Glen Canyon Dam on the west side of the lake in section 24, Township 41 North, Range 8 East, G&SRB&PM, Coconino County, on Navajo Nation land and adjacent to the Glen Canyon National Recreation Area (GCNRA). The pipeline runs from the facility area to the south. The purpose of the action is system redundancy for an existing pipeline from Glen Canyon Dam and will not increase water allocation. The National Park Service is the action agency. This letter documents our recommendations regarding threatened and endangered species, critical habitat, species proposed to be listed, or critical habitat proposed to be designated, under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

The Arizona Ecological Services Field Office has posted lists of candidate, proposed, threatened and endangered species, and relevant designated or proposed critical habitat, for all of Arizona's counties on the Internet. Please refer to the website <http://arizonaes.fws.gov> for species information for the county where your project occurs. If you have difficulty obtaining a list, please contact our office and we will mail or fax you one. For future projects it is not necessary to contact our office to obtain a species list if you choose to access our website directly.

On the webpage's left side choose "Threatened & Endangered". Scroll down to the state map and click the county of choice. Species information includes status, counties of occurrence, and a summary of the species' physical description, elevation range and habitat, and some general comments including citations for Federal Register (FR) notices. (The FR is available at most public libraries and on the Internet.) At our website, more information for each species can be obtained at the main page by clicking on "Document Library" and "Documents by Species".

Please note that your action area may not include all or any of the species listed on our webpage. The information at our site and in the FR should be useful to you in determining which species may occur within the action area. Site-specific surveys may be needed to verify the presence or absence of a species or its habitat, in order to complete the analysis of project-related effects.

Threatened and endangered species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat *may be affected* by a federally funded, permitted or authorized activity, the agency needs to consult with us. Please note that a “may affect” determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. An effect exists even if only one individual or habitat segment may be affected. The effects analysis needs to include the entire action area, which often extends well outside the “footprint” of the project (e.g., downstream). If the agency determines that the action may jeopardize a proposed species or adversely modify proposed critical habitat, the agency needs to enter into a section 7 conference. Candidate species, which may be listed on our webpage, are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event they become proposed or listed prior to project completion.

Because this action is located adjacent to Lake Powell, effects on fish should be given consideration. Although the elevation of the proposed intake means it will be located at considerable depth, the possibility for continued drop in lake elevation should be factored into your effects analysis. One potential effect is the entrainment of fish in the pumps. Your letter states that the intakes will be fitted with screens to prevent fish from being drawn into the system. We support this measure and recommend that screen size be selected based on species potentially affected and their life history. In addition, to prevent water contamination and impacts to fish, a vehicle fluid-leakage and spill plan should be developed and implemented (see recommendation #6 under the condor discussion). Since the facility will be located adjacent to the rim, potential effects to species that may use canyon walls (e.g., nesting raptors) should be considered. Also, surface disturbance associated with construction of the pipeline should be evaluated for effects to terrestrial species.

The California condor (*Gymnogyps californianus*) (condor) was reintroduced as a non-essential experimental population to Vermillion Cliffs, less than 40 miles from the project site. The project site is within the nonessential experimental population area. On National Park System lands in this area, condors are treated as threatened species for the purposes of section 7 consultation. Condors are capable of traveling long distances in a short period of time (e.g., 200 miles/day) and tend to follow the Colorado River corridor. Therefore, they have the potential to be in the general project area on a daily basis. Like many scavengers, condors are very curious, and some may be drawn to human activity such as construction. We recommend the following measures if condors occur within the action area:

1. Prior to the start of construction, contact personnel monitoring California condor locations and movement to determine the locations and status of condors in the action area.
2. If a condor occurs at the construction site, cease construction until the condor leaves on its own or until techniques are employed by permitted personnel that result in it leaving the area.



3. Instruct construction workers and supervisors to avoid interaction with condors and to immediately contact the appropriate GCNRA, Peregrine Fund, and/or Navajo Nation Department of Fish and Wildlife (NNDFWL) personnel if or when condor(s) occur at a construction site.
5. Clean up the construction site at the end of each day work is being conducted (e.g., trash removed, scrap materials picked up) to minimize the likelihood of condors visiting the site. Inspect the area to ensure adequate clean-up measures are taken.
6. To prevent water contamination and potential poisoning of condors, develop and implement a vehicle fluid-leakage and spill plan. The plan should include provisions for immediate clean-up of any hazardous substance and define how each hazardous substance will be treated in case of leakage or spill.

In addition to species listed under the Act, we recommend you consider species protected under the Migratory Bird Treaty Act (MBTA). The MBTA prohibits the take of species on the list of migratory birds (see Section 10.13, Title 50 of the Code of Federal Regulations).

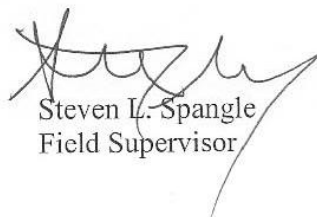
Since the proposed action will occur near Lake Powell, if the project will result in deposition of dredged or fill materials into waters of the United States, we advise contacting the U.S. Army Corps of Engineers, which regulates these activities under Section 404 of the Clean Water Act.

We recommend you contact the NNDFWL for assistance in determining if any Tribally-listed species may occur in your project area. Federal law does not protect some Tribally-listed species. The NNDFWL also houses a natural heritage program (NNHP), which is a database of rare, threatened, and endangered species for the Navajo Nation. The NNHP data provide a more site-specific accounting of species occurrence records that, when used in conjunction with our species-by-county information, can help identify species occurring in the action area. Because there are areas of the Navajo Nation that have not been inventoried for species of concern and inventory information can become quickly outdated, occurrence records should not be used to rule out the presence of a species, nor should they substitute for on-site surveys. We also recommend that you invite the Navajo Nation to participate in your section 7 consultation.

Thank you for the opportunity to comment on the proposed project. In future communication regarding this project please refer to consultation number 02-21-05-I-0304. If you need more assistance or have any questions, please contact John Nystedt at (928) 226-0614 (x104) or Brenda Smith (x101) of our Flagstaff Suboffice.

Thank you for your continued efforts to conserve endangered species.

Sincerely,



Steven L. Spangle  
Field Supervisor

cc: Director, Navajo Nation Department of Fish and Wildlife, Window Rock, AZ  
Program Manager, Water Quality, Navajo Environmental Protection Agency, Window Rock, AZ  
Superintendent, Glen Canyon National Recreation Area, National Park Service, Page, AZ  
NEPA Coordinator, Environmental Services, Bureau of Indian Affairs, Gallup, NM  
Tribal Liaison, Fish and Wildlife Service, Albuquerque, NM

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# Coconino County

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Apache (Arizona) trout	<i>Oncorhynchus apache</i>	Threatened	This yellowish or yellow-olive cutthroat-like trout has large dark spots on body. Its dorsal, anal, and caudal fins are edged with white. It has no red lateral band.	Apache, Coconino, Gila, Graham, Greenlee, Navajo	>5000 ft	Presently restricted to cold mountain streams with many low gradient meadow reaches.	Occupies stream habitats with substrates of boulders, rocks, and gravel with some sand or silt through mixed conifer and spruce-fir forests, and montane meadows and grasslands in the White Mountains. Also managed as a sport fish under special regulations.
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Large, adults have white head and tail. Height 28-38 inches; wingspan 66-96 inches. Lifespan 1-4 years. Dark with varying degrees of mottled brown plumage. Feet bare of feathers.	Apache, Cochise, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey.	Some birds are nesting residents while a larger number winters along rivers and reservoirs. An estimated 200 to 300 birds winter in Arizona. Once endangered (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) because of reproductive failures from pesticide poisoning and loss of habitat, this species was down listed to threatened on August 11, 1995. Illegal shooting, disturbance, and loss of habitat continues to be a problem. Species has been proposed for delisting (64 FR 36454) but still receives full protection under the ESA.
Black-footed ferret	<i>Mustela nigripes</i>	Endangered	Weasel-like, yellow buff coloration with black feet, tail tip, and eye mask. It has a blunt light colored nose and is 15-18 inches long and tail length is 5-6 inches.	Apache, Coconino, Navajo	<10,500	Grassland plains generally found in association with prairie dogs.	Unsurveyed prairie dog towns may be occupied by ferrets or may be appropriate for future reintroduction efforts. The Service developed guidelines for surveying prairie dog towns which are available upon request. No wild populations of this species are currently known to exist in Arizona.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Brady pincushion cactus	<i>Padlocactus bradyi</i>	Endangered	Small, semi-globose cactus, 2.4 inches tall and 2 inches in diameter. Spines are white or yellowish-tan. The spine clusters 1-2 central spines and 14-16 spreading radial spines. Flower: straw yellow produced at top of the stem.	Coconino	3850-4500 ft	Benches and terraces in Navajo desert near Marble Gorge.	Substrate is Kaibab limestone chips over moenkopi shale and sandstone soil. Plant community dominated by shadscale ( <i>Atriplex confertifolia</i> ), snakeweed ( <i>Gutierrezia sarothrae</i> ), mormon tea ( <i>Ephedra viridis</i> ), and desert trumpet ( <i>Eriogonum inflatum</i> ). Protected by CITES and Arizona Native Plant Law.
California Brown pelican	<i>Pelecanus occidentalis californicus</i>	Endangered	Large dark gray-brown water bird with a pouch underneath long bill and webbed feet. Adults have a white head and neck, brownish black breast, and silver gray upper parts.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Coastal land and islands; species found around many Arizona lakes and rivers.	Subspecies is found on Pacific Coast and is endangered due to pesticides. It is an uncommon transient in Arizona on many Arizona lakes and rivers. Individuals wander up from Mexico in summer and fall. No breeding records in Arizona.
California condor	<i>Gymnogyps californianus</i>	Endangered	Very large vulture (47 in., wingspan to 9 1/2 ft, weight to 22 lbs), adult plumage blackish, immature more brownish, adult wing linings white, immature mottled, head and upper parts of neck bare, yellow-orange in adults, grayish in mature	Apache, Coconino, Mohave, Navajo	Varies	High desert canyonlands and plateaus.	Recovery program has reintroduced condors to Northern Arizona, with the first release (6 birds) in December 1996. Release site located at the Vermilion Cliffs (Coconino County), with an experimental/nonessential area designated for most of Northern Arizona and Southern Utah. Breeding documented in Arizona. Experimental/nonessential area in Arizona is within a polygon formed by Hwy 191, Interstate 40, and Hwy 93, and extends north of the Arizona-Utah and Nevada borders.
Chiricahua leopard frog	<i>Rana chiricahuensis</i>	Threatened	Cream colored tubercules (spots) on a dark background on the rear of the thigh, dorsolateral folds that are interrupted and deflected medially, and a call given out of water distinguish this spotted frog from other leopard frogs	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	3300-8900 ft	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Require permanent or nearly permanent water sources. Populations north of the Gila River may be a closely-related, but distinct, undescribed species. A special rule allows take of frogs due to operation and maintenance of livestock tanks on State and private lands.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Humpback chub	<i>Gila cypha</i>	Endangered	Large (18 inches) minnow flattened head long fleshy snout, large fins, and a very large hump between the head and the dorsal fin.	Coconino, Mohave	< 4,000 ft	Large warm turbid rivers especially canyon areas with deep fast water.	Critical habitat in Grand Canyon. Species also found in Upper Basin.
Kanab ambersnail	<i>Oxytoma haydeni kanabensis</i>	Endangered	Small <0.7 inch, light amber color, sometimes grayish-amber mottled, right handed shell.	Coconino	2,900 ft	Travertine seeps and springs in Grand Canyon National Park.	Extremely geographically isolated. Three historical populations; two remaining, one on private property in Utah and one in Grand Canyon National Park; species affected by operations by Glen Canyon Dam. Associated with watercress, monkey flower, and other wetland vegetation.
Little Colorado spinedace	<i>Lepidomeda vittata</i>	Threatened	Small (<4 inches long) silvery minnow which is darker on the back than the belly.	Apache, Coconino, Navajo	4000-8000 ft	Moderate to small streams in pools and riffles with water flowing over gravel and silt.	Critical habitat includes eighteen miles of East Clear Creek, eight miles of Chevelon Creek, and five miles of Nutrioso Creek.
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	4100-9000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type, in canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are preferred. Critical habitat was finalized on August 31, 2004 (69 FR 53182). Critical habitat in Arizona occurs in Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties.
Navajo sedge	<i>Carex specuicola</i>	Threatened	Perennial forb with triangular stems, elongated rhizomes. Flower: white June and July.	Apache, Coconino, Navajo	5700-6000 ft	Silty soils at shady seeps and springs.	Designated critical habitat is on the Navajo Nation near Inscription House Ruins. Found at seep springs on vertical cliffs of pink-red Navajo sandstone.



COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Razorback sucker	<i>Xyrauchen texanus</i>	Endangered	Large, up to 3 feet long and up to 6 lbs, high sharp-edged keel-like hump behind the head. Head flattened on top. Olive-brown above to yellowish below	Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pinal, Yavapai, Yuma	< 6000 ft	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	Species is also found in Horseshoe Reservoir (Maricopa County). Critical habitat includes the 100-year floodplain of the river through the Grand Canyon from confluence with Paria River to Hoover Dam, Hoover Dam to Davis Dam, Parker Dam to Imperial Dam. Also Gila River from Arizona/New Mexico border to Coolidge Dam; and Salt River from Hwy 60/SR77 Bridge to Roosevelt Dam; Verde River from FS boundary to Horseshoe Lake.
San Francisco Peaks groundsel	<i>Senecio franciscanus</i>	Threatened	Member of sunflower family, dwarf alpine species 1-2.4 inches tall. Leaves deeply lobed. Flowers: 0.5 inch diameter 1-6 yellow-gold flowers.	Coconino	10900+ ft	Alpine tundra	Designated critical habitat is San Francisco Peaks. Found above spruce-fir and pine forests on talus slopes
Sentry milk vetch	<i>Asragalus crenophyllax</i> var. <i>crenophyllax</i>	Endangered	< 1 inch high forming a mat 1-10 inches in diameter. Flowers: pale purple April to May	Coconino	>4,000 ft	Pinyon-juniper-cliffrose on a white layer of limestone.	Grows on Kaibab limestone with little soil in an unshaded opening in pinyon-juniper. Possibly more populations to be found on south rim of Grand Canyon and east rim of Marble Gorge.
Siler pin cushion cactus	<i>Pediocactus sileri</i>	Threatened	Small solitary or clustered cactus globose shaped about 5 inches tall and 3-4 inches in diameter. Flowers: yellow with maroon veins.	Coconino, Mohave	2,800-5,400 ft	Desert scrub transitional areas of Navajo, sagebrush and Mohave Deserts.	Grows on gypsiferous clay and sandy soils of Moenkopi formation.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Southwestern willow flycatcher	<i>Empidonax traillii eximius</i>	Endangered	Small passerine (about 6 inches) grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	<8500 ft	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Migratory riparian-obligate species that occupies breeding habitat from late April to September. Distribution within its range is restricted to riparian corridors. Difficult to distinguish from other members of the <i>Empidonax</i> complex by sight alone. Training seminar required for those conducting flycatcher surveys. Critical habitat was proposed on October 12, 2004 (50 CFR 60706, October 12, 2004) and can be viewed at <a href="http://lanzones.fws.gov">http://lanzones.fws.gov</a> . In Arizona there are critical habitat segments proposed in Apache, Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Yavapai, and Yuma counties.
Welsh's milkweed	<i>Asclepias welshii</i>	Threatened	Milkweed family ( <i>Asclepiadaceae</i> ), rhizomatous, herbaceous perennial, 10-40 inches tall with large oval leaves. Flowers: cream colored, rose tinged in center.	Coconino	VARIES	Open stabilized desert scrub dunes and lee side of active dunes.	Designated critical habitat is in Ulah.
Gila chub	<i>Gila intermedia</i>	Proposed Endangered	Deep compressed body, flat head. Dark olive-gray color above, silver sides. Endemic to Gila River Basin.	Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	2000 - 3500 ft	Pools, springs, cienegas, and streams.	Multiple private landowners, including the Nature Conservancy, the Audubon Society, and others. Also Fort Huachuca. Species also found in Sonora, Mexico. Proposed critical habitat occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz and Yavapai counties.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Fiskeisen plains cactus	<i>Pediocactus peeblesianus</i> var. <i>fiskeiseniae</i>	Candidate	Very small (3 inches tall - 1.5 inches diameter) unbranched cactus that retreats into gravelly soils after flowering and fruiting. Tubercles form a spiral pattern around plant. Central spine 3/8 inch long. Flowers cream/yellow.	Coconino, Mohave	4,000-5,000 ft	Exposed layers of Kaibab limestone on canyon margins or hills of Navajoan Desert.	
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate	Medium-sized bird with a slender, long-tailed profile, slightly down-curved bill, which is blue-black with yellow on the lower half of the bill. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 6,500 ft	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	Listing was found warranted, but precluded as a distinct vertebrate population segment in the western U.S. on July 25, 2001. This finding indicates that the Service has sufficient information to list the bird, but other, higher priority listing actions prevent the Service from addressing the listing of the cuckoo at this time.
Arizona bugbane	<i>Cimicifuga arizonica</i>	Conservation Agreement	Perennial herb in the buttercup family up to 6-7 feet tall. Small white petal-less flowers appear in July-August. Fruit a follicle that splits open on one side as it dries.	Coconino, Gila	5,300-7,000 ft	Moist, loamy soil between coniferous and riparian ecotones.	Rich, fertile soils high in humus content, deep shade, and high humidity appears to be primary habitat requirements for this species. Conservation Agreement signed in June 1999.
Paradise (Kaibab) plains cactus	<i>Pediocactus paradinei</i>	Conservation Agreement	Small, green, globose cactus, usually less than 40 mm tall with half of its stem underground. Plant diameters can reach 60-80 mm. 4-6 spines per areole; flowers are 19-25 mm with cream to pale yellow petals and pink midrib.	Coconino	>4,500 ft	Pinyon-juniper woodland, and shrub/grassland	Conservation Agreement between the Service, Kaibab National Forest, and the Bureau of Land Management finalized in October 1998; signed in February 1998.





THE STATE OF ARIZONA  
**GAME AND FISH DEPARTMENT**

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DEPUTY DIRECTOR  
STEVE K. FERRELL



May 24, 2005

Mr. Devin Kennemore  
Environmental Consulting, LLC  
PO Box 231  
Rowe, NM 87562

Re: Special Status Species Information for Township 41 North, Range 8 East, Section 24 and Township 41 North, Range 9 East, Section 30; Proposed Page-LeChee Water Supply Project.

Dear Mr. Kennemore:

The Arizona Game and Fish Department (Department) has reviewed your request, dated February 1, 2005, regarding special status species information associated with the above-referenced project area. The Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachment have been documented as occurring in the project vicinity (3-mile buffer). In addition this project does not occur in the vicinity of any Proposed or Designated Critical Habitats.

The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

Making available this information does not substitute for the Department's review of project proposals, and should not decrease our opportunities to review and evaluate new project proposals and sites. The Department is also concerned about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The Department would appreciate the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the subject area, when specific details become available.

Mr. Devin Kennemore

May 24, 2005

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If you have any questions regarding this letter, please contact me at (602) 789-3619. General status information, county and watershed distribution lists and abstracts for some special status species are also available on our web site at <http://www.azgfd.gov/hdms>.

Sincerely,



Ginger L. Ritter

Heritage Data Management System, Data Specialist

SSS:glr

Attachment

cc: Rebecca Davidson, Project Evaluation Program Supervisor  
Rick Miller, Habitat Program Manager, Region II

AGFD # 02-04-05(01)

**Special Status Species within 3 Miles of T41N, R8E Sec. 24 and T41N, R8E Sec. 30**

NAME	COMMON NAME	ESA	USFS	BLM	STATE
<i>Catostomus latipinnis</i>	Flannelmouth Sucker	SC	S		

No Critical Habitats in project area. AGFD # 02-01-05(01). Proposed Page-LeChee Water Supply Project.

Arizona Game and Fish Department, Heritage Data Management System, May 24, 2005.

# Special Status Species in Arizona, listed alphabetically by watershed code, by taxon, by scientific name.

Updated April 2005

WATERSHED	TAXON	SCIENTIFIC NAME	COMMON NAME	ESA	BLM	USFS	STATE
1508030	FISH	Poeciliopsis occidentalis sonoriensis	Yaqui Topminnow	LE			WSC
14070006	AMPHIBIAN	Rana pipiens	Northern Leopard Frog			\$	WSC
14070006	BIRD	Empidonax traillii eximius	Southwestern Willow Flycatcher	LE		\$	WSC
14070006	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC		\$	WSC
14070006	FISH	Catostomus latipinnis	Flannelmouth Sucker	SC		\$	WSC
14070006	FISH	Gila cypha	Humpback Chub	LE			WSC
14070006	FISH	Xyrauchen texanus	Razorback Sucker	LE		\$	WSC
14070006	INVERTEBRATE	Oxytoma haydeni haydeni	Niobrara Ambersnail		\$	\$	
14070006	MAMMAL	Euderma maculatum	Spotted Bat	SC		\$	WSC
14070006	MAMMAL	Nyctinomops macrotis	Big Free-tailed Bat	SC		\$	
14070006	PLANT	Asclepias welschii	Welsh's Milkweed	LT			HS
14070006	PLANT	Carex specuicola	Navajo Sedge	LT			HS
14070007	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC		\$	WSC
14070007	FISH	Catostomus latipinnis	Flannelmouth Sucker	SC		\$	
14070007	FISH	Rhinichthys osculus	Speckled Dace	SC		\$	
14070007	PLANT	Asclepias welschii	Welsh's Milkweed	LT			HS
14070007	PLANT	Camissonia exilis	Slender Evening-primrose	SC		\$	SR
14070007	PLANT	Opuntia nicholii	Navajo Bridge Cactus				SR
14070007	PLANT	Pediocactus bradyi	Brady Pincushion Cactus	LE			HS
14070007	PLANT	Sclerocactus sileri	House Rock Fishhook Cactus				SR
14070007	PLANT	Talinum validulum	Tusayan Flame Flower	SC			SR
14080105	PLANT	Erigeron rhizomatus	Rhizome Fleabane	LT			
14080201	BIRD	Pica hudsonia	Black-billed Magpie				WSC
14080201	PLANT	Eremocrinum albomarginatum	Utah Solitaire Lily			\$	SR
14080201	PLANT	Puccinellia parishii	Parish Alkali Grass	SC			HS
14080204	AMPHIBIAN	Rana pipiens	Northern Leopard Frog			\$	WSC
14080204	BIRD	Athene curicularia hypugaea	Western Burrowing Owl	SC		\$	
14080204	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC		\$	WSC
14080204	BIRD	Pica hudsonia	Black-billed Magpie				WSC
14080204	BIRD	Sitrix occidentalis lucida	Mexican Spotted Owl	LT		\$	WSC
14080204	MAMMAL	Microtus mexicanus navaho	Navajo Mexican Vole	SC		\$	WSC
14080204	PLANT	Asclepias welschii	Welsh's Milkweed	LT			HS
14080204	PLANT	Carex chihuahuensis	A Sedge			\$	
14080204	PLANT	Carex specuicola	Navajo Sedge	LT			HS





# COOPERATIVE EXTENSION

*Bringing the University to You*

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## Fact Sheet FS-03-59

### **Measures to Prevent the Spread of Noxious and Invasive Weeds During Construction Activities**

Steven Siegel, Environmental Scientist  
Sierra Pacific Power Company

Susan Donaldson, Water Quality Education Specialist  
University of Nevada Cooperative Extension

Invasive weeds are plants that have been introduced into an environment outside of their native range, where they have few or no natural enemies to limit their spread. Invasive weeds affect us all—as homeowners, taxpayers, consumers, tourists, and land managers. Some invasive weeds are designated as noxious in Nevada state law, requiring control by the property owner or manager.

The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Permits for construction projects may now require that measures be incorporated to identify and manage these weeds.

Experience has demonstrated that prevention is the least expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:

- Educating workers about the importance of managing weeds on an ongoing basis;
- Properly identifying weed species;
- Avoiding or treating existing weed populations; and
- Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.

A search was conducted of Internet sites and published permit requirements that incorporate weed prevention measures to determine appropriate practices to prevent weed spread during projects involving land disturbance. These measures may not be applicable or appropriate for all projects, but the list below should contain at least a few useful measures for any project. The weed management process should include education, weed identification, avoidance or treatment and reclamation of bare or disturbed areas. Following the list of management practices, we have provided sample suggested language for inclusion in contracts for projects that may be impacted by weed invasion.

## **Construction and Property Maintenance**

1. Incorporate a strategy of integrated weed management into construction layout, design, and project alternatives evaluation.
2. Remove or treat seed sources and other viable reproducing plant parts that could be spread by construction disturbance or by passing vehicles or foot traffic.
3. Avoid moving weed-infested gravel, rock and other fill materials to relatively weed-free locations. Gravel and fill should come from weed-free sources. Inspect gravel pits and fill sources to identify weed-free sources.
4. Identify existing noxious weeds along access roads and control them before construction equipment moves into a relatively weed-free areas.
5. Clean off-road equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts before moving into relatively weed-free areas.
6. Minimize the removal of roadside vegetation during construction, maintenance and other ground-disturbing activities.
7. Use only certified weed-free straw and mulch for erosion control projects. Consider the use of weed-free fiber roll barriers or sediment logs.
8. Minimize contact with roadside sources of weed seed that could be transported to other areas.
9. Keep active road construction sites that are in relatively weed-free areas closed to vehicles that are not involved with construction.
10. Road maintenance programs should include monitoring and treatment for noxious weeds.
11. Provide training to management and workers on the identification of noxious weeds, the importance of noxious weed control and measures to minimize their spread.
12. Quickly treat individual plants or small infestations before they become established, produce seed or are able to spread..

## **Seeding and Planting**

1. Obtain soil components and mulches from weed-free sources.
2. Purchase and use only certified weed-free seed.
3. Reestablish vegetation on all bare ground (including areas denuded by fire) to minimize weed spread.
4. Ensure establishment and maintenance of vigorous, desirable vegetation to discourage weeds.
5. Minimize contact with sources of weed seed in areas not yet revegetated.
6. Monitor all seeded sites for weed infestation. Treat all weeds adjacent to newly seeded areas prior to planting and treat planted areas for weeds in the first growing season.
7. Mulch to minimize the amount of noxious weed seeds that will reach the soil surface and subsequently germinate.

## **Grazing and Livestock Management**

1. Refrain from grazing or moving cattle through populations of noxious weeds while they are setting seed or when fruit is ripened.

2. Purchase only weed-free hay and other feed.
3. Keep cattle and other livestock out of newly planted areas.
4. Employ rotational grazing and other management strategies that minimize soil disturbance.
5. Purge animals with weed-free feed for five days before moving them from infested to non-infested areas

### **General**

1. Identify and map noxious weed populations on lands that you own or manage. Provide mapping information using the protocol for your state's weed mapping efforts. Contact the Natural Resources Conservation Service, 775-784-5863 ext. 118, for Nevada's protocol.
2. Suppress fires that may impact native plant populations. Clean vehicles that may contribute to the spread of weeds during fire fighting activities.
3. Minimize soil disturbances caused by water, vehicle, and animal traffic in weed infested areas.
4. Minimize transport of weed seeds or reproductive weed parts by irrigation water.

### **Suggested Construction Contract Wording for Weed Prevention**

*Note: This section is provided as an example of language that can be included in construction contracts when appropriate to help prevent the spread of weeds. Nevada Revised Statutes Chapter 555 advises that the control of noxious weeds is the responsibility of every landowner or occupant. This suggested contract wording can be modified as needed to fit individual projects.*

Prior to any construction disturbance you will:

- Identify and map all noxious and invasive weed populations present in the project area
- Treat or contain any weed populations that may be impacted or disturbed by construction activity
- Flag all weed populations to be avoided
- Provide training to construction workers and equipment operators on the identification of weeds to be avoided
- Certify that all construction material sources used for supplies of sand, gravel, rock and mulch are weed-free prior to obtaining or transporting any material from them
- Obtain and use only certified weed-free straw or use fiber roll logs for sediment containment
- Wash and inspect all vehicles for weed seeds and plant parts prior to bringing them onto the job site
- Install stormwater Best Management Practices to prevent erosion of the job site and the potential transport of weedy material onto or off of the job site

During construction you will:

- Minimize ground disturbance and vegetation removal as much as possible and practical

- Wash, or using an air compressor, blow clean all vehicles (including tires and undercarriage) that may have entered weed-infested areas prior to entering uninfested areas of the job site
- Restrict vehicles or other traffic that may transport weed seeds or plant material from entering the job site unless they are first washed and inspected

After construction is complete you or the property owner will:

- Revegetate or otherwise prevent the establishment of weeds in all areas of the job site through a program of monitoring and post-construction weed treatment for the life of the project
- Revegetate using soil components and mulches obtained from non-weed infested sources
- Utilize seed and other plant materials that has been checked and certified as noxious weed-free and that has a weed content of 0.05 percent or less
- Revegetate using plant materials that have a high likelihood of survival
- Maintain all planted material and native vegetation located on the project site for the life of the project

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## References:

- California Bureau of Land Management. 2003. Weed Management and Prevention Guidelines for Public Lands. <http://www.ca.blm.gov/pa/weeds/weedprevent.html>
- Center for Invasive Plant Management. 2003. Guidelines for Coordinated Weed Management of Noxious Weeds: Development of Weed Management Areas, Section IV: Prevention and Early Detection and Appendix 1: Sample Contracts, Agreements and Memorandums of Understanding. <http://www.weedcenter.org/management/guidelines/tableofcontents.html>
- Colorado Bureau of Land Management. 1991. Prototype Weed Prevention Measures. <http://www.co.blm.gov/botany/lolostip.htm>
- Lewis County Noxious Weed Control Board. 2003. Weed Prevention. Washington State University Cooperative Extension. Lewis County, Washington.
- Sheley, Roger and Kim Goodwin. 2000. Plan Now For Noxious Weed Invasion. Montana State University.
- Sheley, R., M. Manoukian and G. Marks. 2000. Preventing Noxious Weed Invasion. Pp. 69-72 in: Biology and Management of Noxious Rangeland Weeds, ed. R.L. Sheley and J.K. Petroff. Oregon State University Press, Corvallis, Oregon.
- Trainor, Meghan and A.J. Bussan. 2000. Integrated Weed Management; Preventing Weed Invasion. Montana State University Extension.

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## For more information, contact:

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Nevada Department of Agriculture  
350 Capitol Hill, Reno, NV 89502  
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<b>GLCA Native Plant List</b>									
<b>LATIN NAME</b>	<b>Common Name</b>	<b>Growth Form</b>	<b>Mature Height (feet)</b>	<b>Flower/Fruit Color</b>	<b>Origin</b>	<b>Plants Available</b>	<b>Seed Available</b>		
<i>Abronia fragrans</i>	Sand Verbena	Forb	1	White	GLCA	X	X		
<i>Achillea millefolium</i>	Yarrow	Forb	1	White	Colorado Plateau	X			
<i>Agastache cana</i>	Wild Hyssop	Forb	4	Red/Pink	Madrean	X	X		
	Licorice								
<i>Agastache rupestris</i>	Hummingbird Mint	Forb	4	Red/Orange	Madrean	X	X		
<i>Agave utahensis</i>	Utah Agave	Agave	10	Yellow/White	GLCA	X			
<i>Allionia incarnata</i>	Trailing Allionia	Forb	1	Pink	GLCA	X			
<i>Amelancier utahensis</i>	Utah Serviceberry	Shrub	15	White	GLCA	X	X		
<i>Andropogon gerardii</i>	Big Bluestem	Grass	5	red fall foliage	GLCA	X	X		
<i>Andropogon glomeratus</i>	Bushy Bluestem	Grass	5	red fall foliage	GLCA	X	X		
<i>Antennaria parviflora</i>	Pussytoes	Forb	1	none	Rocky Mountains	X			
<i>Aquilegia chrysantha</i>	Golden Columbine	Forb	2	Yellow	Sonoran	X	X		
<i>Aquilegia formosa</i>	Red Columbine	Forb	2	Red	Madrean	X	X		
	Southwestern Red Columbine								
<i>Aquilegia triternata</i>	Columbine	Forb	2	Red/Yellow	Madrean	X	X		
<i>Aristida purpurea</i>	Three Awn	Grass	1	none	GLCA	X	X		
<i>Artemisa frigida</i>	Fringed Sagebrush	Shrub	3	none	GLCA	X			
<i>Artemisia filifolia</i>	Sand Sagebrush	Shrub	5	none	GLCA	X			
<i>Artemisia ludoviciana</i>	False tarragon	Subshrub	3	none	GLCA	X			
<i>Artemisia tridentata</i>	Big Sagebrush	Shrub	6	none	GLCA	X	X		
<i>Asclepias asperula</i>	Spider Milkweed	Forb	2	White/Red	GLCA	X	X		
<i>Asclepias speciosa</i>	Showy Milkweed	Forb	3	Pink	GLCA	X	X		
<i>Atriplex canescens</i>	Four-wing Saltbush	Shrub	5	Pink	GLCA	X	X		
<i>Atriplex confertifolia</i>	Shadscale	Shrub	2	Pink	GLCA	X			
<i>Bouteloua curtipendula</i>	Sideoats Grama	Grass	2	none	GLCA	X	X		
<i>Bouteloua gracilis</i>	Blue Grama	Grass	1	none	GLCA	X	X		

<i>Callirhoe involucrata</i>	Poppy Mallow	Forb	1	Pink/Red	Great Plains	X	X
<i>Calylophus hartwegii</i>	Fendler's Sundrops	Forb	1	Yellow	Great Plains	X	X
<i>Calylophus lavandulifolius</i>	Sundrops	Forb	1	Yellow	GLCA	X	X
<i>Calylophus serrulatus</i>	Bush Sundrops	Forb	1	Yellow	Great Plains	X	X
<i>Ceratoides lanata</i>	Winterfat	Shrub	4	White	GLCA	X	
<i>Cercocarpus intricatus</i>	Slickrock Mountain Mahogany	Shrub	3	White	GLCA	X	
<i>Cercocarpus ledifolius</i>	Curl-leaf Mountain Mahogany	Tree	15	White	Colorado Plateau	X	
<i>Cercocarpus montanus</i>	Birch-leaf Mountain Mahogany	Tree	10	White	GLCA	X	
<i>Chamaebatiaria millefolium</i>	Fernbush	Shrub	6	White	Colorado Plateau	X	
<i>Chrysopsis villosa</i>	Golden Aster	Forb	2	Yellow	GLCA	X	
<i>Chrysothamnus nauseosus</i>	Chamisa/Rabbitbrush	Shrub	8	Yellow	GLCA	X	X
<i>Chylopsis linearis</i>	Desert Willow	Shrub	15	Pink	Sonoran	X	
<i>Clematis ligusticifolia</i>	Virgin's Bower	Vine	15	White	GLCA	X	
<i>Cleome serrulata</i>	Rocky Mountain Beepoint	Annual	3	Purple	GLCA	X	
<i>Cornus stolonifera</i>	Dogwood	Shrub	6	White	GLCA	X	
<i>Cupressus arizonica</i>	Arizona Cypress	Tree	50+	cones	Mogollon Rim	X	
<i>Datura meteloides</i>	Sacred Datura	Annual	2	White	GLCA	X	X
<i>Dithyrea wislizenii</i>	Spectacle Pod	Forb	1	White	GLCA	X	
<i>Echinacea purpurea</i>	Purple Coneflower	Forb	2	Purple	Great Plains	X	
<i>Echinocactus polyacanthus</i>	Cottontop	Cactus	4	Yellow	GLCA	?	
<i>Echinocereus engelmannii</i>	Engelmann's Hedgehog	Cactus	1	Pink/Purple	GLCA	X	
<i>Echinocereus triglochidiatus</i>	Claret Cup	Cactus	1	Red/Pink	GLCA	X	
<i>Ephedra viridis</i>	Green Mormon Tea	Shrub	3	Yellow	GLCA	X	
<i>Eriogonum corymbosum</i>	Buckwheat Bush	Shrub	4	White/Yellow	GLCA	X	X
<i>Eriogonum umbellatum</i>	Sulfur Buckwheat	Forb	1	Yellow	Rocky Mountains	X	
<i>Fallugia paradoxa</i>	Apache Plume	Shrub	10	White	GLCA	X	

<i>Fendlera rupicola</i>	Cliff Fendlerbush	Shrub	10	White	GLCA	X	
<i>Forestiera neomexicana</i>	New Mexico Olive/Privet	Shrub	25	Purple	GLCA	X	
<i>Fraxinus anomala</i>	Single-leaf Ash	Tree	15	none	GLCA	?	
<i>Fraxinus velutina</i>	Arizona Ash	Tree	50+	samaras	Sonoran	X	
<i>Gaillardia pinnatifida</i>	Blanketflower	Forb	1	Red/Yellow	GLCA	X	X
<i>Gilia aggregata</i>	Skyrocket	Forb	3	Red	GLCA	X	X
<i>Gleditsia triacanthos</i>	Honey Locust	Tree	50+	Yellow	Southeast US	X	
<i>Gutierrezia sarothrae</i>	Snakeweed	Subshrub	2	Yellow	GLCA	X	
<i>Helianthus maximiliani</i>	Maximilian's Sunflower	Forb	8	Yellow	Great Plains	X	X
<i>Heliotropeum concinnum</i>	Sand Heliotrope	Annual	1	White	GLCA	X	X
<i>Hilaria jamesii</i>	Galleta Grass	Grass	1	none	GLCA	X	X
<i>Holodiscus dumosus</i>	Cliff Spiraea	Shrub	4	White	GLCA	X	
<i>Hymenopappus argentea</i>	Perky Sue	Forb	1	Yellow	Great Plains	X	
<i>Juniperus osteosperma</i>	Utah Juniper	Tree	25	Purple/Blue	GLCA	?	
<i>Lersquerella fendleri</i>	Fendler Bladderpod	Forb	1	Yellow	GLCA	X	
<i>Liatis spicata</i>	Spike Gayflower	Forb	2	Pink	Great Plains	X	X
<i>Linum lewisii</i>	Blue Flax	Forb	1	Blue	GLCA	X	X
<i>Lupinus argenteus</i>	Silver Lupine	Forb	2	Blue	GLCA	X	
<i>Mahonia repens</i>	Creeping Mahonia/Oregon Grape	Shrub	1	Yellow	GLCA	X	
<i>Mentzelia decapetala</i>	Blazing Star	Forb	1	Yellow	Rocky Mountains	X	X
<i>Mirabilis multiflora</i>	Showy Four O'Clock	Forb	1	Pink	GLCA	X	X
<i>Nama hispidum</i>	Purple Nama	Annual	1	Purple/Pink	GLCA	X	X
<i>Oenothera caespitosa</i>	Caespitose Evening Primrose	Forb	1	White	GLCA	X	X
<i>Oenothera missouriensis</i>	Missouri Evening Primrose	Forb	1	Yellow	Great Plains	X	X

<i>Oenothera pallida</i>	Pale Evening Primrose	Forb	1	White	GLCA	X	X
<i>Opuntia erinacea</i>	Plains/Grizzlie Bear Cactus	Cactus	2	Pink	GLCA	?	
<i>Opuntia phaeacantha</i>	Beavertail	Cactus	2	Yellow	GLCA	?	
<i>Oryzopsis/Stipa hymenoides</i>	Indian Ricegrass	Grass	2	none	GLCA	X	X
<i>Parthenocissus vitacea</i>	Thicket Creeper	Vine	25	purple	GLCA	X	
<i>Penstemon ambiguus</i>	Sand Penstemon	Forb	2	Pink	GLCA	X	X
<i>Penstemon barbatus</i>	Scarlet Bugler	Forb	2	Red	GLCA	X	X
<i>Penstemon eatonii</i>	Firecracker Penstemon	Forb	3	Red	GLCA	X	X
<i>Penstemon palmeri</i>	Palmer Penstemon	Forb	5	Pink	GLCA	X	X
<i>Penstemon secundiflorus</i>	Sidebells Penstemon	Forb	2	Red	New Mexico	X	X
<i>Penstemon virgatus</i>	Wandbloom Virgatus	Forb	3	Blue	Rocky Mountains	X	X
<i>Pinus edulis</i>	Pinyon Pine	Tree	25	none	GLCA	X	
<i>Platanus wrightii</i>	Arizona Sycamore	Tree	50+	pale	Sonoran/Mogollon Rim	X	
<i>Populus fremontii</i>	Fremont Cottonwood	Tree	50+	none	GLCA	X	
<i>Prunus virginiana</i>	Chokecherry	Shrub	15	White	GLCA	X	
<i>Pseudotsuga menziesii</i>	Douglas Fir	Tree	50+	cones	GLCA	X	
<i>Psilostrophe tagetina</i>	Paperflower	Forb	2	Yellow	Colorado Plateau	X	X
<i>Psoralea argemone</i>	Indigobush	Shrub	3	Purple	GLCA	X	
<i>Psoralea argemone</i>	Indigobush	Shrub	4	Purple	GLCA	X	
<i>Ptelea trifoliata</i>	Hoptree	Tree	15	Green	GLCA	X	
<i>Purshia mexicana/stansburiana</i>	Cliffrose	Shrub	12	Yellow	GLCA	X	
<i>Purshia tridentata</i>	Bitterbrush	Shrub	3	Yellow	GLCA	X	
<i>Quercus gambelii</i>	Gambel's Oak	Tree	50+	acorns	GLCA	X	
<i>Ratibida columnifera</i>	Coneflower	Forb	4	Red/Yellow	Rocky Mountains	X	X
<i>Rhus glabra</i>	Smooth Sumac	Shrub	20	Yellow	GLCA	X	

<i>Rhus trilobata</i>	Three-leaf Sumac	Shrub	10	Yellow	GLCA	X	
<i>Rosa woodsii</i>	Wild Rose	Shrub	4	Red/Pink	GLCA	X	
<i>Rubus neomexicanus</i>	New Mexico Raspberry	Shrub	5	White	GLCA	?	
<i>Rudbeckia hirta</i>	Black-eyed Susan	Forb	2	Yellow	Great Plains	X	X
<i>Salix exigua</i>	Coyote Willow	Shrub	15	none	GLCA	X	
<i>Salix gooddingii</i>	Goodding's Willow	Tree	50+	none	GLCA	X	
<i>Schizymenium scoparium</i>	Little Bluestem	Grass	3	red fall foliage	GLCA	X	X
<i>Senecio longilobus</i>	Threadleaf Groundsel	Forb	2	Yellow	Great Plains	X	X
<i>Solidago canadensis</i>	Canadian Goldenrod	Forb	6	Yellow	GLCA	X	X
<i>Solidago sparsiflorus</i>	Alcove Goldenrod	Forb	3	Yellow	GLCA	X	
<i>Sorghastrum nutans</i>	Indiangrass	Grass	5	red fall foliage	GLCA	X	X
<i>Sphaeroclea grossularifolia</i>	Globemallow	Forb	1	Orange	GLCA	X	
<i>Sporobolus airoides</i>	Alkali Sacaton	Grass	3	none	GLCA	X	X
<i>Sporobolus cryptandrus</i>	Sand Dropseed	Grass	3	none	GLCA	X	X
<i>Stanleya pinnata</i>	Prince's Plume	Forb	7	Yellow	GLCA	X	X
<i>Stipa comata</i>	Needle-and-Thread	Grass	4	none	GLCA	X	X
<i>Tradescantia occidentalis</i>	Spiderwort	Forb	1	Blue	GLCA	X	
<i>Verbena macdougalii</i>	McDougal's Verbena	Forb	2	Pink	Colorado Plateau	X	
<i>Viguiera multiflora</i>	Showy Goldeneye	Forb	2	Yellow	Colorado Plateau	X	X
<i>Wyethia scabra</i>	Rough Mule's Ears	Forb	2	Yellow	GLCA	X	X
<i>Yucca angustissima</i>	Narrowleaf Yucca	Yucca	6	White	GLCA	?	
<i>Yucca baccata</i>	Broadleaf Yucca	Yucca	6	White	Colorado Plateau	X	
<i>Zauchneria arizonica</i>	Arizona Hummingbird Trumpet	Forb	1	Red	Madrean	X	X

[INSERT SHPO CORRESPONDENCE AND CONCURRENCE LETTER HERE]

# **City Of Page**

## **Page-LeChee Water Supply Project**

The water supply system for the City of Page and the LeChee Chapter of the Navajo Nation is currently vulnerable to interruption by any failure of the pipeline from the Glen Canyon Dam to the water treatment plant in the city. Failure of this pipeline could take anywhere from several days to weeks to repair depending on where the failure occurred. The City can only store approximately one day's supply of water with its current pumping capacity and storage tanks. To address this problem, the City of Page is proposing to construct an alternate supply line from a location above the dam in the Chains area in the Glen Canyon National Recreation Area. The new supply line would consist of a pumping plant on the canyon rim, six boreholes from the canyon rim to an elevation deep within the reservoir, and a pipeline that primarily follows the Chains area access road and US 89 to a point where the new line will intersect the existing line.

### **Environmental Assessment**

Before the National Park Service (NPS) can grant the necessary right-of-way to the City of Page to construct and operate the new alternate water supply line, the NPS must first complete the requirements of the National Environmental Policy Act (NEPA). To meet these requirements, an Environmental Assessment (EA) will be prepared to determine if the project could potentially result in any significant impacts to the natural or human environment. If no potentially significant impacts are identified during the preparation of the EA, then the NPS will issue a Finding of No Significant Impacts (FONSI). When the FONSI is issued, the NPS will also issue a right-of-way permit to the City of Page for the project.

### **Public Scoping Period and Meeting**

In order to ensure that all relevant issues are considered in the EA, the NPS will be accepting comments and concerns that are specifically related to the proposed project from the public for 30 days. This 30-day public scoping period will begin on December 1, 2004 and end on December 30, 2004. During this period, all comments or concerns should be written and mailed to: **Mr. Devin Kennemore, C<sup>2</sup> Environmental Consulting, LLC, PO Box 231, Rowe, NM 87562-0231**; or you may email your comments or concerns to Mr. Kennemore at: **[devin.kennemore@csquaredllc.com](mailto:devin.kennemore@csquaredllc.com)**. The public is invited to attend a public scoping meeting at 7:00 PM on Thursday, January 6, 2005, at the Page City Hall. A presentation will be made about the proposed project at the beginning of this meeting. Afterwards, representatives from the City of Page and the NPS will be available to discuss any comments or concerns you may have about the project.

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National Park Service  
U.S. Department of the Interior

Glen Canyon National  
Recreation Area

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P. O. Box 1507  
Page, Arizona 86040

Barbara Wilson  
928-608-6260

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## GLEN CANYON – NEWS RELEASE - DRAFT

Contacts:

Devin Kennemore [Devin.kennemore@csquaredllc.com](mailto:Devin.kennemore@csquaredllc.com)

City of Page \_\_\_\_\_

### GLEN CANYON NATIONAL RECREATION AREA (GLCA) ANNOUNCES OPPORTUNITY FOR PUBLIC INPUT FOR CITY OF PAGE-LECHEE WATER SUPPLY PROJECT

Glen Canyon National Recreation Area has initiated work on an environmental assessment and is seeking public input for the proposed City of Page-LeChee water supply project to determine if the project could potentially result in any significant impacts to the natural or human environment.

This public scoping opportunity begins December 1, 2004 and ends on December 30, 2004. The public is invited to identify any issues or concerns they may have with the proposed project. During this period, all comments or concerns should be written and mailed to: Mr. Devin Kennemore, C<sup>2</sup> Environmental Consulting, LLC, PO Box 231, Rowe, NM 87562-0231; or email your comments or concerns to Mr. Kennemore at: [devin.kennemore@csquaredllc.com](mailto:devin.kennemore@csquaredllc.com)

The purpose of the project is to construct an alternate supply line from a location above the dam in the Chains area in the Glen Canyon National Recreation Area. The new supply line would consist of a pumping plant on the canyon rim, six boreholes from the canyon rim to an elevation deep within the reservoir, and a pipeline that primarily follows the Chains area access road and US 89 to a point where the new line will intersect the existing line.

The water supply system for the City of Page and the LeChee Chapter of the Navajo Nation is currently vulnerable to interruption by any failure of the pipeline from the Glen Canyon Dam to the water treatment plant in the city. Failure of this pipeline could take anywhere from several days to weeks to repair depending on where the failure occurred. The City can only store approximately one day's supply of water with its current pumping capacity and storage tanks.

The public is also invited to attend a public scoping meeting at 7:00 PM on Thursday, January 6, 2005, at the Page City Hall. A presentation will be made about the proposed project at the beginning of this meeting. Afterwards, representatives from the City of Page and the NPS will be available to discuss any comments or concerns you may have about the project.

- NPS -

GLCA 2004-33

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# United States Department of the Interior

NATIONAL PARK SERVICE  
Geologic Resources Division  
P.O. Box 25287  
Denver, CO 80225

TRANSMITTED VIA ELECTRONIC MAIL - NO HARDCOPY TO FOLLOW

L2360

May 30, 2006

Memorandum

To: Superintendent, Glen Canyon National Recreation Area

From: Jim Woods, Chief, Geoscience and Restoration Branch  
Geologic Resources Division

Subject: Review of Concept Design Study for a Water Intake on Cliffside above Lake Powell, Glen Canyon National Recreation Area, Arizona

## SUMMARY

In April 2006, Barbara Wilson, Environmental Specialist, Glen Canyon National Recreation Area (GLCA) contacted the Geologic Resources Division (GRD) to request a review of a design study for constructing a water intake for the City of Page. The water intake would be located near a cliff above Lake Powell and adjacent to Glen Canyon Dam within the boundary of GLCA. The dam is managed by the Bureau of Reclamation (BOR). The City of Page has requested a rights-of-way across GLCA to construct the intake. The park has requested the City of Page to prepare an environmental assessment (EA) including the subject concept design study to analyze the geologic stability of the proposed site to support the project. The City of Page contracted the BOR to prepare the subject concept design study which includes a brief summary of field work completed, core photographs, geologic logs, and a visual inspection of the site for surface expressions of rock jointing.

Deanna Greco, Geologist, of my staff reviewed the concept design study. Based on Deanna's review, GRD finds the study is insufficient in determining the geologic stability of the proposed construction site as set forth below. We also provide recommendations for how the inadequacies of the geotechnical analysis can be addressed in a revised concept design study.

## DISCUSSION

Pursuant to the contract between the City of Page and BOR, the Provo Field Office of the BOR drilled a 415 foot boring in November 2005, and the core samples were boxed and stored at a BOR warehouse in Page, Arizona. A geologist from the BOR then logged the borehole cores and prepared a brief summary of field work completed on the site in December 2005.

After reviewing the report, GRD staff concludes that the study was inadequate and more details are required to determine whether this site would be suitable to support the facility. The March 2006 report provides information such as core photographs, a summary of the core examination, driller logs, and a surface geology inspection. The report fails to provide any interpretation of the findings. Particularly bothersome are statements in Section 1.2 (Examine Core) of the report. The lack of a geologist being present during the drilling to make onsite interpretations of drill data is one concern. Since a geologist was not present, the samples were

mechanically broken into smaller pieces so that they would fit into the core boxes for storage, thus making any determinations about natural fractures very difficult at best.

The surface geology inspection was a basic field inventory of joint and fractures with surface expressions. Since the core data did not adequately determine subsurface expressions, the borehole data and surface inspection cannot be adequately correlated. Without this information a factor of safety for the facility cannot be determined.

## **RECOMMENDATIONS**

GRD recommends the following steps be taken to adequately address concerns about the geologic stability of the site:

1. Using the already acquired surface inspection data, determine the spatial relationships between the locations and orientations of the fractures.
2. Perform a stability analysis of the slopes potentially affected by the site. Many computer based programs are currently available for analyzing the stability of slopes. A three dimensional wedge analysis and the shear strength along the joint interfaces can be determined or estimated. A range of strength parameters as well as different geometric configurations should be considered for the evaluation.
3. From the stability analysis, the factor of safety for rock slopes can be determined.

If you have any questions regarding these findings, or if you need further assistance on this issue, please contact Deanna Greco at 303.969.2351, or via email at [deanna\\_greco@nps.gov](mailto:deanna_greco@nps.gov).

cc:

GLCA: Barbara Wilson



*National Park Service, Natural Resource Program Center (NRPC)  
Geologic Resources Division (GRD), Geoscience and Restoration Branch (GRB)  
Denver, Colorado*

TRANSMITTED VIA ELECTRONIC MAIL - NO HARDCOPY TO FOLLOW

*Memorandum*

*January 22, 2008*

To: Barbara Wilson, Environmental Specialist, Glen Canyon National Recreation Area

From: Deanna Greco, Geologist, Geoscience and Restoration Branch, Geologic Resources Division

Subject: Review of Geology Report: Lake Powell Reservoir-Side Pumping Plant Site, Glen Canyon National Recreation Area, Arizona

## **SUMMARY**

In April 2006, Barbara Wilson, Environmental Specialist, GLCA contacted the Geologic Resources Division to request a review of a design study for a water intake for the City of Page. The water intake would be located on the cliff side above Lake Powell, adjacent to Glen Canyon Dam and within the boundary of Glen Canyon National Recreation Area (GLCA). The Bureau of Reclamation (BOR) manages the dam while the National Park Service manages the adjacent land. The City of Page has requested a right-of-way from GLCA to build the intake. As part of the right-of-way process, the park requested an Environmental Assessment of the project and an analysis of the geologic stability site. The City of Page contracted the Bureau of Reclamation (BOR) to provide the geologic analysis.

The National Park Service, Geologic Resources Division (GRD) found the BOR study insufficient at determining the geologic stability of the site. The study submitted included a brief summary of completed field work, photographs of drill core logs, geologic logs and a stability analysis based on a visual inspection of the site for surface expressions of rock jointing. A GRD memo from May 2006, discussed details about the inadequacies of the geotechnical analysis and provided recommendations for how these issues could be addressed.

In response to these concerns, the Bureau of Reclamation agreed to expand the investigation at the proposed project site. In December 2007, the Bureau of Reclamation provided GRD with a Geology Report for the Lake Powell Reservoir-Side Pumping Plant Site. The GRD review found the report to provide a more in depth geotechnical analysis than the previous submittal. The report found that the potential for a large block failure in the area of the proposed pump station and intake structure to be low. In addition to these results, the report proposes the use of rock bolts on the canyon wall. This raises another issue that the park needs to evaluate and address.

## **DISCUSSION**

The Bureau of Reclamation conducted an appraisal study in June of 2004 for a water intake and pumping plant for the City of Page. The proposed water intake structures would be within the boundaries of GLCA. The City of Page requested a right-of-way across GLCA to construct the intake and in response to the request, the National Park Service (NPS) required that the City of Page prepare an environmental assessment (EA) that was to include an analysis of the geologic stability of the proposed site. The city of Page then contracted the BOR to perform the geologic stability analysis and in November 2005 drill core samples collected, boxed and then stored at a BOR warehouse in Page, Arizona. In December 2005, a Geologist from the BOR logged the borehole cores and prepared a brief summary of field work completed on the site. GLCA then requested the assistance of the National Park Service, Geologic Resources Division to review the geologic analysis for the site. After reviewing the report, GRD staff concluded that the study was inadequate and more details were required to determine whether this site would be suitable to support the facility.

The May 2006 GRD memo identified 3 recommendations for further study to adequately address concerns about the stability of the site. GRD advised that the spatial relationships between the locations and orientations of the fractures (joints) should be determined. The 2007 Geology Report addresses these recommendations and concludes that only one large joint, Joint A projects for a significant length and toward the canyon rim. No other joints intersect Joint A, therefore, it appears that the likelihood of the project inducing a block failure is low. The report indicates there is no evidence that the water intake will compromise the stability of the canyon rim.

Navajo sandstone comprises the rock of the canyon walls. By nature, Navajo sandstone can be quite susceptible to localized rock fall. The 2007 Geology Report recommended that an evaluation of impacts on the project from canyon wall rock fall be performed. It goes on to suggest that if a determination is made that rock fall will impact the project, rock bolting of the canyon rim should be performed as needed during construction.

## **RECOMMENDATIONS**

Based on the findings in the Geology Report, it is recommended that the following steps be considered as part of an evaluation of the project:

- ☐ ☐ ☐ ☐ Although it was determined that no other joints intersect Joint A, in the event that a right of way is granted and the project proceeds, additional evaluation is recommended during the design phase.
- ☐ ☐ ☐ ☐ The park should consider the visual as well as the resource impacts of rock bolting. Rock bolts would be a conspicuous addition to the canyon walls. Painting rock bolts to match the color of the rock makes them less obvious, but staining and unnatural patterns from drilling will still make the bolts stand out. An assessment of the affects of placing bolts on the canyon walls is recommended if rock bolting is part of the project.

For further assistance with this issue, please contact Deanna Greco at 303.969.2351, or via email at [deanna\\_greco@nps.gov](mailto:deanna_greco@nps.gov).

cc:

GLCA – Barbara Wilson

GRD – Vimont, Wood

PUBLIC COMMENT EMAIL No. 1

From: <rat454bigblock@direcway.com>  
To: <devin.kennemore@csquaredllc.com>  
Subject: Page-LeChee Water Supply Project  
Date: Sunday, December 05, 2004 1:08 PM

Sir,

Concerning the Page-LeChee Water Supply Project, I am requesting that the National Park Service and the city of Page ensure any construction of buildings, shelters, coverings, etc., related in any manner whatsoever to the pumping plant take place in such a manner as to not be viewed from the lake when looking up from the water toward the rim.

This will ensure avoiding the same mistake made for the pumping station related to the Navajo Generating Station. This building can be viewed from the lake and is an absolute eyesore.

The viewshed must be protected!

PUBLIC COMMENT EMAIL No. 2

From: "HANSEN MARK L" <mlhansen@srpnet.com>  
To: <devin.kennemore@csquaredllc.com>  
Subject: CITY OF PAGE-LECHEE WATER SUPPLY PROJECT  
Date: Monday, December 06, 2004 10:24 AM

Millions of dollars of public money could be saved if a pump were placed on the downstream side of the dam and a pipe run up through the existing access tunnel. It is my understanding that the dam is the division between the upper basin and lower basin for water use and there might be regulations that prevent water being taken from the downstream side of the dam. For the amount of money that could be saved, our Congressmen should be contacted to see if a change to the regulations could be made to allow a different point for the extraction of water from the same water source.

Mark Hansen (928) 645-xxxx